Costly Tax Enforcement and Financial Repression

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Abstract

Using a simple pure-exchange overlapping generations model characterized by financial repression, purposeful government expenditures and cost of tax collection, we analyze whether financial repression can be explained by the cost of raising taxes. Note, following the trend in the current literature, financial repression has been modeled via obligatory reserve requirements that banks in the economy need to hold. We show that with public expenditures affecting utility of the agents, modest costs of tax collection tend to result in financial repression being pursued as an optimal policy by the consolidated government. However, when public expenditures are purposeless, the above result only holds for relatively higher costs of tax collection. But, more importantly, costs of tax collection cannot produce a monotonic increase in the reserve requirements, what are critical, in this regard, are the weights the consumer assigns to the public good in the utility function and the size of the government. So cost of tax enforcement is necessary but not a sufficient condition for producing financial repression as a welfare optimizing outcome.

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1 Introduction

2 Introduction

Using a pure-exchange overlapping generations model, characterized by costly tax enforcement, we analyze the relationship between the costs of tax collection and financial repression. We follow the dominant trend in the literature[1] in defining financial repression through an obligatory "high" reserve deposit ratio requirement, that the banks in the economy needs to maintain.[2] Specifically, we analyze whether the "high" reserve requirements in a closed economy characterized by costly tax collection, are a fall out of a welfare maximizing decision of the government, which has access to income taxation and seigniorage as sources of revenue.

Given that the concern is not whether financial repression is prevalent, but the associated degree to which an economy is repressed, since developed or developing economies both resort to such restrictive policies (Espinosa and Yip (1996)), the pertinent question is - Why, if at all, would a government want to repress the financial system ? This seems paradoxical, especially when one takes into account the well documented importance of the financial intermediation process on economic activity, mainly via the finance-growth nexus.[3] Besides, the fact that "high" cash reserve requirements enhances the size of the implicit tax base and, hence, is lucrative for the government to repress the financial system, alternative explanations, with varied levels of success, have ranged from: Inefficient tax systems (Cukierman *et al* (1992)) and Giovannini and De Melo (1993)) and tax evasion (Roubini and Sala-i-Martin (1995), Gupta (2005, 2006, 2008) and Gupta and Ziramba (2008a)) to degree of financial development (Di Giorgio (1999)) and asymmetric information (Gupta (2006)) and banking crisis (Gupta (2005)), besides, productive public expenditure

[1] See for example, Drazen (1989), Bacchetta and Caminal (1992), Haslag and Hein (1995), Espinosa and Yip (1996), Haslag (1998), Haslag and Koo (1999), Haslag and Bhattacharya (2001), Gupta (2005, 2006, 2007) and Gupta and Ziramba (2008a, b) amongst others.

[2] Financial repression, though, can involve other set of government legal restrictions, like interest rate ceilings and compulsory credit allocation, besides, "high" reserve requirements, that prevent the financial intermediaries from functioning at their full capacity level. However, given the wave of interest rate deregulation in the 1980s, and removal credit ceiling some years earlier, the major form of financial repression is currently via obligatory reserve requirements(Caprio *et al.* (2001)).

[3] See Roubini and Sala-i-Martin (1992), and the references cited there in.

(Basu (2001)) and bureaucratic corruption (Gupta and Ziramba (2008b)), and, finally, currency substitution (Gupta (2007)). In this paper, we analyze whether we can add costs of tax collection to this list?

The motivation for believing that costly tax collection can be a possible rationale for financial repression, can be outlined as follows: If tax collection is costly and is increasing at a increasing rate in taxes (Bird and Zolt (2005) and Agéenor and Neanidis (2007)), with two sources of revenue, namely, taxation and seigniorage, the government might want to either one or both the money supply growth rate (rate of the inflation tax) and the reserve requirements (the seigniorage base) as part of a welfare-maximizing strategy. Given that the size of the reserve requirement is our metric for financial repression, we could, thus, check if increases in costs of tax collection can be a rationale for a more restrictive policy as an welfare maximizing outcome. To the best of our knowledge, this is the first study to analyze costly tax collection as a rationale for financial repression.

Alternatively, the current study can also be viewed as an analysis that looks into the optimal mix of explicit and implicit taxation of a consolidated government in the presence of costs of collecting direct taxation. In this regard, this paper, is comparable to Agénor and Neanidis (2007). In this paper, the authors outline cost of tax enforcement as a reason behind the fact that developing countries tend to rely more on direct rather than indirect taxation, based on an endogenous growth framework. Their results show that in the presence of positive cost of tax collection growth maximizing optimal tax rate on consumption is positive, while, the value of the same is zero when there exited no such costs, and, hence, the government relied completely on direct taxes. We, by adding a money to the model, analyze the role of seigniorage (the implicit tax) relative to the explicit direct tax in the presence of cost of tax enforcement. Thus, though the main motive of our analysis is to relate financial repression with cost of tax collection, our study, in general, is quite similar to what Agéenor and Neanidis (2007) does, especially, in terms of the issues, we address, on 'optimal' explicit and implicit taxation when there are costs involved in raising direct taxes. Our framework, as should be confessed though, is much simpler than the one adapted by Agéenor and Neanidis (2007). The remainder of the paper is organized as follows: Section 2 outlines the economic environment, while, section 3 derives the optimal policy decisions for the benevolent government under alternative sizes of the cost of tax collection. Finally, Section 4 concludes.

3 Economic Environment

The economy is populated by three types of agents, namely, consumers, banks (financial intermediaries), and an infinitely-lived government. Time is discrete and there is an infinite sequence of agents indexed by t = 1, 2,3,..... Agents live for two periods. Each two-period lived overlapping generations household consumer/household has preferences defined over a consumption good and a public good. The consumer is endowed with y units of the consumption good when young. The agent invests the net of tax endowment in bank deposits. When old, the consumer is retired, and consumes out of one's young age savings. Thus, at time t, there are two coexisting generations of young and old. N people are born at each time point t = 1. At date t =1, there exist N people in the economy, called the initial old, who live for only one period. At each date $t \geq$1, N people are born (the young generation) and N people are beginning the second period of their life (the old generation). Note, the population is constant and hence N, is normalized to 1.

Formally, the agent's problem born in period t is as follows:

$$U(c_{t+1}, g_{t+1}) = \psi \frac{c_{t+1}^{1-\sigma}}{1-\sigma} + (1-\psi)\frac{g_{t+1}^{1-\sigma}}{1-\sigma} \tag{1}$$

subject to:

$$p_t d_t = (1-\tau_t) p_t y \tag{2}$$

$$c_{t+1} = \frac{p_t}{p_{t+1}}(1+i_{dt+1}) d_t \tag{3}$$

To check for the robustness of our results we also look at a scenario where the utility of the consumer only depends on consumption good. Specifically,

$$U(c_{t+1}) = \frac{c_{t+1}^{1-\sigma}}{1-\sigma} \tag{4}$$

where $U(.)$ is the utility function, with the standard assumption of positive and diminishing marginal utilities in both goods; $\psi(1-\psi)$ is the weight the consumer assigns to the consumption (public) good in the utility function; c_{t+1} (g_{t+1}) are the old age consumption of consumption good (public good); y d_t are the real deposits held in period t; τ_t is the tax rate at period t; p_t, is the price of the consumption good at period t; i_{dt+1} is the nominal interest rate on bank deposits. Each unit of the consumption good placed into deposits at date t yields $(1 + r_{dt+1})$ = $\frac{(1+i_{dt+1})}{1+pi_{t+1}}$ with

$(1+\pi_{t+1})$ = $\frac{p_t}{p_{t+1}}$ as the gross inflation rate. units of the consumption good at date $t+1$. As consumption only takes place in the second period of life, the savings function is inelastic with respect to its return. This assumption makes computations much easier and seems to be a good approximation of the real world.[4]

Banks receive the deposits d_t and are subjected to a standard cash reserve requirement which constraints the banks to hold at least γ_t of each unit of the good deposited, in the form of money. In equilibrium, with money being return-dominated, banks will hold exactly a fraction γ_t in fiat money. Let M_t denote nominal money balances per young person. Then, $M_t = \gamma_t p_t d_t$ holds. The rest is invested into riskless assets. An investment of one unit of consumption good in period t produces $1+x_{t+1}$ units of consumption good in period $t+1$. Consumers do not have direct access to this riskless investment, and, hence, require the banks to perform a pooling function on their behalf.[5] Thus, the only form of savings for the consumers is through the deposits with the financial intermediaries. Because fiat money does not pay any interest rate, the gross real return on money between t and $t+1$ is $\frac{1}{1+\pi_{t+1}}$. Throughout the analysis we restrict our attention to equilibria where money is return dominated, or $1+x_{t+1} > (1/(1+\pi_{t+1}))$. Alternatively, $(1+i_{lt})>1$, where i_{lt} is the nominal return on bank investment.

The banking sector is assumed to be perfectly competitive and banks have access to a costless intermediation technology. Profit maximization on behalf of the banks causes the gross real return on deposits to be a weighted average of the returns from the investment and money, with the weights being defined the reserve-deposit ratio. Formally,

$$1+r_{dt+1} = (1-\gamma_{t+1})(1+r_{t+1}) + \gamma_{t+1}\frac{1}{1+\pi_{t+1}} \tag{5}$$

must hold.

The government is assumed to be infinitely-lived. It purchases g_t units of the consumption good. In the first case, the public good which is assumed to be useful in the sense that they yield direct-utility to the agents, while, in the second scenario government expenditures are useless. These expenditures are financed through income taxation, and seigniorage. Moreover the government faces explicit costs of raising taxes, $\frac{1}{2}\phi\tau_t^2 y$. As in Agénor and Neanidis (2007), we assume these costs to be increasing with the tax rate at an increasing rate, and also increasing at a constant rate with the endowment.In real per-capita terms the government budget constraint can be written as follows:

$$g_t = \tau_t y + \frac{M_t - M_{t-1}}{p_t} - \frac{1}{2}\phi\tau_t^2 y \tag{6}$$

[4]See Hall (1988).

[5]Implicitly, we are assuming as if the investment into the riskless assets needs to be in bulk.

with $M_t = (1 + \theta_t)M_{t-1}$ and $\phi \geq 0$, where θ is the net money growth rate and ϕ is the cost parameter. Note, the consolidated government coordinates the activities of the treasury and the central bank, both of which are "equally subservient to the government". The benevolent government maximizes the steady state level of welfare for all future generations, obtained by substituting the equilibrium decision rules into the agents' utility function(s) to determine the optimal levels of the policy variables.[6]

4 Optimal Policy Decisions

In this section, we analyze the optimal policies for the government in the face of a rise in the cost of tax collection. For this purpose, we study the behavior of a benevolent government or social planner who maximizes the utility of all consumers, evaluated at the steady state, by choosing γ, τ and θ, following alternative values of ϕ. Specifically, the problem for the social planner, with the discount rate $0<\beta<1$, is captured by: $\sum_{i=0}^{\infty} \beta^i U(c_{t+1+i}, g_{t+1+i})$, in the case where public good is useful, and $(\sum_{i=0}^{\infty} \beta^i U(c_{t+1+i}))$, when public expenditures are pure government consumption subject to $\tau \geq 0$, $\tau \leq 0.99$; $\gamma \geq 0$, $\gamma \leq 0.99$; $\theta \geq 0$ in the former with $g_t = \tau_t y + \frac{M_t - M_{t-1}}{p_t} - \frac{1}{2}\phi\tau_t^2 y$. In the second case, besides, the above set of inequality constraints on τ, θ and γ, the government also needs to ensure that it consumes a specific amount of goods according to the budget constraint. Further, we will assume that the government follows time invariant policy rules, which means that the institutionally determined tax rate, τ_t, the cash reserve ratio, γ_t, the money growth rate, θ_t, the level of government expenditures, g_t are constant over time.

The problem of the social planner is non-linear in τ, γ, and θ, and, hence, cannot be solved analytically. Numerical solution of the problem, in turn, requires values for the structural parameters of the model. For our experiments below, we use the following set of values: y is normalized to 1; σ = 1.0; [7] β = 0.98 (Chari *et al.*(1995)) ; x = 2 percent (Bhattachary and Haslag (2001)); ψ = 0.75, 0.50 and 0.25. Based on τ = 25.00 percent, γ = 17.30 percent, $\theta = \pi$ = 21.40 percent, obtained from Haslag and Young (1998),[8] yields a value of ϕ = 33.66 percent, when we take into

[6] A competitive equilibrium for this model economy is a sequence of prices $\{p_t, i_{dt}, i_{lt}\}_{t=0}^{\infty}$, allocations $c_{t+1}\}_{t=0}^{\infty}$, stocks of financial assets $\{m_t, d_t\}_{t=0}^{\infty}$, and policy variables $\{\gamma_t, \tau_t, \theta_t, g_t\}_{t=0}^{\infty}$ such that: The consumer maximizes utility given by (1) or (4) subject to (2) and (3); Banks maximize profits such that (5) holds; the goods and money markets clear, i.e., y - $\frac{1}{2}\phi\tau_t^2 y = c_t + g_t$, and M_t=$\gamma_t p_t d_t$, respectively, holds, and; The government budget, equation (7) is balanced on a period-by-period basis.

[7] Our basic results continued to hold for $\sigma = \frac{1}{2}$ and 2.0

[8] The authors derive these values as avergase based on 82 countries.

account, that costs of tax collection amounts to 3 percent of total revenue in developing countries (Bird and Zolt (2005) and Agéenor and Neanidis (2007)). Given the values of τ, γ, θ, ϕ and y, the size of the government, derived from the government budget constraint, is equal to 21.77 percent. For deducing financial repression is positively correlated with cost of tax enforcement, we start off with our benchmark case of $\phi = 0$. Finally, to check for the robustness of our results, we also use $\phi = 0.05$.[9]

The results of the experiments have been reported in Table 1. Column 1 of the table reports the alternative size of the cost parameter. Columns 2 to 10 reports the optimal values of τ, γ and θ under $\psi = 0.75$, 0.50 and 0.25, respectively, i.e, these columns corresponds to the three cases where the government expenditure is valued less, equally and more than the consumption good, by the consumer. While, the optimal policy parameters, when the government expenditures are pure government consumption, are reported in Columns 11 through 13.

[INSERT TABLE 1]

The following observations can be made from Table 1:

Useful Public Expenditures (Columns 2 through 10): (a) When $\phi = 0$, i.e., there is no cost of tax collection, the optimal money growth rate and reserve requirements are always set to zero, irrespective of the weight the consumer assigns to private consumption and public good in the utility function. So optimal seigniorage is zero in this case. The optimal value of the tax rate, is, however, set equal to the weight of the government good in the utility function; (b) When $\phi = 0.05$, the results are reversed, when compared to (a). Now all the revenue is raised via seigniorage, with money growth rate set at infinity and the reserve requirement set to the weight of the government good in the utility function. In fact, our experiments revealed that the threshold level of tax enforcement cost required to produce positive reserve requirements are even smaller than $\phi = 0.05$, and; (c) Finally, with $\phi = 0.3366$, the results in (b) continue to hold. In addition, the results continue to hold even beyond ϕ 0.3366.

Useless Public Expenditures (Columns 11 through 13): (a) The optimal policy decisions of the government is qualitatively the same as that of cases (a) and (c) under useful public expenditures. The only difference being that now tax rates and reserve requirements, respectively, when $\phi = 0$ and 0.25, are set equal to the size of the government, and; (b) Relatively higher costs of tax collection are now required to produce positive degrees of repression. Since as can be seen, with $\phi = 0.05$, the optimal reserve requirements and money growth rate still continues to be zero, with the tax

[9]For details regarding the choice of this value for ϕ, see below.

rate equal to the ratio of $\frac{g}{y}$. Intuitively, this is because, government expenditure is not useful to the consumers as such, and, hence, positive degrees of financial repression is only guaranteed by comparatively higher costs of tax collection, when gauged in respect to the scenario of useful public expenditure.

Thus, in summary, one can draw the following general conclusions:

- Small costs of tax collection can ensure positive levels of financial repression;
- However, cost of tax enforcement cannot produce monotonic increase in financial repression;
- Beyond a certain level of the cost of tax collection, movements in the reserve requirements are governed by weights attached to the government good, or by the size of the government;
- So, as far as, the reliance on indirect taxation, in our case seigniorage, is concerned, our results are quite comparable to those of Agéenor and Neanidis (2007), since, just as in their case, we show that positive (minor) costs of tax collection can lead to positive levels of indirect taxation.

5 Conclusion

In this paper, using a simple pure-exchange overlapping generations model characterized by financial repression, purposeful government expenditures and cost of tax collection, we analyze whether financial repression can be explained by the cost of raising taxes. Following other studies in the literature, we define financial repression through an obligatory "high" reserve deposit ratio requirement, that the banks in the economy needs to maintain. In other words, this study attempts to assay whether costly tax enforcement can provide a rational for financial repression. But more generally, the study also attempts to find the optimal policies of a benevolent government following an increase in the cost of tax collection, when the consolidated government has access to income taxation and seigniorage as sources of revenue.

When numerically analyzed for a world economy, the following basic conclusions could be drawn: (i) Cost of tax collection is *necessary but not sufficient* in producing a positive correlation between financial repression and the size of the cost, and; (ii) The role and size of the government is critical in the analysis. In fact, as pointed out above, beyond a certain level of the cost of tax collection, movements in the reserve requirements are governed by weights

attached to the government good or the size of the government. So, in general, the paper shows that a benevolent social planner would only rely on seigniorage once the cost of tax enforcement crosses a threshold limit, with the latter being relatively higher, when public expenditures are not valued by consumers. An immediate extension of the current study would be to revisit our results using an endogenous growth framework similar to those of Agéenor and Neanidis (2007), but with a monetary side to it.

Selected References

[1] Agenor, P-R., and Neanidis, K. C. (Oct. 2007.) Optimal Taxation and Growth with Public Goods and Costly Enforcement. University of Manchester Discussion Paper Series Number 087.

[2] Bacchetta, P., and Caminal, R.(Oct. 1992.) Optimal seigniorage and financial liberalization. *Journal of International Money and Finance* 11(5): 518–538.

[3] Barro, R. J. (Oct. 1990.) Government spending in a simple model of endogenous growth. *Journal of Political Economy*, 98(5, Part - 2): S103–S125.

[4] Basu, P. (2001.) Reserve Ratio, Seigniorage and Growth. *Journal of Macroeconomics* 23(3), 397-416.

[5] Bird, R. M., and Zolt, E. M. (Dec 2005.) The Limited Role of the Personal Income Tax in Developing Countries. *Journal of Asian Economies*, 16: 928-946.

[6] Caprio, G., Honohan, P., Stiglitz, J. E., 2001. *Financial liberalization: How far, how fast?* Cambridge University Press, Cambridge, UK.

[7] Chang, R., L. Kaltani, N. Loayza. (2005) Openness can be good for growth: The role of policy complementarities. NBER Working Paper Series. *Working paper number* 11787.

[8] Chari, V.V., Manuelli, R.E., and Jones, L.E. (1995.) The Growth Effects of Monetary Policy. *Quarterly Review, Federal Reserve Bank of Minneapolis* 19(4), 18-32.

[9] Chen, B. L., Chiang, Y. Y., and Ping, W. (Jun. 2000.) Credit market imperfections, financial activity and economic growth. *Working Paper No. 00-W20*, Vanderbilt University.

[10] Del Monte, A., and Papagni, E. (2001.) Public Expenditure, corruption, and economic growth: the case of Italy. *European Journal of Political Economy* 17, 1-16.

[11] Cuikerman, A., Sebastian, E., and Tabellini, G. (Jun. 1992.) Seigniorage and political instability. *America Economic Review* 82(3): 537-555.

[12] Di Giorgio 1999. Financial development and reserve requirements. *Journal of Banking and Finance* 23, 1031-1041.

[13] Diamond, P. and Yellin, J. (July 1990.) Inventories and Money Holdings in a Search Economy. *Econometrica*, 58(4):929-950.

[14] Drazen, A. (1989.) Monetary Policy, Seigniorage, and Capital Controls in an Open Economy. In *An European Central Bank?* (M. de Cecco and A. Giovannini, eds.) Cambridge: Cambridge University Press, pp. 13-52.

[15] Espinosa, M., and Yip, C. K. (Jun. 1996.) An endogenous growth model of money, banking, and financial repression. *Working Paper No. 96-4*, Federal Reserve Bank of Atlanta.

[16] Gallagher, M., (Jun. 2005.) Benchmarking Tax Systems. *Public Administration and Development*, 25: 125-144.

[17] Giovanni, A., and De Melo, M. (Sep. 1993.) Government revenue from financial repression. *American Economic Review* 83(4): 953–963.

[18] Gupta, R., (Nov. 2005.) Costly state monitoring and reserve requirements. *Annals of Economics and Finance*, 6(2): 263–288.

[19] Gupta, R., (Feb. 2006.) Asymmetric information, tax evasion and alternative instruments of government revenue. *The ICFAI Journal of Monetary Economics*, IV(1): 75–89.

[20] Gupta, R. (2007.) Currency substitution and financial repression. *Working Paper*, Department of Economics, University of Pretoria.

[21] Gupta, R. (2008.) Tax evasion and financial repression. Forthcoming *Journal of Economics and Business*.

[22] Gupta, R. and Ziramba, E. (2008.) Tax evasion and financial repression: A reconsideration using endogenous growth models. *Working Paper*, Department of Economics, University of Pretoria.

[23] Gupta, R. and Ziramba, E. (2008.) Openness, Bureaucratic Corruption and Public Policy in an endogenous growth models. *Working Paper*, Department of Economics, University of Pretoria.

[24] Haslag, J. H., and Bhattacharya, J., (2001.) On the use of inflation tax when non-distortionary taxes are available. Review of Economic Dynamics 4, 823-841.

[25] Haslag, J. H. (Jul. 1998.) Monetary policy, banking and growth. *Economic Inquiry* XXXVI(3): 489–500.

[26] Haslag, J. H., and Hein, S. E. (Apr. 1995.) Does it matter how monetary policy is implemented?. *Journal of Monetary Economics* 35(2): 359–386.

[27] Haslag, J. H., and Koo, J. (1999.) Financial repression, financial development and economic growth. *Working Paper No. 99-02*, Federal Reserve Bank of Dallas.

[28] Haslag, J. H., and Young, E. R. (Jul. 1998.) Money creation, reserve requirements, and seigniorage. *Review of Economic Dynamics*. 1(3): 677–698.

[29] Holman, J. A., Neanidis, K. C., 2006. Financing government expenditure in an open economy. *Journal of Economic Dynamics and Control*, 30: 1315-1337.

[30] Roubini, N., and Xavier, Sala-i-Martin. (Jul. 1992.) Financial repression and economic growth. *Journal of Development Economics* 39(1): 5–30.

[31] Roubini, N., and X. Sala-i-Martin, (Apr. 1995.) A growth model of inflation, tax evasion, and financial repression. *Journal of Monetary Economics*, 35(2): 275–301.

Table 1: Optimal Policy Decisions

	Useful Public Good									Useless Public Good		
	$\psi = 0.75$			$\psi = 0.5$			$\psi = 0.25$					
Cost	γ^*	θ^*	τ^*	γ^*	θ^*	τ^*	γ^*	θ^*	τ^*	γ^*	θ^*	τ^*
$\phi = 0$	0	0	0.25	0	0	0.5	0	0	0.75	0	0	0.2177
$\phi = 0.05$	0.25	∞	0	0.5	∞	0	0.75	∞	0	0	0	0.2177
$\phi = 0.3366$	0.25	∞	0	0.5	∞	0	0.75	∞	0	0.2177	∞	0
Note: Parameters defined as above.												