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Abstract

A model is presented in which one firm borrows from one bank with a positive supply curve of loans. The bank monitors firm's output, which firm produces output underground too, in order to avoid this monitoring and minimize its marginal expenditure on loans by defaulting. The model incorporates also a laborer-consumer who allocates labor between the formal and informal sectors in a way preserving full employment. In this model, the following results obtain: There cannot be underground only economy even in the absence of government national-accounting induced output monitoring once part at least of the output has to be monitored by the bank. The capital employed officially is always more than that underground. Bank monopoly power induces lexicographic preferences towards underground economy income. The stability of the system depends on the relative size of the official to total capital ratio and the response of loan demand to the interest rate. The introduction of government and indirect taxation alter the optimal official to total capital ratio. Yet, the steady-state and stability of the system remain unchanged under a tax financed balanced budget. Government borrowing by a rent-seeking government or to cope with tax-evasion induced budget deficits lowers lending to the firm and leads thereby the system to equilibrium away from steady-state; but tax evasion increases such lending towards steady-state restoration.

Key Words: Developing economies, Concentrated banking, Bilateral monopsony, Underground economy, Taxation

JEL Codes: O10, L10, E26, H20, D70

1. Introduction

According to La Porta and Shleifer (2008, p. 275): "In developing countries, informal firms account for up to about half of all economic activity. Using data from World Bank firm-level surveys, we find that informal firms are small and extremely unproductive compared with even the small formal firms in the sample, and especially relative to the larger formal firms." Boly (2012) reports that most Less Developed Countries (LDCs, 32 out of 47) are located in sub-Saharan Africa, while 14 LDCs are located in Asia and 1 (Haiti) in Latin America and the Caribbean, with low industrial base and significant market distortions that policymaking has to address.[1] Moreover, as Jebuni et al. (1988) note, domestic competition in developing economies is low and responsible for the inefficient use of resources. And, this is a picture of an economy with concentrated banking (see e.g. Demirguc-Kunt and Levine 1999, and Kemraj 2008).

Can such a bank sector help development in Hirschman's (1965) sense that development is not so much about finding optimal combinations of productive factors and resources as on using—for development tasks—resources and capabilities that are

hidden, scattered, or badly utilized? Researchers have found considerable evidence that banking system structure affects official and unofficial output growth. For example, according to Mitchener and Wheelock (2010, Abstract), "banking market concentration had a positive impact on manufacturing sector growth in the early twentieth century". Cetorelli and Gambera (2001) and Hoxha (2009) add that bank industry concentration boosts also the growth of industries that depend relatively heavily on non-bank financing. And, judging from Capasso and Jappelli's (2013) claim that non-bank finance is channeled to low-return technology underground, one concludes that increased bank market power corroborates growth in the formal sector of the economy directly and in the informal sector indirectly.

Under these circumstances of small and mainly informal firms and a few official corporate conglomerates, an investigation of the developmental role of banking in LDCs might be pursued analytically within the context of a bilateral monopsony for loans as follows: People live long enough to try increase and smooth income and consumption during their lifetime through the development of two key economic institutions, namely banks and firms. Consider a hypothetical economy in which this aim is pursued as follows: (i) People deposit money with the bank that they have established in order to benefit from the deposit rate and from a share in the profits accompanying the operation of the bank as a lender to the firm, (ii) which people too, have incorporated to complete the whole scheme of enhancing income and smoothing consumption over time.

The primary institution in this scheme is the bank and this is the reason why people let it have "the upper hand" by letting it exercise monopoly power through a supply curve of loans according to which the lending rate includes a premium for alleged default. People defend against this bank behavior by allowing firms to actually default by hiding information to the lending bank that the firm will invest to produce and sell output underground hidden from the bank[2]. That is, the empirical evidence about increased demand for non-bank finance under concentrated banking is modeled here as demand for bank loans that will not be paid out. The two concepts of loan demand become equivalent analytically, when by the term "the bank" is meant the overall financial system.[3] So "the bank" does well contemplating some probability of default. People tolerate this weakness of the system, because any income generated by banks and firms is ultimately distributed among them…

The next section works out the analytics of such a bank-firm bilateral monopsony scenario.[4] Assuming away wage differences and trade between formal and informal sectors on which the dual economy literature focuses (see e.g. Bhattacharya 1994), the aim is to derive the optimal official to total capital ratio under the presumption that both parties agree with the market clearing price-quantity. This presumption is made for comparison purposes with the outcome under a social-welfare minded government, taxing to finance its role as a regulatory agency aiming at enforcing the market clearing price-quantity. A comparison with the outcome under a rent-seeking bureaucracy favoring the high price-low quantity option to benefit by selling bonds in exchange of the subsequent excess bank liquidity, is made, too. This case is illustrated diagrammatically at the end of the next section when a third type of government, namely the populist rent-seeking bureaucracy in support of the low price-low quantity combination, is examined briefly, too.

It is clear that the approach to development underlying the discussion herein focuses not on development *per s*e but on how it is shaped based on overt and covert resources and capabilities financed by concentrated banking. Neither the model elaborated below is a dynamic aggregate growth model; it is one based on some microeconomics upon which the initial conditions of a dynamic analysis may be formed. The third section should be one checking the real-world relevance of the results but several restrictive assumptions have been made like the neglect of the international factor which plays a major role in LDCs. International trade and foreign direct investment should be encouraging the official economy at the expense of the unofficial one. But, government borrowing from abroad is expected to be sooner or later recessionary if the money is not channeled to public investment. And, what about the complications arising from link between international profit shifting and tax evasion? The third section concludes this paper by contemplating on such issues and on its restrictive assumptions in general.

2. The Formal Discussion

Under the socioeconomic arrangement described earlier, there is an underground economy which is initially identified with the sector of the economy where output comes out of the capital formed on the basis of default loans. Tax evasion becomes one more reason to go underground when government and taxation are introduced into the discussion.

2.1 The Basic Model

According to La Porta and Shleifer (2008, p. 275): "Few formal firms have ever operated informally". So, in what follows, the allocation of business operations between formal and informal activities is taken to be that of the private business sector in its entirety. More precisely, let:

$$h = \frac{official\ capital}{total\ capital} = \frac{K}{H + K}$$

where K is the capital employed officially while H is the capital used underground. Following Bonaccorsi di Patti and Dell'Ariccia (2004) who document that banking market concentration promotes firm creation in industries where the creditworthiness of entrepreneurs is difficult to assess, and identifying these industries as those that are prone to underground operations, the difference:

$$1 - h = \frac{H}{H + K} \equiv probability\ of\ default$$

in so far as lending to the whole private sector is concerned. Firms can influence the cost of funding by deciding which part of their assets will disclose and pledge them as collateral. And, as Hart (1995) argues, a debt in firm's capital structure can mutually benefit debtor and creditor if contracts are incomplete. Anyway, in this basic model the only reason to allocate investment underground is to default in a Capasso and Jappelli (2013) fashion. Hence, $h = 1 - (1 - h)$, and the profit of the lending bank, Π_B, may be written as follows:

$$\Pi_B = hrL - \delta D - c(L) \qquad (1)$$

where r is the lending rate, δ is the deposit rate, L and D is loans and deposits respectively, while $c(L)$ is the operational cost of lending. If ρ is the reserve requirements ratio:

$$\rho D + L = D \Rightarrow D = \frac{L}{1-\rho} \qquad (2)$$

Given this and that the inverse demand for loans in an LDC (see e.g. Kemraj 2008) is:

$$r = a - bL \qquad (3)$$

(1) becomes:

$$\Pi_B = h(a - bL)L - \frac{\delta}{1-\rho}L - c(L) \qquad (1')$$

where a and b are some positive constants. The first order condition for profit maximization in L is:

$$\frac{d\Pi_B}{dL} = ha - 2hbL - \frac{\delta}{1-\rho} - c' = 0 \Rightarrow$$

$$L^* = \frac{(1-\rho)(ha - c') - \delta}{2hb(1-\rho)} \qquad (4)$$

where c' is the marginal cost of loan supply. Inserting (3) in the same condition, one obtains that at the optimum:

$$r^* = \frac{\delta + (1-\rho)c'}{h(1-\rho)} + bL^* \qquad (5)$$

which in view of (4) gives an:

$$r^* = \frac{\delta + (1-\rho)(ha + c')}{2h(1-\rho)} \qquad (5')$$

Setting $h = 0$ in (4) and (5′), both L^* and r^* become infinity: There cannot be underground only economy. This is a result which obtains wholly within the context of the private sector, i.e. in the absence of a government that would require output reporting for national account at least purposes. It is the lending bank that requires so.

Next, the bank and the firm form a bilateral monopsony in L. It is assumed that they have agreed upon the market clearing r, $\tilde{r}$, by equating it with r^*below and by having the firm taking $r^* = \tilde{r}$ for granted. That is, if the revenue of the borrowing firm from the sale of its product(s) is $R = mL^e$, with $0 < e \leq 1$, the firm's task is to choose that h which maximizes its profit:

$$\Pi_F = m(L^*)^e - r^*L^* \qquad (6)$$

The first order condition yields that:

$$\frac{d\Pi_F}{dh} = \frac{me[\delta + (1-\rho)c']}{2h^2b(1-\rho)}\left[\frac{2hb(1-\rho)}{(1-\rho)(ha - c') - \delta}\right]^{1-e} - \frac{[\delta + (1-\rho)c']^2}{8h^3b(1-\rho)^2} = 0$$

or the same, the following cubic equation in h:

$$h^3[32b(me)^2(1-\rho)^2] - h\{[\delta + (1-\rho)c']^2(1-\rho)a\} + [\delta + (1-\rho)c']^3 = 0$$

when for convenience $e = 1/2$. The discriminant is clearly negative and hence, the equation has one real root and two nonreal complex conjugate roots. The real one is:

$$h^* = \sqrt[3]{\frac{3\Phi^* + \sqrt{9\Phi^{*2} + 4\Psi^{*3}}}{6}} - \sqrt[3]{\frac{-3\Phi + \sqrt{9\Phi^{*2} + 4\Psi^{*3}}}{6}} \quad (7)$$

where $\Phi^* = \{[\delta + (1-\rho)c']^2(1-\rho)a\}/[32b(me)^2(1-\rho)^2]$ and $\Psi^* = [\delta + (1-\rho)c']^3/[32b(me)^2(1-\rho)^2]$. It may be easily checked that this root is positive and less than one. We also obtain that:

$$K^* = \frac{\sqrt[3]{3\Phi^* + \sqrt{9\Phi^{*2} + 4\Psi^{*3}}} - \sqrt[3]{-3\Phi + \sqrt{9\Phi^{*2} + 4\Psi^{*3}}}}{\sqrt[3]{6} - \sqrt[3]{3\Phi^* + \sqrt{9\Phi^{*2} + 4\Psi^{*3}}} + \sqrt[3]{-3\Phi + \sqrt{9\Phi^{*2} + 4\Psi^{*3}}}} H^* \quad (8)$$

The fraction in (8) exceeds one, and the capital employed officially is always more than that underground, when the numerator exceeds the denominator or the same, if:

$$2\sqrt[3]{3\Phi^* + \sqrt{9\Phi^{*2} + 4\Psi^{*3}}} > \sqrt[3]{6} + (2)\sqrt[3]{-3\Phi + \sqrt{9\Phi^{*2} + 4\Psi^{*3}}}$$

According to to Buehn and Schneider (2011), this is the rule in the real world, indeed.[5] Now, recall that the firm and the bank form a bilateral monopsony in L, having agreed upon the market clearing r, $\tilde{r}$, and so:

$$\Pi_B = h\tilde{r}L - \frac{\delta}{1-\rho}L - c(L)$$

and consequently,

$$\frac{d\Pi_B}{dL} = h\tilde{r} - \frac{\delta}{1-\rho} - c' = 0 \Rightarrow \tilde{r} = \frac{\delta + (1-\rho)c'}{h(1-\rho)}$$

It follows that (5) and (5′) are equivalent to:

$$r^* = \tilde{r} + bL^* \quad (9) \qquad and \qquad r^* = (\tilde{r} + a)/2 \qquad (9')$$

respectively. Combining (9) with a supply curve of loans according to which the lending rate includes a mark-up offsetting the probability of default to discourage underground activities:

$$r = \tilde{r} + (1-h)L \qquad (10)$$

one concludes that $b = 1 - h$. Combining next (10) with (3) yields that:

$$r = \frac{\tilde{r}b + a(1-h)}{b + (1-h)}$$

or when $b = 1 - h$:

$$r = \frac{(\tilde{r} + a)b}{2b} = r^*$$

That is, if, for example, a Liapunov function in$b \neq 1 - h$ was defined regarding the dynamics of K and H, the equality between b and $1 - h$ would emerge as a globally asymptotically stable equilibrium. And, (8) could be simplified to read:

$$\frac{K^*}{H^* + K^*} = 1 - b \Rightarrow K^* = \frac{1 - b}{b} H^* \qquad (8')$$

From (8), $1 - b$ should exceed b, implying along with $1 - b > 0$ that $0 < b < 1/2$. This in conjunction with the derivative $dL/dr = -1/b$ from (3), lead to the conclusion that: The demand for loans is highly sensitive to lending rate changes. Or, that the penalty of the mark-up $(1 - h)L$ affects greatly the amount and purpose of borrowing and thereby the volume of investment in both formal and informal sectors.

The output of these sectors, Y and V, respectively, could be taken to derive from the production functions:

$$Y = \beta \left(\frac{nN}{K^*}\right)^{\gamma} \qquad (11)$$

for the formal sector, and:

$$V = \vartheta \left[\frac{(1 - n)N}{H^*}\right]^{\mu} \qquad (12)$$

for the underground economy, where N is total labor supply, n is the fraction of labor in the official economy, and β, ϑ, γ and μ are some positive constants, with $0 \leq \gamma, \mu < 1$. On the part of labor, its supply is fully inelastic at its full over the total economy employment level, N^*, capable of being channeled across sectors without frictions so as to be keeping consumption, c, at its equilibrium level, c^*. Optimal consumption derives from the maximization of the utility function: $U = \zeta c^{\sigma}$, which in view of the budget constraint: $c = Y + V + \Delta$, becomes:

$$U = \zeta(Y + V + \Delta)^{\sigma} \Rightarrow U = \zeta \left\{\beta \left(\frac{nN^*}{K^*}\right)^{\gamma} + \vartheta \left[\frac{(1 - n)N^*}{H^*}\right]^{\mu} + \Delta\right\}^{\sigma} \qquad (13)$$

where ζ and σ is some positive constants, with $0 < \sigma < 1$. The symbol Δ designates "other income", that is $(1 + \delta)D$ plus shares in the profits of banks and firms. (13) reflects the identity of preferences over consumption and income, postulated by the scenario describing our hypothetical economy. The purpose of labor is how to allocate labor between formal and informal activities so as c^* may be attained given K^* and H^* and hence, Δ does not enter into the relevant calculations:

$$\frac{dU}{dn} = \zeta\sigma c^{\sigma - 1} \left[\frac{\beta\gamma(N^*)^{\gamma} n^{\gamma - 1}}{(K^*)^{\gamma}} - \frac{\vartheta\mu(N^*)^{\mu}}{(H^*)^{\mu}}\right] = 0 \Rightarrow$$

$$n^* = \left(\frac{\vartheta\mu}{\beta\gamma}\right)^{\frac{1}{\gamma - \mu}} \frac{1}{N^*} \frac{K^{*\frac{\gamma}{\gamma - \mu}}}{H^{*\frac{\mu}{\gamma - \mu}}} \qquad (14)$$

or, in view of $(8')$,

$$n^* = \left(\frac{\vartheta\mu}{\beta\gamma}\right)^{\frac{1}{\gamma-\mu}} \left(\frac{1-b}{b}\right)^{\frac{\mu}{\gamma-\mu}} \frac{K^*}{N^*} \qquad (14')$$

From (14),

$$\frac{dn^*}{dK^*} = \left(\frac{\vartheta\mu}{\beta\gamma}\right)^{\frac{1}{\gamma-\mu}} \frac{1}{N^*} \left(\frac{\gamma}{\gamma-\mu}\right) \left(\frac{K^*}{H^*}\right)^{\frac{\mu}{\gamma-\mu}}$$

while from $(14')$,

$$\frac{dn^*}{dK^*} = \left(\frac{\vartheta\mu}{\beta\gamma}\right)^{\frac{1}{\gamma-\mu}} \frac{1}{N^*} \left(\frac{1-b}{b}\right)^{\frac{\mu}{\gamma-\mu}}$$

It follows from these two last derivatives that:

$$\left(\frac{\gamma}{\gamma-\mu}\right) \left(\frac{K^*}{H^*}\right)^{\frac{\mu}{\gamma-\mu}} = \left(\frac{1-b}{b}\right)^{\frac{\mu}{\gamma-\mu}} \Rightarrow \left(\frac{\gamma}{\gamma-\mu}\right)^{\frac{\gamma-\mu}{\mu}} \frac{K^*}{H^*} = \left(\frac{1-b}{b}\right)$$

which in conjunction with $(8')$ yields that:

$$\left(\frac{\gamma}{\gamma-\mu}\right)^{\frac{\gamma-\mu}{\mu}} \frac{K^*}{H^*} = \frac{K^*}{H^*} \Rightarrow \mu = 0$$

That is, utility is maximized when $V = \vartheta$: Once H is determined by the bank-firm interaction at H^*, labor sets n so as to maximize the utility from the output based on K^*. Bank monopoly power induces lexicographic preferences towards underground economy income. The meaning of lexicographic preferences is that what matters for utility maximization is the overall consumption from formal and informal activities regardless any preferences favoring consumption from one of them (see e.g. Whalley, and Zhang 2011). It is a sociological phenomenon documented by anthropological investigation, and it obtains here as a result of "orthodox" modeling, because of the assumption that the informal sector is an inescapable feature of any economy.[6] It does, however, explain why value added, productivity and quality, are low in this economy (see e.g. La Porta and Shleifer 2008).

2.2 The Introduction of Government

So far we have assumed a private only sector economy; no government and hence, taxes to finance its expenditures, and no central bank to issue money beyond the bank money which has been assumed implicitly until now. Let us know introduce a public sector in which the role of the government is a regulatory-agency one instituted to safeguard against the emergence of bilateral monopsony bargaining away from $\tilde{r}$. A too high lending rate would deter loan demand on the part of the firm, and a too low rate would undermine the profitability of lending on the part of the bank. Either case is highly likely as a solution to bilateral monopsony bargaining, investment of any kind would be hurt and unborrowed free reserves would pile up. The task of the government is to prevent the outgrowth of such trends through regulation, financing it through taxes.

Financing government intervention by selling bonds to the bank would prompt the bank to adopt bilateral monopsony bargaining practices in order to produce those unborrowed by the firm reserves that would be channeled to the government. The government rivals the private sector for bank funds, strengthening the bargaining power of the bank against the firm, and cancelling thereby its *raison d'être* as a social-welfare maximizing institution set out to control the bank. One reason why such a rivalry might come up is an income redistribution scheme at the expense of the people and benefiting (i) the banker itself by exploiting its monopoly position, and (ii) a rent-seeking bureaucracy, accommodating the banker's own interests by selling bonds to the bank that will never be redeemed.

In what follows, we examine the effects of both kinds of government, and by noting that it is a standard proposition of public finance theory that a firm and/or bank profit tax would not alter decisionmaking, *ceteris paribus*, that is, given the type of government. Either tax might be seen as the part of profit that goes to the government when profits are distributed to agents (i) under a balanced government budget in the case of the social-welfare maximizing government, and (ii) over and above the profit extracted by an exploiting banker and rent-seeking bureaucracy. Also, it is seen below that the connection of labor's choice with a personal income tax is not critical in influencing the stability of the system. So the focus of the discussion should be the indirect taxation under each type of government as follows.

Let us start with a social-welfare minded government whose expenditure G is wholly financed by *ad valorem* taxation on the bank at a rate τ and on the firm at a rate t. (4) and (5′) become:

$$\bar{L} = \frac{(1-\rho)(ha\tau - c') - \delta}{2hb\tau(1-\rho)} \qquad (15)$$

$$\bar{r} = \frac{\delta + (1-\rho)(ha\tau + c')}{2h\tau(1-\rho)} \qquad (16)$$

respectively, with $\bar{L} < L^* \Rightarrow -(1-\rho)c' < \delta$, which is true, and with $\bar{r} > r^* \Rightarrow (1-\rho)c' > -\delta$. In so far as the firm is concerned, (6) becomes:

$$\Pi_F = tm(\bar{L})^e - \bar{r}\bar{L} \qquad (17)$$

with

$$\frac{d\Pi_F}{dh} = \frac{tme[\delta + (1-\rho)c']}{2h^2b\tau(1-\rho)}\left[\frac{2hbt(1-\rho)}{(1-\rho)(ha\tau - c') - \delta}\right]^{1-e} - \frac{[\delta + (1-\rho)c']^2}{8h^3b(1-\rho)^2} = 0$$

or the same, the following cubic equation in h, assuming of course again that $e = 1/2$:

$$h^3[32b(me)^2(1-\rho)^2t^3] - h\{[\delta + (1-\rho)c']^2(1-\rho)at\tau^2\} + \tau^2[\delta + (1-\rho)c']^3 = 0$$

with only one real solution:

$$\bar{h} = \sqrt[3]{\frac{3\bar{\Phi} + \sqrt{9\bar{\Phi}^2 + 4\bar{\Psi}^3}}{6}} - \sqrt[3]{\frac{-3\bar{\Phi} + \sqrt{9\bar{\Phi}^2 + 4\bar{\Psi}^3}}{6}} \quad (18)$$

where $\bar{\Phi} = \{[\delta + (1-\rho)c']^2(1-\rho)at\tau^2\}/[32b(me)^2(1-\rho)^2t^3]$ and $\bar{\Psi} = \tau^2[\delta + (1-\rho)c']^3/[32b(me)^2(1-\rho)^2t^3]$. Comparing Φ^* with $\bar{\Phi}$, the two become equal when $t = \tau$, in which case $\Psi^* > \bar{\Psi}$; but,

$$\partial h/\partial \Psi = 12(6^{-4/3})\Psi^2(9\Phi^2 + 4\Psi^3)^{-1/2}\left\{\left[3\Phi + (9\Phi^2 + 4\Psi^3)^{1/2}\right]^{-2/3} - \left[-3\Phi + (9\Phi^2 + 4\Psi^3)^{1/2}\right]^{-2/3}\right\} > 0$$

and hence, $\bar{h} < h^*$. That is, all depends on the relationship between the two tax rates. Taxation will raise K for sure, or $\bar{h} > h^*$, if $\tau^2 > t^3$ so that both $\bar{\Psi} > \Psi^*$ and $\bar{\Phi} > \Phi^*$ given that:

$$\partial h/\partial \Phi = \frac{\left[3 + 9\Phi(9\Phi^2 + 4\Psi^3)^{-1/2}\right]\left[3\Phi + 9(9\Phi^2 + 4\Psi^3)^{1/2}\right]^{-2/3}}{3(6)^{1/3}} - \frac{\left[-3 + 9\Phi(9\Phi^2 + 4\Psi^3)^{-1/2}\right]\left[-3\Phi + 9(9\Phi^2 + 4\Psi^3)^{1/2}\right]^{-2/3}}{3(6)^{1/3}} > 0$$

In any case, the introduction of government alters the optimal h. But, recall that its purpose is to be keeping r at $\tilde{r}$, and this is managed as follows.

$$\Pi_B = h\tilde{r}\tau L - \frac{\delta}{1-\rho}L - c(L)$$

and consequently,

$$\frac{d\Pi_B}{dL} = h\tilde{r}\tau - \frac{\delta}{1-\rho} - c' = 0 \Rightarrow \tilde{r} = \frac{\delta + (1-\rho)c'}{h\tau(1-\rho)}$$

Equating this $\tilde{r}$ with (16) yields that:

$$\bar{\tau} = \frac{\delta + (1-\rho)c'}{ha(1-\rho)} \quad (19)$$

The government can keep r at $\tilde{r}$ by setting this tax rate, $\bar{\tau}$, for the bank. And, the relationship in general between $\bar{r}$ and $\tilde{r}$ is a replication of $(9')$:

$$\bar{r} = (\tilde{r} + a)/2 \qquad (9'')$$

Combining, next, (3) with (15) yields that $\bar{r} = \tilde{r} + b\bar{L}$, which when in turn is combined with the supply curve of loans: $r = \tilde{r} + (1-h)$, the conclusion that $b = 1 - h$ and that this equality is a globally asymptotically stable equilibrium continues to hold. The introduction of social-welfare minded government and indirect taxation does not influence the stability of the system. It is easily checked that in so far as the consumer-laborer is concerned, n would be affected but nothing else as it should be indeed the case under lexicographic preferences towards the informal sector. Equally easily may be verified that these preferences and the assumption of full employment suggest that neither the introduction of personal income taxation at some rate $\mathbb{t}$ would

alter the stability of the system beyond a further change in n.[7] These are conclusions under a social welfare minded government: $G = (\tau + t)L$. Or, under personal income taxation: $G = (\tau + t)L + \mathbb{t}(Y + V)$, in the absence, of course, of tax evasion that would prompt one consider V to be untaxed.

Things under a rent-seeking bureaucracy will be different if, assuming for simplicity away $\mathbb{t}$, $G = (\tau + t)L + \lambda D$ as follows: If λ is the fraction of D channeled by the bank to bond purchases, (2) becomes:

$$D = \frac{L}{1 - \rho - \lambda} \qquad (2')$$

with $(1 - \rho)$ in (4) and $(5')$ being replaced by $(1 - \rho - \lambda)$ in (15) and (16):

$$\hat{L} = \frac{(1 - \rho - \lambda)(ha\tau - c') - \delta}{2hb\tau(1 - \rho - \lambda)} \qquad (20)$$

$$\hat{r} = \frac{\delta + (1 - \rho - \lambda)(ha\tau + c')}{2h\tau(1 - \rho - \lambda)} \qquad (21)$$

To compare $\hat{L}$ and $\bar{L}$, and $\hat{r}$ with $\bar{r}$, we need to know which is the relative size of the τ involved in each expression. And, this may be found by asking which is the bank tax rate needed to ensure that $\hat{r} = \tilde{r}$ if this type of government wanted so. It is the rate:

$$\hat{\tau} = \frac{\delta + (1 - \rho - \lambda)c'}{ha(1 - \rho - \lambda)} > \bar{\tau} \qquad (19')$$

because $\hat{\tau} > \bar{\tau} \Rightarrow 0 > -ha\delta\lambda$, which is true. The difference, $\hat{\tau} - \bar{\tau} = ha\delta\lambda$, is what is appropriated by the bank in exchange of λD; it is a bank profit which is not distributed to the people, in exchange of the rent λD accruing to bureaucracy.

In so far as the firm is concerned, it has no other option but to act as a Stackelberg follower, setting subsequently:

$$\hat{h} = \sqrt[3]{\frac{3\hat{\Phi} + \sqrt{9\hat{\Phi}^2 + 4\hat{\Psi}^3}}{6}} - \sqrt[3]{\frac{-3\hat{\Phi} + \sqrt{9\hat{\Phi}^2 + 4\hat{\Psi}^3}}{6}} \qquad (22)$$

where $\hat{\Phi} = \{[\delta + (1 - \rho - \lambda)c']^2(1 - \rho - \lambda)at\tau^2\}/[32b(me)^2(1 - \rho - \lambda)^2t^3]$ and $\hat{\Psi} = \tau^2[\delta + (1 - \rho - \lambda)c']^3/[32b(me)^2(1 - \rho - \lambda)^2t^3]$. In view of $(19')$, $\hat{\Phi} > \bar{\Phi}$ and $\hat{\Psi} > \bar{\Psi}$ given t. And, since h is increasing in both Φ and Ψ, one concludes that $\hat{h} > \bar{h}$: The reduction of loanable funds brought about by government lending is in line with Fielding (2007). It appears to be discouraging firms from operating underground to lower the probability of default and benefit thereby as much as they can from the limited funds. And, again, no change in consumer behavior is expected other than adjusting n. But, once $(19')$ holds, b ceases to be equal to $1 - h$, and the system is forced to operate at an equilibrium away from the steady-state one.[8]

2.3 The Introduction of Tax Evasion

Taxation may induce the bank and the firm to tax evade. In our one bank-one firm-one person scenario, tax evasion does not make sense as all of these entities could be monitored by the government continuously. These entities are rather averages of a multitude of banks-firms-persons, respectively, differing only in tax compliance attitude. The tax evasion probabilities corresponding to banks and firms are p and q, respectively, and are the probabilities of tax audit. To keep calculations as simple as possible, penalties for tax evasion are assumed away. Under these circumstances, government borrowing becomes inevitable even for the social-welfare minded government. Thus, for the bank:

$$\Pi_B = (1-p)h(a-bL)L + p\tau h(a-bL)L - \frac{\delta}{1-\rho-\lambda}L - c(L)$$

$$\acute{L} = \frac{(1-\rho-\lambda)(haP-c') - \delta}{2hbP(1-\rho-\lambda)} \qquad (23)$$

$$\acute{r} = \frac{\delta + (1-\rho-\lambda)(haP+c')}{2hP(1-\rho-\lambda)} \qquad (24)$$

where $P = [(1-p) + p\tau] > \tau$ provided that $1 > \tau$. Similarly, for the firm:

$$\Pi_F = (1-q)m(\acute{L})^e + qtm\left(\acute{L}\right)^e - \acute{r}\acute{L}$$

with first order condition under $e = 1/2$:

$$\frac{d\Pi_F}{dh} = \frac{qtma[hb(1-\rho-\lambda)K] - qtmb\{(1-\rho-\lambda)[haK-c'] - \delta\}}{2hb\sqrt{2hb(1-\rho-\lambda)P\{(1-\rho)[haP-c'] - \delta\}}} - \frac{\delta(1-\rho-\lambda)^2[\delta + (1-\rho-\lambda)c']^2 + c'^2}{2h^3(1-\rho-\lambda)^4bP^2} = 0$$

from which the following value of h obtains:

$$\acute{h} = \sqrt[3]{\frac{3\acute{\Phi} + \sqrt{9\acute{\Phi}^2 + 4\acute{\Psi}^3}}{6}} - \sqrt[3]{\frac{-3\acute{\Phi} + \sqrt{9\acute{\Phi}^2 + 4\acute{\Psi}^3}}{6}} \qquad (25)$$

where

$$\acute{\Phi} = \frac{2a\{\delta(1-\rho-\lambda)^2[\delta + (1-\rho-\lambda)c']^2 + c'^2\}^2}{b\{qmt[\delta + (1-\rho-\lambda)c']\}^2(1-\rho-\lambda)^4P^2}$$

and

$$\acute{\Psi} = \frac{2(1-\rho-\lambda)\{\delta(1-\rho-\lambda)^2[\delta + (1-\rho-\lambda)c']^2 + c'^2\}^2}{b[\delta + (1-\rho-\lambda)c'][qmt(1-\rho-\lambda)^4]^2P^3}$$

Both, $\acute{\Phi}$ and $\acute{\Psi}$ decrease in P and hence, in τ, given that P appears only in the denominator of $\acute{\Phi}$ and $\acute{\Psi}$. This, in turn, implies that the introduction of τ reduces h when tax evasion is allowed given the direct relationship between h and Φ and Ψ. The same is true with regard to t as it too appears only in the denominator. Intuitively, this decline in h in response to tax evasion is something that should be expected,

indeed. By escaping taxes, banks lend more at a lower interest rate *vis a vis* what (20) and (21) indicate: $\hat{L} < \acute{L} \Rightarrow 2hb(1-\rho-\lambda)(1-p)[\delta+(1-\rho-\lambda)c'](\tau-1)<0$, which is true; and $\acute{r} < \hat{r} \Rightarrow 2h(1-\rho-\lambda)(1-p)[\delta+(1-\rho-\lambda)c'](\tau-1)<0$, which is also true. And, in order to escape taxes, firms increase underground investment.[9]

The case of the social-welfare minded government is that for which λ is equal to zero. This type of government could ensure that $\acute{r} = \tilde{r}$ by setting:

$$\acute{t} = \frac{(1-2p)[\delta+(1-\rho)c'] - (1-\rho)(1-p)ha}{p(1-\rho)ha - 2p[\delta+(1-\rho)c']}$$

To specify what is meant by $\lambda = 0$ under such a government, note that the part of government borrowing that goes to balance the budget can be identified through the relationship: $G = (p\tau+qt)L + sD = (\tau+t)L$, from which, in view of (2), one obtains that:

$$1-\rho = s - \frac{1-(\tau+t)}{(p\tau+qt)}$$

where the fraction of D channeled to borrowing is now s. Therefore, $1-\rho-\lambda = [\Xi-\lambda(p\tau+qt)]/(p\tau+qt)$, where $\Xi \equiv s(p\tau+qt)+(\tau+t)-1$. The case of the social-welfare minded government is that for which λ is zero in this expression,[10] and $\acute{t}$ may be rewritten as follows:

$$\acute{t} = \frac{(1-2p)[\delta(p\tau+qt)+\Xi c'] - \Xi(1-p)ha}{p\Xi ha - 2p[\delta(p\tau+qt)+\Xi c']} \qquad (26)$$

It may be easily checked that substituting for Ξ, a quadratic equation in $\acute{t}$ comes up, implying a nonlinear relationship between $\acute{t}$ and t if $\acute{r} = \tilde{r}$ is to be enforced.[11] These are the results in the absence of personal income taxation whose introduction would alleviate the borrowing needs of the social-welfare minded government. Yet, once there does exist such a need because, for instance, of personal income tax evasion, (26) is expected to hold. In any case, n is adjusted accordingly and the result that government borrowing lowers lending to the firm and leads thereby the system to an equilibrium away from steady-state, has to be qualified in the light of the increase of such lending brought about by tax evasion.

2.4 The Populist Government

According to Khemraj (2008), market power in bank lending in LDCs, may imply that excess liquidity and bank loans become substitutes at a low but still positive loan rate. Once, the marginal borrower is unwilling to pay the minimum rate, non-remunerative excess liquidity is accumulated by the bank. We have seen that within the context of the private sector exclusively, bank market power is not enough to arrive at a perfect substitutability between excess liquidity and lending. Neither such an eventuality would be to the best interest of a rent-seeking bureaucracy; much more so, of a social-welfare minded government. Yet, there is a third type of government that has to be considered since it has not been rare historically; namely that of the populist rent-seeking bureaucracy. It is the one that would force the bank to operate under the lowest r, i.e. that desired by the firm, below $\tilde{r}$, given (20), which is supposed to ensure the optimal unborrowed reserves that the government needs to exploit.

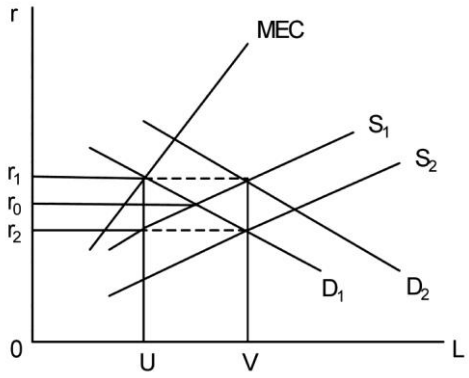

Figure 1

Figure 1 illustrates this case assuming taxation away to keep the diagram as simple as possible. D_1 is the demand curve for loans by the firm, which becomes D_2 when the demand from the non-social-welfare maximizing government is added. The supply curve of loans is given by S_1while MEC is the marginal expenditure curve of the firm. The market clearing r is r_0, and r_1 and r_2 are the maximum and minimum r which may be produced by bilateral bargaining with the bank. Unborrowed funds are UV and may be produced either through $r_1$with given S or via r_2 forcing in effect a downward shift of S to S_2. This, i.e. a loan market "in the hands" of a populist bureaucracy, might be an explanation of the emergence of perfect substitutability between excess liquidity and bank lending at low rates in LDCs where banks do possess market power.[12] The liquidity is in excess only seemingly, awaiting to be exploited by the populist government.

The presence of such an excess liquidity might also be taken as a sign of "lazy banking" in an environment of political instability encouraging sooner or later the emergence of a populist government, and having banks preparing financially themselves for this eventuality. As Emran and Farazi (2009, p. 1) note, government borrowing in developing economies "may create moral hazard and thus discourage the banks from lending to the risky private sector, and stifle their incentives to seek out new profitable investment opportunities in the private sector". And, the evidence they find in support of this hypothesis is overwhelming regardless the matter of excess liquidity at low interest rate. It is evidence about in general the absence of "Ricardian Equivalence" in developing countries. Evidence, which, within the context of this paper, implies increased competition by firms to secure lending, discouraging them even further to engage in underground activities in an environment of general economic decline, *ceteris paribus*: "[A] $1.00 more borrowing by government reduces private credit by about $1.40" (Emran and Farazi 2009, Abstract).[13]

3. Concluding Remarks

To sum up, assuming away dual economy considerations and international trade, a one firm-one bank-one laborer model was presented initially, as an abstract description of a private-only-sector developing economy. Bank monopoly power was found to induce lexicographic preferences towards underground economy income. The stability of the system depends on the relative size of the official to total capital ratio and the response of loan demand to the interest rate. Next, three types of government were introduced into the basic model. Government and indirect taxation do alter the optimal official to total capital ratio. But, the steady-state and stability of

the system remain unchanged under a tax financed balanced budget, which is defined to be the budget case under a social-welfare minded government. Government borrowing by a rent-seeking government or to cope with tax-evasion induced budget deficits lowers lending to the firm and leads thereby the system to equilibrium away from steady-state; but tax evasion increases such lending towards steady-state restoration. The third type of not only rent-seeking but populist too, bureaucracy, might be cited as a reason of experiencing perfect substitutability between excess liquidity and bank lending at some positive interest rate.

Dual economy characteristics have been assumed away from the discussion at no real-world relevance cost as the long standing critique against this approach appears to suggest (see e.g. Ghatak 1978). There does exist enormous heterogeneity of rates of return to the same factor of production within a single economy – see e.g. Banerjee and Duflo (2005) – so that a two at least sector economy might be contemplated. And, this paper too, follows the general trend by aggregate growth theory to disregard this reality. But, it is a paper based on a microeconomic feature of developing economies, namely that of a more or less bilateral monopsony in the loan market, linking at the same time this market with the presence of and the need to mobilize resources and capabilities that are hidden. The mentality underlying such an approach abides by Hirschman's (1965) view of development rather than macroeconomic growth. What is important for this paper methodologically is that macroeconomic dynamics should originate in the initial conditions shaped by so to speak "less aggregate" stylized facts, considering the overall economy as whole and not compartmentally.

An evaluation of the real-world relevance of the results should logically follow, but money financed budgets and the international factor play a major role in LDCs and both of these factors have been assumed away, too. To address the money issue, note that under a social-welfare minded government, seigniorage issuance would just lubricate "the machine". Money neutrality and superneutrality is expected to be the case in the absence of tax evasion. And, money issuance instead of government borrowing might be chosen to fill the tax gap in case of tax compliance problems, with the only effect being an overall system operating at a higher rate of inflation, *ceteris paribus*.

But, under any type of rent-seeking government, seigniorage issuance would constitute an additional source of income for the bureaucracy. A "restrained" bureaucracy will certainly choose less intervention in the private credit market; that is, less government borrowing, lessening subsequently the adverse effects of it on the steady state and its stability. Only, the inflation rate would be higher than under the social-welfare minded government. The inflation might easily get out of control, burdening further the stability problem of a system whose steady state is under stress from government borrowing and tax evasion, if bureaucracy chooses to be "extravagant"; much more so if government borrowing induces a "lazy bank" mentality.

In any case, IMF (2005) points out that over the last few decades, macroeconomic stability concerns have reduced significantly the reliance of governments in developing countries on inflation tax. Could borrowing from abroad have made any difference if of course issuance of sovereign debt in international markets or loan acquisition from foreign private banks were possible in practice?[14] The answer would

be in the affirmative if borrowed funds were channeled to public investment even if the risks of sovereign finance were small; otherwise, such borrowing is expected sooner or later to be recessionary regardless type of bureaucracy. And, the risks of sovereign finance have been such that to have induced in recent years, several developing countries to adopt aggressive policies aiming at retiring public external debt and substituting it with domestically issued debt (see e.g. Panizza 2008).

International trade and foreign direct investment do encourage *a priori* the overall economy and favor the official one. But, the experience of developing countries with the international sector has been one of "anarchy", making in practice impossible to handle borrowing from abroad efficiently even if the government is a social-welfare minded one. According to Baunsgaard and Keen (2005), the recent trade liberalization has resulted in a significant loss of tariffs, which has not been possible to recover through the introduction of value added taxation. And, the profit shifting by multinationals out of many developing countries and into tax havens has been so massive that has alarmed the international community altogether,...UNCTAD, Oxfam, Eurodad, IF Campaign, Christian Aid, International Bar Association,... (see e.g. Forstater 2012).

It is under such in general circumstances, circumstances of weak institutions and limited law enforcement as Singh, Jain-Chandra, and Mohommad (2012) would emphasize, and circumstances of neocolonialism one might add that the predictive power of the model presented earlier should be evaluated...

Footnotes

[1] These are actually economies where not only poverty but also low economic, institutional, and human resources prevail. The complete list of them as approved by the UN General Assembly in 1971 has as follows: In South Asia: Afghanistan, Bangladesh, Bhutan, and Nepal. South-East Asia: Cambodia Lao People's Democratic Republic, and Myanmar. In South-West Asia: Yemen. In South Pacific: Kiribati, Samoa, Solomon Islands, Timor Leste, Tuvalu, and Vanuatu. In Sub-Saharan Africa: Angola, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, São Tomé and Príncipe, Senegal, Sierra Leone, Somalia, Sudan, Togo, Uganda, United Republic of Tanzania, and Zambia. And, finally, Haiti in the Americas. These are all countries which moreover have to cope with geophysical challenges.

[2] Nowhere in the literature of the causes of underground economy (see e.g. Schneider and Enste 2000) is to be found the idea presented herein that this economy may be also the result of moral hazard, hidden information, on the part of borrowing firms. Standard debt contracts are inefficient in fostering incentive compatibility if the firm and the bank are not both risk neutral (see e.g. Freixas and Rochet 2008), and the real world is not one of "mutual" risk neutrality.

[3] This is a "heroic" assumption, but is made only to conform to the evidence; analytically, it is unnecessary.

[4] It is also a Piccione-Rubinstein (2007) jungle economy scenario and hence, the optima found below should be assessed in this connection too, as is done later herein.

[5] From a list of 162 countries only 9 of them were found with an underground economy exceeding the official one between 1999 and 2007: Azerbaijan, Georgia, Guatemala, Haiti, Nigeria, Panama, Tanzania, Uruguay, and Zimbabwe. Nevertheless, the trend over time is declining.

[6] Also, according to Houba Luttens, and Weikard (2014), in a farsighted (rather than myopic) jungle, the equilibrium is not a jungle, a coercive one, but coincides with lexicographic welfare maximization. Only myopia can prompt non-lexicographic, jungle equilibria in a jungle.

[7] If Y is only taxed, just replace $\beta\gamma$ in (14) and (14′) by $\mathbb{t}\beta\gamma$; and if V is taxed too, replace $\vartheta\mu$ in these expressions by $\mathbb{t}\vartheta\mu$ as well. The result that $\mu = 0$ does not change. This is in accordance with the proposition that in a farsighted jungle economy, initial holdings are irrelevant for lexicographic welfare maximization (see e.g. Houba Luttens, and Weikard 2013).

[8] As Rötheli (2012) shows in a dynamic context, rational and bounded rational default expectations under concentrated banking can even aggravate cyclical trends.

[9] The credit rationing implied by government borrowing is lessened in the presence of tax evasion, but continues to exist. The point is that contrary to what Dabla-Norris and Feltenstein (2003), for example, suggest, credit rationing is not the result of tax evasion once the bank is taxed, too.

[10] In any case, both τ and t enter both the numerator and denominator of $\acute{\Phi}$ and $\acute{\Psi}$. Letting $\Lambda \equiv p\tau + qt$, $\acute{\Phi}$ and $\acute{\Psi}$ become:

$$\acute{\Phi} = \frac{2a\{\delta(\Xi - \lambda\Lambda)^2[\delta\Lambda - (\Xi - \lambda\Lambda)c']^2 + \Lambda^4 c'^2\}^2}{b\{qmt[\delta\Lambda + (\Xi - \lambda\Lambda)c']\}^2(\Xi - \lambda\Lambda)^4 P^2}$$

and

$$\acute{\Psi} = \frac{2(\Xi - \lambda\Lambda)\{\{\delta(\Xi - \lambda\Lambda)^2[\delta\Lambda + (\Xi - \lambda\Lambda)c']\}^2 + \Lambda^4 c'^2\}^2}{b[\delta\Lambda + (\Xi - \lambda\Lambda)c'][qmt(\Xi - \lambda\Lambda)^4]^2 P^3}$$

The qualitative result that Φ and Ψ decrease in τ and t remains and imposes restrictions on parameter values, which are of no concern here.

[11] The quadratic equation is: $\acute{\tau}^2\omega_1 + \acute{\tau}\omega_2 + \omega_3 = 0$, where $\omega_1 \equiv \{p[ha(1+sp)] - c'(1+sp) - 2\delta p^2\}$, $\omega_2 \equiv \{t[(pha - c')(1+sq) - 2\delta pq] + ha(1-p)(1+sp) - (1-2p)[\delta p + c'(1+sp)] - (pha + c')\}$, and $\omega_3 \equiv \{t\{(1+sq)[ha(1-p) - (1-2p)c'] - (1-2p)\delta a\} + (1-2p)c' - ha(1-p)\}$.

[12] Does this mean from Khemraj's (2008) evidence about such substitutability in 6 countries (between roughly 1999 and 2007) that these countries had populist governments or political instability leading to populism? These countries are Guyana, Namibia, Tanzania, Trinidad & Tobago, Uganda, and Zambia. And, a simple search for their history in *Wikipedia* suffices to show that all of them have been subject to great instability, indeed.

[13] Equally broader as the issue of lazy banking is the matter of public sector corruption in connection with the rent-seeking bureaucracy, and of private sector corruption in connection with tax compliance. Is such a bureaucracy corrupt? If rent-

seeking signifies corruption, the answer will be in the affirmative. The same "goes" for the private sector. But, corruption has many facets which should not bother us here in order to avoid the temptation linking it such issues as political and/or market competition (see e.g. Montinola and Jackman 2002), efficiency-enhancing, (see e.g. Barreto 2001, and Ahmad, Ullah, and Arfeen 2012), etc. For us, here, any government can be democratic or dictatorial, bank market concentration may become the source of public sector "corruption" *ex hypothesi*,such corruption is found to be hampering efficiency whereas private sector "corruption" is found to be improving it...

[14] The access of developing countries to international financial markets should not be taken for granted. As Gelos, Sahay, and Sandleris (2004, p. 3) indicate, questions like the following all matter: "At what development stage can low-income countries expect to be able to tap the international capital markets? Which characteristics differentiate those countries that are able to borrow regularly from those that are only occasionally or never able to do so? To which extent do government policies matter for capital market access?"

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