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**Public Banks and the
Productivity of Capital**

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PUBLIC BANKS AND THE PRODUCTIVITY OF CAPITAL*

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ABSTRACT. Weak institutions are shown to create scope for public banks to play a growth-promoting role, even if such banks are less efficient than private banks.

KEYWORDS: Economic growth, governance, regulation

JEL: O16, G18, G28, K42

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1 Introduction

A growing literature challenges the view that public banks are detrimental to economic growth (Andrianova, Demetriades and Shortland 2011, Ang 2011, Körner and Schnabel 2011).¹ Andrianova et al. (2011), for example, provide new evidence suggesting that during 1995–2007 public banks have been associated with higher growth rates. These results lend support to a modern version of the ‘developmental’ view of public banks, made relevant by failures in corporate governance and regulation. Such failures allowed private banks in developed countries to behave opportunistically, aiming at maximizing short term trading profits and relying on government safety nets to cover hidden risks (Johnson 2009, Kane 2010).

The aim of this paper is to illustrate in a formal setting a plausible mechanism through which public banks can play a growth-promoting role, even if such banks are less efficient than private banks. To this end, the paper puts forward a model of banking competition in which there are two types of private bank—honest and opportunistic—alongside a public bank. It is assumed that depositors cannot distinguish between honest and opportunistic banks. When regulation is weak, opportunistic banks can take excessive risks with depositors’ money, by engaging in socially unproductive speculation. These assumptions accord well with stylized facts surrounding the recent financial crisis, such as the compounding of agency problems by the invention of new and complex financial products, which were mainly designed to conceal large tail risk and to enrich bankers in the good state of the world.²

The model builds on Andrianova, Demetriades and Shortland (2008), which introduces a public bank into the “circular city” model of banking competition.³ The main novelty here is the introduction of a speculative investment which represents a natural way to capture opportunistic behavior by banks. In contrast, the kind of opportunism analyzed in Andrianova et al. (2008) involves wildcat banking (banks optimally choosing whether to appropriate depositors’ money),

¹Altunbas, Evans and Molyneux (2001) and Karas, Schoors and Weill (2008) study the relative efficiency of public banks.

²Private banks’ increased appetite for taking and concealing such risks to boost private rewards was documented before the current crisis by Rajan (2005) and coined, post-crisis, “casino banking” by Bank of England Governor Mervyn King.

³The model was developed by Salop (1979) and applied to banking by Freixas and Rochet (1997).

a setting more relevant for transition.

2 Model

Private banks and a continuum of risk-neutral depositors are located along a circle of unitary length. Depositors are uniformly distributed with unitary distribution density. A depositor incurs transportation cost $\alpha > 0$ which is proportional to the distance between the depositor and the bank. In the centre of the circle, a public bank has been in existence for some time and as such has equal appeal to all depositors.

The depositors are endowed with 1 unit of cash but do not have direct access to investment opportunities, to earn a return they need to deposit their cash in a bank. The money collected from private depositors can be invested into a safe technology with a constant rate of return r . All banks, private and public, have access to this technology. A proportion $\gamma \in (0, 1)$ of private banks have, in addition, access to a risky technology (“gambling”) which returns R with probability $\rho \in (0, 1)$ or zero with probability $1 - \rho$. These private banks are “opportunistic” in contrast to the “honest” banks that have no access to gambling. An opportunist chooses whether to invest safely or to gamble with depositors’ money.⁴ The type of private bank is private information, while the value of γ is common knowledge.

Because of the riskiness of the gambling technology, an opportunistic bank fails to honour its deposit contract whenever the realized return is zero. Gambling is socially unproductive: $\rho R < r$. As such, it is prohibited by the regulator: a private bank that chooses to gamble is found out with probability λ and if additionally the positive return from gambling is realized, the bank is fined an amount $f > 0$ per deposit contract.⁵ Investments in the risky technology that return zero are sunk. In such a case, depositors lose their deposit but with probability $\lambda \in (0, 1)$ are compensated by the amount $0 < d \leq 1$ through a deposit insurance scheme.⁶

⁴Alternatively, we can think of all banks having access to both technologies, but some (public and $1-\gamma$ proportion of private banks) are prevented from “gambling” by stricter internal governance.

⁵If the realized gambling return is zero, the regulator is powerless to impose a fine.

⁶The depositor compensation probability does not have to be the same as the bank punishment probability. Nevertheless, as the two measure different aspects of government effectiveness, they are likely to be highly correlated and in the model are treated both as λ for expositional convenience.

The public bank offers a net deposit rate of $r_s = r_s^0 - \alpha/(2\pi) > 0$ to all depositors. Private banks are located anywhere along the circle with bank i offering deposit rate r_i ($i = 1, \dots, n$) which is set so as to maximize profits. There are potentially many identical private banks that can enter the industry at a positive fixed cost, F , and with free entry n banks will enter.

The timing of events is as follows.

- (1) Private banks decide whether to enter; n banks enter.
- (2) Private bank i ($i = 1, \dots, n$) sets its deposit rate r_i .
- (3) Each depositor chooses the bank in which to place the deposit of 1 monetary unit.
- (4) Banks invest. Opportunistic banks choose whether to invest safely or to gamble.
- (5) Investment returns are realized. Risky investments are discovered with probability λ .
- (6) Payoffs are realized.

Let $\kappa \in \{0, 1\}$ represent an opportunist's decision to invest safely ($\kappa = 0$) or to gamble ($\kappa = 1$). The expected payoffs of the depositor located at distance x_i from a private bank i and depositing his money in bank i is

$$U_i = [1 - \gamma\kappa(1 - \rho)] \cdot (1 + r_i) + \gamma\kappa(1 - \rho)\lambda d - \alpha x_i, \quad (1)$$

where κ is set by the opportunist to maximize its profits. If the depositor, instead, puts his money into the public bank, then his payoff is

$$U_s = 1 + r_s \quad (2)$$

because every depositor is one radius away from the public bank. The expected payoffs of an honest bank and an opportunistic bank are, respectively:

$$V_i^{1-\gamma} = (r - r_i) \cdot D_i, \quad (3)$$

$$V_i^\gamma = (1 - \kappa)(r - r_i) \cdot D_i + \kappa\rho \cdot [R - r_i - \lambda f] \cdot D_i. \quad (4)$$

The public bank's expected payoff is $V^s = (r - r_s^0) \cdot D_s$. There is an assumed bias against it:

Assumption 1 $r_s \leq r - 3/2 \cdot \sqrt{\alpha F}$ (A1)

i.e. in the absence of gambling, a private bank is more efficient than the public bank.

Assumption 2 (A2)
 $\alpha F > 1$ and $f > R - r$

that is, the costs borne by private banks and depositors (set up and transportation) are higher than an individual deposit, and also the punishment of a bank found by the regulator to have gambled is higher than the excess return from gambling.⁷

3 Results and Discussion

Three types of (pure strategy) equilibria are possible in this model. “High” equilibrium (HE) where there is no gambling by private banks and no demand for public banking; “intermediate” equilibrium (IE) with both the public and private banks having positive demand for deposit contracts, and “low” equilibrium (LE) where only public banking is demanded and no private bank enters.

For expositional convenience, define the following bounds:

$$\lambda_g \equiv \frac{\rho(R - r) - (1 - \rho)\sqrt{\alpha F}}{\rho f}, \tag{5}$$

$$\lambda_x \equiv \frac{\gamma(1 - \rho)(1 + r) - (r - r_s)}{d(1 - \rho)}, \tag{6}$$

$$\tilde{n} \equiv \frac{1}{2F} \left(r - \frac{(1 - \rho)(1 - \lambda d)\gamma r_s}{1 - \gamma(1 - \rho)} \right) \tag{7}$$

Proposition 1 *Assume (A1) and (A2). A unique equilibrium exists and it is of type:*

- (i) HE, if $\lambda \geq \lambda_g$. Then $r_i = r - \sqrt{\alpha F}$, $D_i = \sqrt{F/\alpha}$, and $n = \sqrt{\alpha/F}$ ($i = 1, \dots, n$);
- (ii) IE, if $\lambda_x \leq \lambda < \lambda_g$. Then $r_i = \frac{1}{2} \left[r + \frac{r_s + \gamma(1 - \rho)(1 - \lambda d)}{2(1 - \gamma(1 - \rho))} \right]$, $D_i = [r - r_s - \gamma(1 - \rho)(1 + r - \lambda d)]/\alpha$ and $n < \tilde{n}$ ($i = 1, \dots, n$);
- (iii) LE, if $\lambda < \min\{\lambda_x, \lambda_g\}$. Then $D_i = 0$ ($i = 1, \dots, n$), and $n = 0$.

⁷If the fine for gambling is “small”, opportunists will find it optimal to gamble even when likelihood of punishment is high and that of positive return from gambling is small.

Sketch of the proof: The model is solved by backward induction. Firstly, for a given strategy of opportunistic banks, κ , depositor located at x_i from private bank i picks the larger between U_s and U_i . Secondly, given the realized deposit demand, D_i , measured as a distance between bank i and a marginal depositor (for whom $U_s = U_i$), honest bank i sets r_i to maximize profits. An opportunistic bank j sets its r_j to mimic r_i of the honest bank so as to avoid revealing its true type. Finally, for a given D_i and r_i , bank i decides whether to enter. Under (A1) and (A2), the bounds on λ arise from (i) an opportunist's calculation to gamble [$V^\gamma(\kappa = 1) > V^\gamma(\kappa = 0)$ if $\lambda < \lambda_g$], and (ii) depositor's preference, or lack of it, for private banking [$U_i|_{\kappa=0} > U_s$ if $\lambda > \lambda_x$].

Remark 1 *The depositors' demand for private banking is greater when institutional quality, λ , is higher and the proportion of opportunistic banks, γ , is lower.*

This follows from part (ii) of the proposition, since in IE the demand for a private bank i , D_i , is an increasing function of λ and a decreasing function of γ .

Remark 2 *When private and public banking co-exist, the productivity of capital is increasing with institutional quality, decreasing with the proportion of opportunistic banks and (consequently) increasing with the share of deposits in the public bank.*

This follows from the observation that in IE, the only equilibrium in which there is positive demand for both private and public deposit contracts, the productivity of capital is inversely related to the total capital invested in the speculative activity. The latter happens to be $\gamma \cdot n(\gamma, \lambda) \cdot D_i(\gamma, \lambda)$, and it is rising with λ and falling with γ .

4 Concluding Remarks

These results have policy implications which are particularly relevant today when many banks not only in developing but also in developed countries remain in state hands. They suggest that unless financial regulation can effectively prevent speculative investments, privatization of public banks may be detrimental. In terms of future research, these results suggest that it may be fruitful to continue exploring models in which banks can behave opportunistically and default can be an equilibrium phenomenon.

References

- Altunbas, Y., L. Evans, and P. Molyneux (2001) ‘Bank ownership and efficiency.’ *Journal of Money, Credit and Banking* 33(4), 926–954
- Andrianova, S., P. Demetriades, and A. Shortland (2008) ‘Government ownership of banks, institutions, and financial development.’ *Journal of Development Economics* 85, 218–52
- Andrianova, S., P. O. Demetriades, and A. Shortland (2011) ‘Government ownership of banks, institutions and economic growth.’ *Economica*. In press. DOI: 10.1111/j.1468-0335.2011.00904.x
- Ang, J. (2011) ‘Financial development, liberalization and technological deepening.’ *European Economic Review* 55, 688–701
- Freixas, X., and J.-C. Rochet (1997) *Microeconomics of Banking* (Cambridge, Mass.: MIT Press)
- Johnson, S. (2009) ‘The quiet coup.’ *The Atlantic Online*
- Kane, E.J. (2010) ‘The importance of monitoring and mitigating the safety-net consequences of regulation-induced innovation.’ *Review of Social Economy* 68(2), 145–161
- Karas, A., K. Schoors, and L. Weill (2008) ‘Are private banks more efficient than public banks? evidence from Russia.’ BOFIT Discussion Papers 3/2008, Bank of Finland
- Körner, T., and I. Schnabel (2011) ‘Public ownership of banks and economic growth—the role of heterogeneity.’ *Economics of Transition* 19(3), 407–441
- Rajan, R. G. (2005) ‘Has financial development made the world riskier?’ NBER Working Paper No w11728
- Salop, S. (1979) ‘Monopolistic competition with outside goods.’ *Bell Journal of Economics* 10(1), 141–56