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Tax evasion, financial development and inflation: Theory and empirical evidence ☆

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ABSTRACT

Using a standard overlapping generations monetary production economy, faced with endogenously determined tax evasion by heterogeneous agents in the economy, we provide a theoretical model that indicates that both a lower (higher) level of financial development and a higher (lower) level of inflation leads to a bigger (smaller) shadow economy. These findings are empirically tested within a panel econometric framework, using data collected for 150 countries over the period 1980–2009 to enable a broad generalisation of the results. The results support the developed theoretical model, even after having accounted for the differences in the levels of economic development, the level of institutional quality that includes different tax regimes and regulatory frameworks, central bank participation in the economy as well as different macroeconomic policies.

1. Introduction

"To think of shadows is a serious thing." – Victor Hugo[1]

Recent empirical evidence provided by Bose et al. (2012) show that an improvement in the development of the banking sector is associated with a smaller shadow economy. The findings of Bose et al. (2012) corroborate indicative theoretical results reported by Blackburn et al. (2010) that a less-developed financial sector corresponds to the observance of a bigger shadow economy. Blackburn et al. (2010) studied the relationship between the underground economy and financial development in a model of tax evasion and bank intermediation. In their model, agents with heterogeneous skills seek loans in order to undertake risky investment projects, with asymmetric information between borrowers and lenders implying a menu of loan contracts that induce self-selection in a separating equilibrium. Given these contracts, agents choose how much of their income to declare by trading off their incentives to offer collateral against their disincentives to comply with tax obligations. The main implication of the analysis is that the marginal net benefit of income disclosure increases with the level of financial development. Thus, as with the empirical observation made by Bose et al. (2012), the paper shows that the lower is the stage of such development, the higher is the incidence of tax evasion and the greater is the size of the underground economy. Furthermore, Gupta and Ziramba (2010) using an overlapping generations (OLG) monetary endogenous growth model, whereby government transfers affect young-age income, show that inflation – besides the usual suspects like fiscal policy (Dabla-Norris and Feltenstein, 2005), penalty rates (Schneider, 1994), probability of being detected (Schneider and Enste, 2000) and degree of corruption (Cerqueti and Coppier, 2011) – affect the degree of tax evasion. Specifically, they indicate a negative relationship between inflation and the fraction of income reported.

Against this backdrop, the objectives of this paper are twofold: First, using a monetary OLG stochastic production economy, characterised by endogenous tax evasion, we provide a novel theoretical explanation that both lower financial sector development as well as higher inflation (money growth rate) leads to a bigger shadow economy, and; second, with the theoretical analysis presented yielding an empirically-testable equation (albeit not in the sense of a one-to-one correspondence) relating tax evasion with financial

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[1] Les Misérables (Hugo,1862).

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development and inflation, we test the validity of the theoretical implications using a panel of 150 countries for the period 1980–2009, based on a newly-constructed dataset of shadow economy estimates by Elgin and Öztunali (2012).[2] To the best of our knowledge, this paper is not only the first attempt at providing a simultaneous theoretical explanation of how both (lower) financial development and (higher) inflation may lead to (higher) tax evasion and therefore, to the observance of a (bigger) shadow economy,[3] but also empirically corroborate the theoretical claims.

At this stage, it is important to put into context the importance of our theoretical result that monetary policies (money growth rate and cash-reserve requirements held by financial intermediaries[4]) could also affect the level of tax evasion. Gupta (2008) and Gupta and Ziramba (2009) point out that studies (such as Roubini and Sala-i-Martin (1995), Gupta (2005) and Holman and Neanidis (2006)) which analyse optimal (growth- and/or welfare-maximising) mix of fiscal and monetary policy suffer from the Lucas (1976) critique, by treating tax evasion exogenously. Gupta (2008) and Gupta and Ziramba (2009) reached such conclusions by developing growth models with tax evasion being a behavioural decision (as also pointed out theoretically by Atolia (2003), Chen (2003) and Arana (2004)) to indicate that the level of tax evasion is dependant on the tax and penalty rates. Given this, following a change in the degree of tax evasion, the tax and the penalty rates are not available to the policy maker to respond optimally to such a change, since clearly changes in these policy variables would affect the level of tax evasion further. Thus, Gupta (2008) and Gupta and Ziramba (2009) studies optimal monetary policy response following changes in the degree of tax evasion emanating from not only movements in the structural parameters of the model, but also variations in the tax and penalty rates.[5] Now, with tax evasion also affected by monetary policy, it would imply that the studies of Gupta (2008) and Gupta and Ziramba (2009) is not immune to the Lucas (1976) critique either. In summary, studies that analyse optimal (growth- and/or welfare-maximising) monetary and fiscal policy following a change in the degree of tax evasion is likely to lead to non-optimal policy outcomes, since changes in the policy parameters in response to the change in the level of tax evasion (arising from changes in the structural parameters affecting the degree of evasion) would change the degree of tax evasion further.

The rest of the paper is organised as follows: Section 2 describes the economic setting for our analysis; Sections 3–5, respectively, defines the competitive equilibrium, solves the model for the optimal degree of the shadow economy, discusses the empirical evidence obtained from our dataset against the current background to the observance of the shadow economy and Section 5 offers some concluding remarks.

[2] Note that the shadow economy estimates of Elgin and Öztunali (2012) is obtained from a calibrated dynamic general equilibrium model for various countries over different periods.

[3] We concede that tax evasion and shadow economy are not necessarily synonymous, but contend that measures of the shadow economy are systematically used in the literature as a proxy for the level of tax evasion (Alm, 2012). The use of tax evasion as a substitute for the shadow economy also resonates with the adopted definition of the shadow economy in this paper, and facilitates the theoretical approach followed. Moreover, following Gupta (2005) it can be shown that $\frac{TE}{Y} = SE * \tau$, where $\frac{TE}{Y}$ is tax evasion as a percentage of gross domestic product (GDP), SE is a measure of the shadow economy and τ is a parameter measuring taxes paid as a percentage of GDP.

[4] Note that, the cash-reserve requirements have been long viewed as a measure of financial repression, since higher the cash reserve requirements, lesser the loans available to a bank to lend out for investment/production purposes. For a detailed discussion along these lines, refer to Gupta (2005, 2008) and Gupta and Ziramba (2009, 2010).

[5] See Koreshkova (2006) for a similar analysis relating inflation and the underground economy, where the shadow economy is modelled by distinguishing between a formal and informal production structure, instead of endogenous tax evasion.

2. The economic setting

Time is divided into discrete segments and indexed by $t = 1, 2, \ldots$. The principal economic activities are: (i) entrepreneurs who live for two periods, receive a positive young-age endowment of W_1 and consume only when old. When the cost of undertaking an investment project exceeds the current endowment of entrepreneurs, they require external finance. To obtain the external finance, entrepreneurs have to offer collateral to the banks and thus have to decide what portion of their income to declare in order to increase the probability of obtaining external finance. This external finance is provided by the banks according to the terms and conditions of optimal loan contracts; (ii) each two-period lived overlapping generations depositor receives a young-age endowment of $0 \leqslant W_2 \leqslant 1$ and an old-age endowment of $0 \leqslant W_3 \leqslant 1$. The depositors consume in both periods. The young-age consumer evades a portion of the tax-liability, with the tax evasion being determined endogenously to maximise utility, and the remainder is allocated either towards young-age consumption or deposited in the banks, for future old-age consumption; (iii) the banks operate in a competitive environment and perform a pooling function by collecting the deposits from the consumers and lending it out to the entrepreneurs after meeting an obligatory cash reserve requirements; and (iv) there is an infinitely-lived consolidated government which meets its non-productive expenditure by taxing income, generating seigniorage income and setting a penalty for tax evasion when caught. The government also controls its two main policy instruments, namely money growth rate and the reserve requirement. The government balances its budget on a period-by-period basis. There is a continuum of each type of economic agent with unit mass.

We introduce ex-post moral hazard into the economy due to banks facing a costly state verification (CSV) problem since entrepreneurs can declare bankruptcy even when they are not. The principal outcome of those investment projects of the entrepreneurs, financed via bank loans, is essentially private information to the entrepreneur. If banks are willing to incur some monitoring cost, they can observe the same outcome. Note that the size of CSV is used here as a "proxy" for the efficiency of the financial system. In line with Di Giorgio (1999) and Gupta (2005), it is reasonable to assume that a more developed financial system will have a lower CSV.

2.1. Entrepreneurs

Entrepreneurs live for two periods, receive an initial endowment of W_1, undertake some type of investment and only consumes in the second period. They have access to a simple investment technology such that by investing one unit of the consumption good at t, either $\alpha > 1$ units are produced at $t+1$ with probability of q or 0 units are produced with probability of $1-q$. Capital investment undertaken by the entrepreneur, K_t, is limited by the availability of funding to the entrepreneurs. Hence:

$$K_t = W_1 + l_t \tag{1}$$

where $l_t = \frac{L_t}{p_t}$ and L_t is the nominal quantity of loans that entrepreneurs can obtain from the banks. If the investment activity of the entrepreneur is successful, the cost of external finance obtained at time point t that is repaid to the bank, is a gross interest rate of $1 + i_{lt+1}$. If the investment activity is not successful, resulting in the entrepreneur declaring bankruptcy, nothing is repaid to the bank. The level of output produced by the entrepreneur at time point $t+1$ with probability q, is then:

$$y_{t+1} = \alpha K_t \tag{2}$$