The simple analytics of oligopoly banking in developing economies

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Abstract

Previous studies have documented the tendency for the commercial banking sector of many developing economies to be highly liquid and be characterised by a persistently high interest rate spread. This paper embeds these stylised facts in an oligopoly model of the banking firm. The paper derives both the loan and deposit rates as a mark up rate over a relatively safe foreign interest rate. Then, using a diagrammatic framework, the paper provides an analysis of: (i) the distribution of financial surplus among savers, business borrowers and banks; (ii) exogenous deposit shocks; (iii) exogenous loan demand shocks; and (iv) the impact of interest rate control on financial intermediation.

JEL Codes: D30, E40, G21

Keywords: Oligopoly, commercial banks, developing economies, distribution

1. Introduction

The paper presents an application of an oligopolistic model of the banking firm to developing economies. Klein (1971) provided an early monopolistic theoretical framework of the banking firm, which was later applied and extended in various directions by Slovin and Sushka (1983) and Hannan (1991). An oligopolistic version of the Klein monopolistic banking model was presented by Frexias and Rochet (1999). This article applies the framework of Frexias and Rochet to analyse banking in developing economies. In particular, banks are postulated to mark up the loan rate over a relatively risk-free foreign interest rate plus domestic marginal cost of bank production. As the typical developing economy is open and without an internationally recognisable reserve currency, the banks must decide whether to make loans domestically or invest in a relatively low risk foreign asset. Thus the foreign interest rate is fundamental to the domestic structure of interest rates.

[1] A previous version of this paper was presented at the 41st Annual Monetary Studies Conference in Guyana (Nov 2009) and at the 79st Annual Conference (Nov 2009) of the Southern Economic Association, San Antonio Texas. I gratefully acknowledge helpful comments from conference participants and two anonymous referees. Errors which might remain are my responsibility.

In addition, the deposit rate is a mark up over the risk-free foreign rate. This is because the bank with oligopolistic market power would need to mobilise deposits in local and foreign currency. The deposits are then used by banks to make loans or invest in foreign assets; or banks hold excess liquidity. However, before investing in foreign assets, the typical bank would need to use deposits to purchase foreign currency from the domestic foreign exchange market[2]. It is therefore in the interest of banks to ensure that the domestic deposit rate is attractive relative to the foreign interest rate so as to be able to mobilise funds in local currency and foreign currency deposits when possible.

The analysis that follows postulates there is an asymmetry in the determination of the rate of interest; in other words, banks determine the deposit and lending rates and the public accepts the rate as given. This stems from the fact that commercial banks are the dominant financial firms in the financial system of the developing world and this institutional feature is likely to persist indefinitely. The latter point was underscored long ago by Stiglitz (1989, 61) when he wrote: "LDCs must expect that firms within their economies will have to rely heavily on bank lending, rather than securities markets, as sources of funds. While it may do little harm to try to promote the growth of securities markets, both markets for equities and long-term bonds, these are likely to promote only a small fraction of funds firms require." The latter point was reinforced more recently by the findings of de la Torre, Gozzi and Schmukler (2007) that equity markets in developing economies are suffering from delisting and high concentration, with only a few stocks dominating market capitalisation and trading. Therefore, the study of oligopoly banking and the role they play in financial intermediation – especially in developing economies – is still an important endeavour that needs some attention.

It is often noted that financial deregulation and openness ought to make the domestic banking sector contestable and therefore competitive, thereby diminishing the asymmetry in ability of financial institutions to determine interest rates. But it should be noted that in most cases foreign banks enter to do business in the domestic market and not always to set up offshore banking in the nebulous external markets. Each branch of a multinational bank must pull its own weight and is not likely to be subsidised indefinitely by the parent company. Therefore, entry into the developing economy is ultimately restricted by the capacity of that country to generate profitable business opportunities. In the end, the size of the economy and the level of development act as natural entry barriers. Hence, banks are likely to possess some degree of market power in determining interest rates – in this case the loan and deposit rates. The purpose of this paper is to analyse what the asymmetry in the ability to set interest rates means for distribution and financial intermediation.

The paper is structured as follows. Section 2 presents some stylised facts to motivate the diagrammatic presentation of the model. Section 3 derives the mark up

[2] It would be helpful to note that the foreign exchange market in most developing economies is not integrated with the external markets because most countries do not possess a global reserve currency. So for instance the quantity of US dollars or Euros traded in Jamaica or Guyana (against the local currency) is determined by that country's capacity to earn hard currencies. The quantity of foreign exchange in the domestic market would be a function of the country's exports, remittances, and other capital inflows.

interest rates and sets up the market equilibrium conditions. Section 4 examines such issues as distribution, intermediation and interest rate control using a diagrammatic approach. Section 5 concludes.

2. Stylised Facts

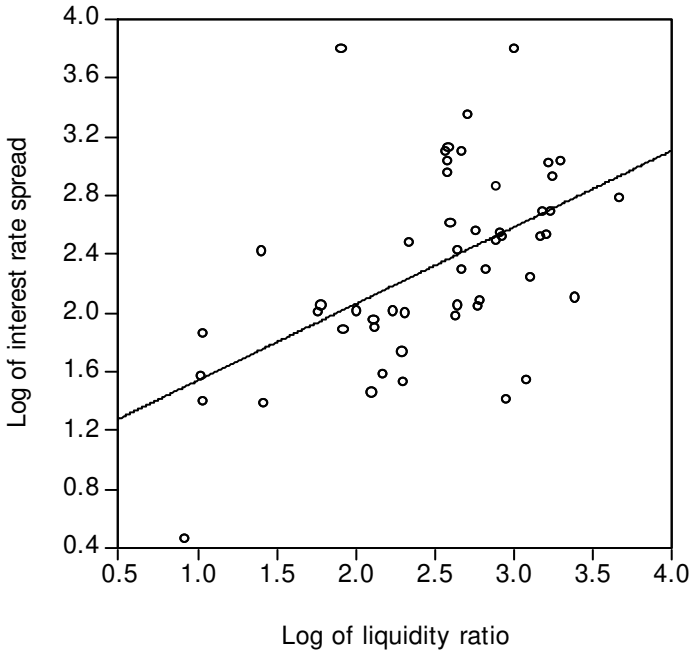
It has been recognised for quite some time that interest rate spread – the difference between the lending rate and the deposit rate – is quite high in developing economies. The spread has tended to persist in a post-liberalised environment also and it has been documented by several authors; see for instance Chirwa and Mlachila (2004), Moore and Craigwell (2002), and Gelos (2006). In general high bank overhead cost of production, market power[3] and high liquidity levels are seen as key factors driving the persistent spread in the post-reform period. Commercial banks in developing economies also hold a high ratio of liquid assets – excess reserves and domestic government securities – in their asset portfolio. This key stylised fact is documented by Saxegaard (2006), Fielding and Shortland (2005) and Khemraj (2010).

Figure 1 shows that there is a positive relationship between excess bank liquidity and interest rate spread. On the vertical axis is the percentage interest rate spread; while on the horizontal axis is the ratio of bank liquid assets to total assets. Both series were obtained from the World Bank's *World Development Indicators*. The scatter plot is based on 52 developing economies (the list of countries is presented in Appendix 1). The average spread and liquid asset ratio is calculated by averaging the annual rates for the period 1996 to 2007. The latter time period is chosen to represent the post-reform era of different parts of the world; in other words, the period minimises the bias of financial repression on bank behaviour and it corresponds with heightened financial reforms and innovations around the world (see de la Torre, Gozzi and Schmukler 2007).

Moreover, a rudimentary OLS regression gives:
$\log(spread) = 1.02 + 0.522\log(LIQ)$ with $R^2 = 0.28$. It should be noted that this regression is not intended to make a causal argument but more for illustration purpose. Furthermore, liquidity and spread are modelled as endogenous variables – as they are determined jointly – later in the analysis.

[3] While monopolistic or oligopolistic market power is likely to be important in developing economies, it has also been emphasised for the deposit market and the setting of the deposit rate in the United States. For those studies see Neumark and Sharpe (1992) and Hannan and Berger (1991).

Figure 1: Interest rate spread (vertical axis) and bank liquidity ratio (horizontal axis)



3. Derivation of the Mark-up Rates

This section assumes an oligopolistic model of the representative banking firm, which is assumed to make a choice between investing in loans at home and investing in a relatively safe foreign asset. This outcome is not implausible as most developing countries do not possess an internationally accepted currency which acts as a medium of exchange (a vehicle currency used to settle international payments) or as a store of value (an international reserve currency). Thus the foreign interest rate becomes critical to the analysis. This application of the banking model implies one fundamental difference to the framework used by Frexias and Rochet (1999), Hannan (1991) and Klein (1971). The latter authors assumed that the bank takes the domestic Treasury bill rate as given. While this is relevant to the United States, it is not necessarily the case for highly open developing economies. A representative bank in the latter economies has to always consider whether to invest a marginal quantity of funds at home in loans or in a relatively safe foreign asset like US Treasury bills or even foreign currency deposits in an overseas counterpart bank. Therefore, the bank takes the foreign interest rate as given.

Equation 1 is the representative bank's profit function that is assumed to be concave in loans to the private sector (L); foreign assets (F); and deposits (D). The i subscript attached to each variable signals the quantity of the respective variable held by the representative bank. Other key variables include r_L = the average lending rate; r_D =

average deposit rate; r_F = rate of interest on the international security or foreign rate; $c_i(L)$ = transaction and monitoring costs associated with making loans to private agents; and ρ = a probability function representing the proportion of borrowers (where: $0 \le \rho \le 1$) who are likely to default on their loans. The bank's balance sheet identity is denoted by equation 2 in which zD = the percentage of deposits kept as total liquid assets, which could be remunerated or non-remunerated liquidity (where z = a percentage). Since it does not change the analysis fundamentally, assume the nominal exchange rate is fixed at 1.

$$\Pi_i = (1-\rho) r_L(L) L_i + r_F F_i - r_D(D) D_i - c_i(L) \quad (1)$$

$$zD_i + F_i + L_i = D_i \quad (2)$$

Equation 3 is obtained by solving the balance sheet constraint for F_i and substituting into equation 2.

$$\Pi_i = [(1-\rho) r_L(L) - r_F] L_i - [r_D(D) - r_F(1-z)] D_i - c_i(L) \quad (3)$$

$$L = L_i + \sum_{i \neq j} L_j \; ; \; D = D_i + \sum_{i \neq j} D_j \quad (3a)$$

The analysis follows Freixas and Rochet (1999) by assuming a Cournot oligopoly. In the Cournot equilibrium the *i*th bank maximises profit by taking the volume of loans and deposits of other banks as given. In other words, for the *i*th bank, (L_i^*, D_i^*), solves equation 3. Equation (3a) denotes the aggregate quantity of loans and deposits demanded, respectively, by the entire banking sector.

The loan market

Equation 4 is the first order condition after maximising the profit function with respect to L_i. The market demand curve the bank faces is downward sloping thus giving the elasticity of demand expression in equation (4b). The symbol ε_L represents the bank's elasticity of demand. There is a unique equilibrium in which bank *i* assumes $L_i^* = L^* / N$, where *N* denotes the number of commercial banks that makes up the banking sector[4]. The expression $r_L'(L)$ represents the first derivative of the loan rate with respect to *L*. As demonstrated by (4a) it is simply the inverse of $L'(r_L)$.

$$\frac{d\Pi_i}{dL_i} = (1-\rho) r_L(L) + (1-\rho) r_L'(L) L_i - r_F - c_i'(L) = 0 \quad (4)$$

[4] The use of *N* weighs each bank equally. This is clearly an unrealistic assumption for the purpose of making the mathematics tractable. Nevertheless, the simplification does not change the conclusion of the model.

$$r_L'(L) = 1 / L'(r_L) \tag{4a}$$

$$\varepsilon_L = r_L \cdot L'(r_L) / L \tag{4b}$$

Substituting 4a and 4b into the first order condition yields equation 5, which shows that the loan rate is a mark up over the foreign rate and the marginal cost of doing business, $c_i'(L)$. The mark up is dependent on the inverse of the product of *N* and the market elasticity of demand (ε_L) for loans. As $N \to 1$ there is the case of a monopoly and the mark up is highest, while as $N \to \infty$ one bank has an infinitesimal share of the market; the equilibrium approaches the competitive state in which the mark up approaches zero. The bank also increases the mark up rate once the perceived probability of default increases (that is: $\rho \to 1$). This mark up rate, moreover, represents the de-repressed rate that is likely to occur in the period of financial reforms and liberalisation when private banks rather than government mandate determine the interest rate.

$$r_L(1 + \frac{1}{N\varepsilon_L}) = [r_F + c_i'(L)] / (1 - \rho) \tag{5}$$

From equation 5 the minimum loan rate is

$$r_L^{\min} = \frac{r_F + c_i'(L)}{(1-\rho)(1 + \frac{1}{N\varepsilon_L})}$$

The private sector's demand for business loans is downward sloping as firms seek to maximise the discounted future stream of cash flow (equation 7); where CF_t = cash flow at time period *t*, y_t = level of physical output; p_t = unit price; W_t = number of workers employed; w_t = the wage rate; and L_t = the quantity of loans borrowed in time period *t* that goes towards purchasing new capital goods. The demand for business loans is inversely sloping because an increase in r_L diminishes the present value of *CF* and thus the demand for business credit. The opposite occurs when the minimum mark-up lending rate falls. Note that the foreign interest rate serves as the discount rate because instead of investing at home the business owner could invest capital abroad in a relatively safe foreign financial asset.

$$CF_t = p_t y_t - w_t W_t - r_L L_t \tag{6}$$

$$CF_{PV} = \sum_{t=0}^{T} \frac{(p_t y_t - w_t W_t - r_L L_t)}{(1 + r_F)^t} \tag{7}$$

Equilibrium in the loan market occurs when the minimum rate (given by equation 5) intersects the demand for business loans. The loan market equilibrium condition can be written as follows

$$L_P(r_L, \Omega) = L_S(r_L^{\min}) \qquad (9)$$

Where L_P = the private sector's demand for business loans and Ω = a vector of other exogenous determinants of the demand for business loans that shift the loan demand curve. The expression $L_S(r_L^{\min})$ represents the loans offered when evaluated at $r_L^{\min}$, which is given by equation 5. Later in the paper the expression $r_L^{\min}$ is represented by a horizontal line, which indicates the banks determine the rate and the borrowing public accepts it as given.

From equation 5 the following general derivative conditions are assumed to exist:

$$r_L^{\min\prime}(r_F) > 0,\ r_L^{\min\prime}(\rho) > 0,\ r_L^{\min\prime}[c_i'(L)] > 0,\ r_L^{\min\prime}(N) < 0$$

The demand for loans is inversely related to the loan rate

$$L_P'(r_L) < 0.$$

The deposit market

The deposit rate can be derived in similar manner. The first order condition is represented by equation 10. Let us assume there is a unique equilibrium in which bank *i* assumes $D_i^* = D^* / N$, where *N* denotes the number of commercial banks that comprise the banking system. $r_D'(D)$ represents the first derivative of the deposit rate with respect to *D*. The public's elasticity of supply of deposits is given by ε_S (equation 10b). Substituting 10a and 10b into equation 10, and noting the unique equilibrium, gives the mark up deposit rate equation 11.

$$\frac{d\Pi_i}{dD_i} = r_D(D) + r_D'(D)D_i - r_F(1-z) = 0 \qquad (10)$$

$$r_D'(D) = 1 / D'(r_D) \qquad (10a)$$

$$\varepsilon_S = r_D \cdot D'(r_D) / D \qquad (10b)$$

$$r_D\left(1 + \frac{1}{N\varepsilon_S}\right) = r_F / (1-z) \qquad (11)$$

From equation 11 the maximum deposit rate, given the foreign interest rate, banks are willing to pay the public is given by

$$r_D^{\max} = \frac{r_F}{(1-z)(1+\frac{1}{N\varepsilon_S})}$$

Equation 11 implies the deposit rate approaches the foreign interest rate as $N \to \infty$ assuming $z = 0$. It also implies that the rate is a positive function, everything else remaining constant, of the percentage deposits (z) kept by the banking system as liquid assets – which can be domestic government securities or non-remunerated excess liquidity. As an aside, note that increasing z could prevent cash from leaving the domestic banking system to the extent that capital flight is a function of the deposit rate. However, the percentage z is non-binding as the banking system of many developing economies is highly liquid (Khemraj 2010 and Saxegaard 2006). Even if the central bank increases or decreases the ratio the system could still hold on to excess liquidity[5]. Thus, the quantity of liquid assets is endogenous in the model and analysis of this article.

The public's supply of deposits is upward sloping in the deposit rate-deposit quantity space. This is because the public desires to maximise the discounted future stream of returns (R) on deposits given by equation 12. The return on deposits is a function of the deposit rate; this is written in general format as $R_t(r_D)$. Like firms, depositors are likely to consider the foreign rate of interest when making the discount. The equilibrium level of deposit is obtained by substituting $r_D^{\max}$ into the deposit supply function. Note that R_{PV} equals the present value of the future returns on deposits:

$$R_{PV} = \sum_{t=0}^{T} \frac{R_t(r_D)}{(1+r_F)^t} \qquad (12)$$

Equations 11 and 12 we could be rewritten in general form and set equal to obtain the deposit market equilibrium as follows.

$$DD(r_D, \Psi) = D_B(r_D^{\max}) \qquad (13)$$

The expression $D_B(r_D^{\max})$ signals that banks demand all deposits at the maximum rate they are willing to pay, while $DD(r_D, \Psi)$ is the public's supply of deposits. Given equation 11, the following derivative conditions can be written in general form: $r_D^{\min\prime}(r_F) > 0$, $r_D^{\min\prime}(z) > 0$, and $r_D^{\min\prime}(N) < 0$. The term Ψ represents a vector of exogenous shift factors that affect the supply of deposits (DD = supply of deposits). In the analysis that

[5] One reason for this has to do with notion of a foreign currency constraint, which holds that the desired change in foreign asset positions the banks would like to make in time period t is not equal to the actual quantities of foreign exchange that exist at time period t (see Khemraj 2009). Hence, banks are forced to hold excess liquidity (a large part of which is non-remunerated).

follows the derived deposit rate, $r_D^{\max}$, is represented by a flat line, which suggests banks determine the rate and the public accepts it as given.

4. Diagrammatic Analysis

Figure 2 summarises the key ideas examined so far. The *DD* curve is upward sloping while the demand for business loans (L_P) is downward sloping. The public takes the minimum mark up lending rate and the maximum deposit rates as given – thus depicting the asymmetric nature of the process of interest rate determination. The latter idea is depicted by the flat lines illustrating the mark up loan and deposit rates. The equilibrium quantity of deposits (D^*) is given at the point where the horizontal line, $r_D^{\max}$, intersects the *DD* line. Similarly, borrowers also take the mark up loan rate as given and the equilibrium quantity loans is determined by the intersection of the horizontal line, $r_L^{\min}$, and the loan demand function.

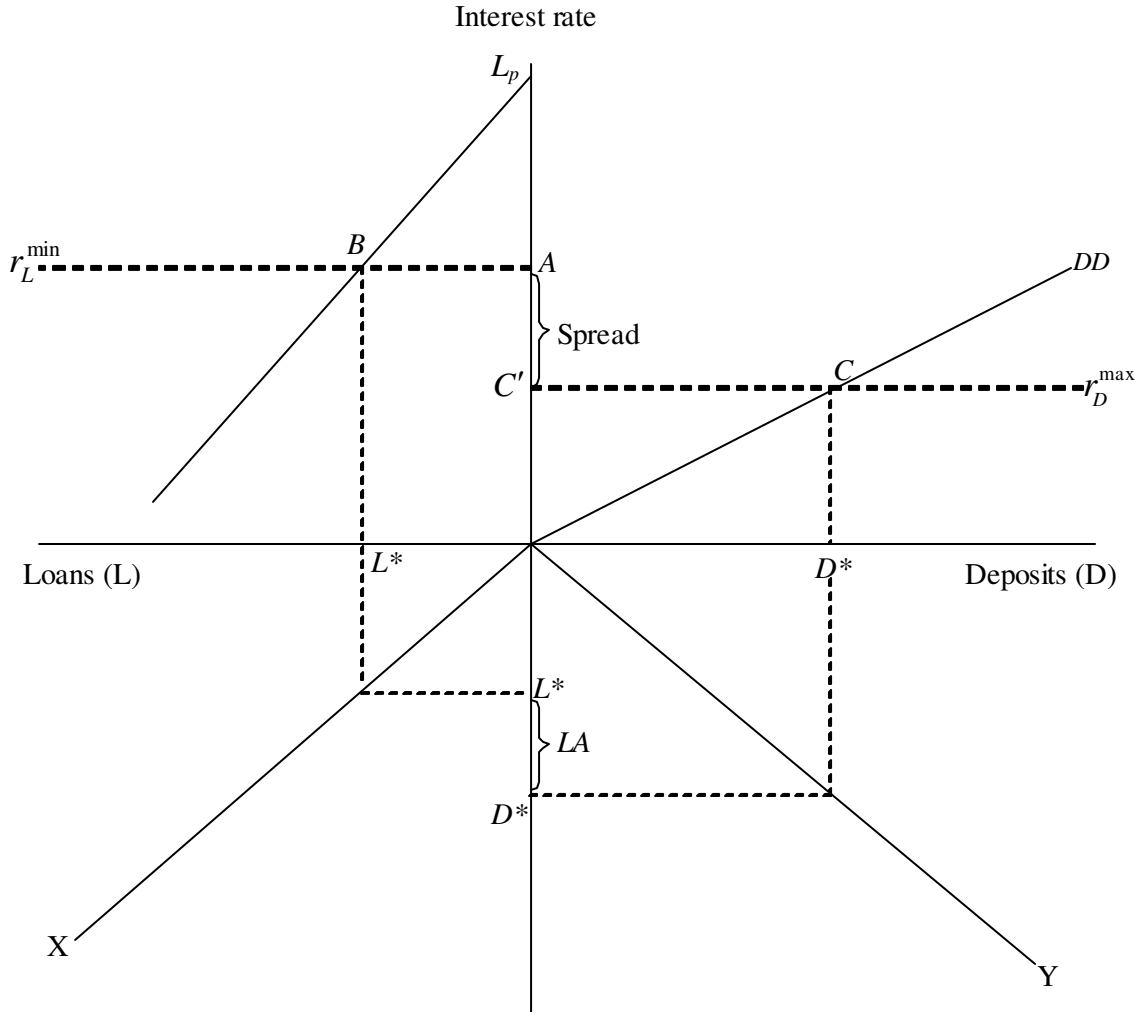
X and Y are 45^0 lines used to reflect the equilibrium deposit and loan quantities on the horizontal axis unto the vertical axis. In light of the assumed slopes, the level of liquid assets (*LA*) in the banking system is given by the difference between the optimal quantities of deposits and loans – D^* and L^*. The quantity of liquid assets, moreover, is positively related to the spread (the distance AC').

Distribution

The analysis that follows suggests that surplus and profits are distributed among three groups – those who save as deposits, those who borrow for business purposes, and the banks (the owners and managers of banks). The minimum lending $r_L^{\min}$ acts as a constraint on the demand for credit and investment demand as only those who can borrow above $r_L^{\min}$ would obtain credit. Therefore, borrowers earn the profit surplus represented by the area of the triangle $L_P AB$.

Depositors, on the other hand, earn the surplus given by the area of the triangle $0C'C$. This follows from the set up that depositors who would like to earn a rate of interest higher than $r_D^{\max}$ would not find it possible to do so. Moreover, by offering savers and depositors a deposit rate that is a mark up over the foreign interest rate, banks dissuade the public from investing abroad. The deposit rate enables the banks to mobilise deposits for their own domestic lending, place investments in foreign assets and satisfy the foreign exchange needs of established customers. Furthermore, there are transaction and information costs that preclude small savers from investing in foreign assets by themselves. Depositors also face a foreign currency constraint – that is a mismatch between the desire to save in a foreign currency and finding a quantity of the said foreign exchange in the domestic foreign exchange market.

Figure 2: Loans, deposits and asymmetric interest rate

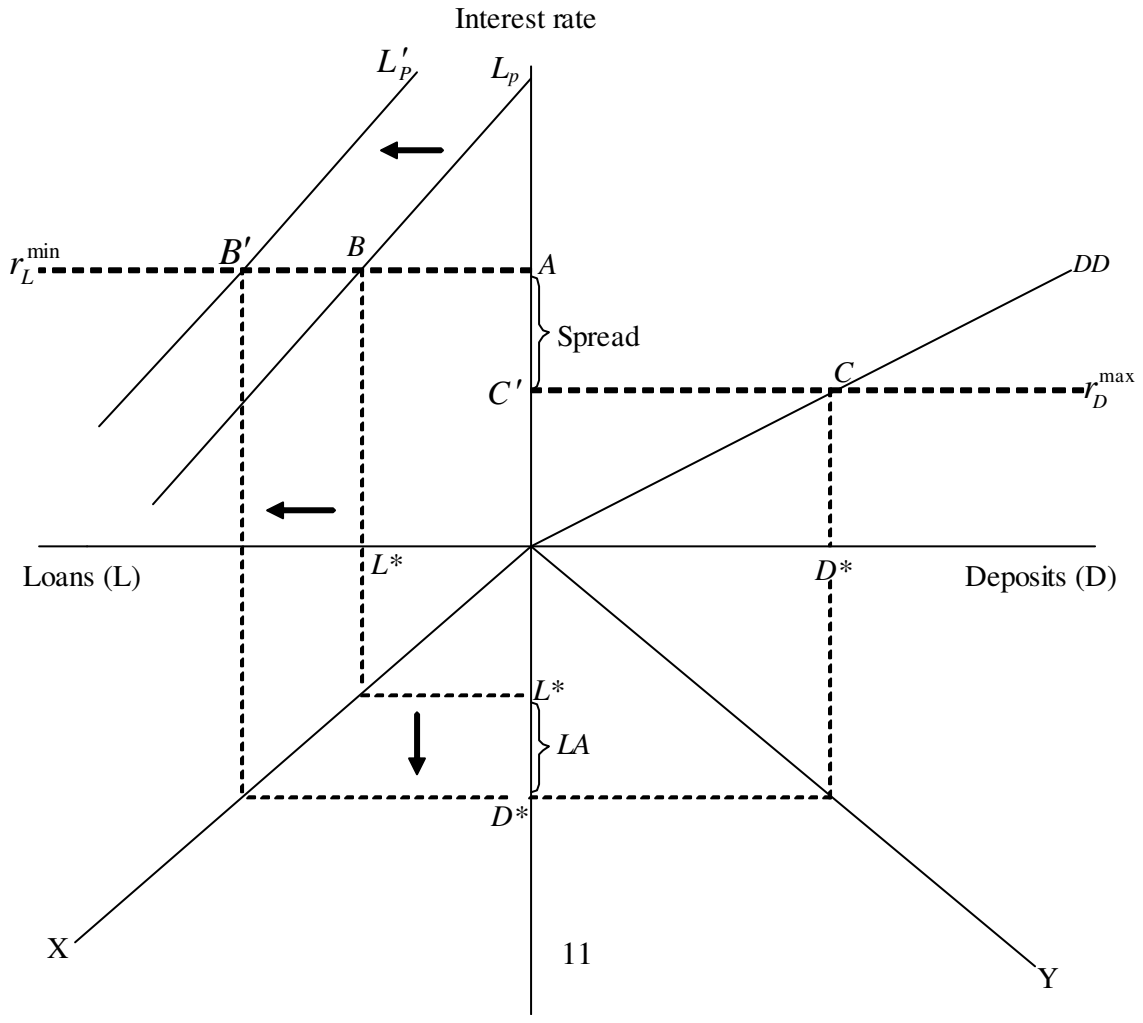


Banks therefore are able to earn the amount denoted by: $r_L^{\min} \times L^* + r_F \times F - r_D^{\max} \times D^*$. The objective of the banking sector in a de-repressed banking system is to set $r_L^{\min}$ and $r_D^{\max}$ in such a manner so as to maintain the spread.

Exogenous increase in loan demand

Assume that the productivity of real investment in the economy is so increased that the demand for business loans shifts outwards (to a new curve L_P') along a constant $r_L^{\min}$. The productivity of real investment is set in the vector Ω; and assume all the other exogenous variables in the model are constant. The adjustment process is elucidated by figure 3. The opposite result would occur from the negative loan demand shock. As would be expected the business sector increases its surplus, which is now given by the area of an enlarged triangle. One interesting outcome is an increase in loans up to the point B' could be met by substituting business loans for liquid assets. However, after B' the banks must again accumulate liquidity positions (that is accumulate liquid assets – *LA*) for various reasons such as to maintain regulation requirements (such are required liquidity ratios and capital requirements) or maintain cash reserves to buy foreign currencies to invest in foreign assets or service the foreign exchange needs of long established customers who might also have borrowed from the banks in the first instance. Therefore, expansion of bank credit beyond point B' requires the central bank to accommodate an expansion of the monetary base. Once the money multiplier is constant this monetary expansion would facilitate the credit expansion when excess liquidity is exhausted.

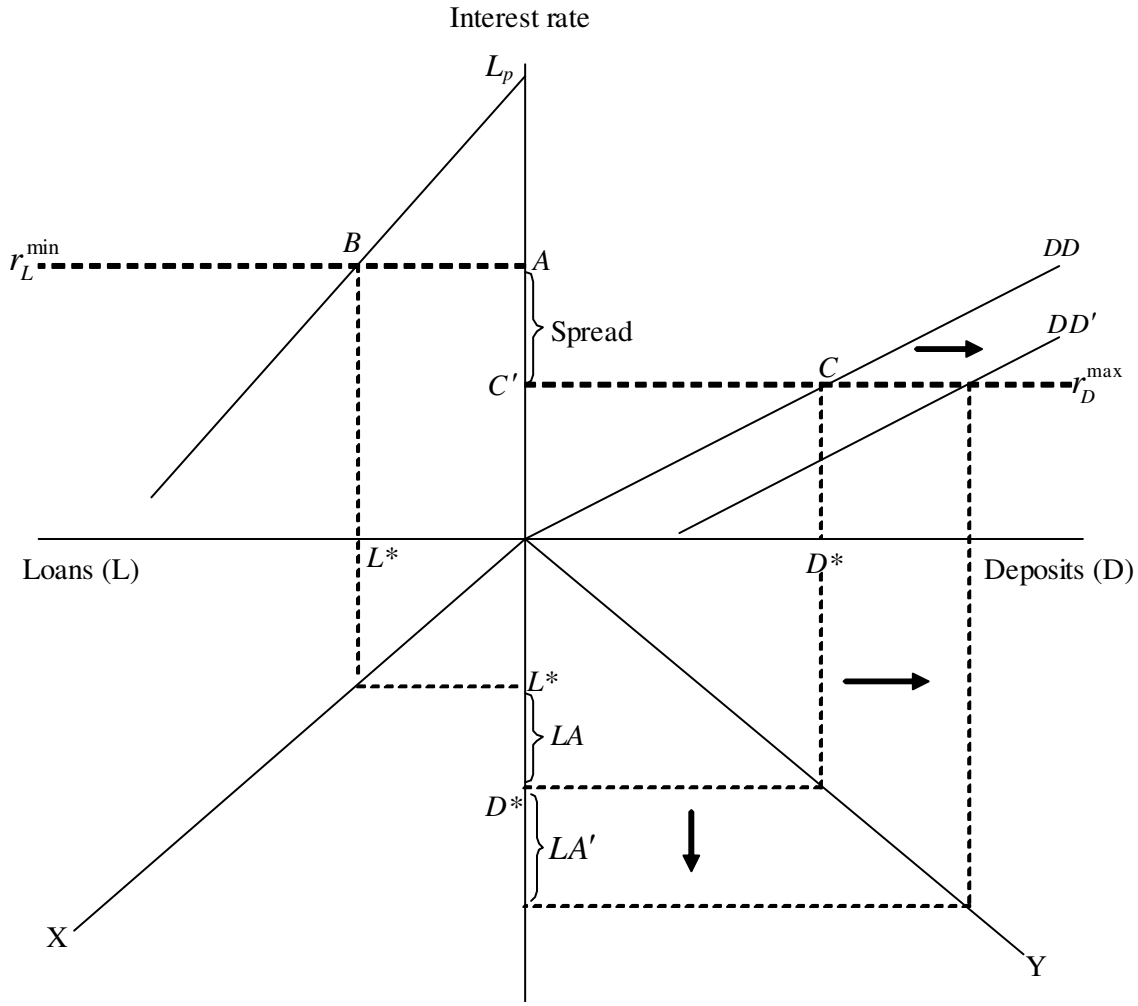
Figure 3: Exogenous increase in loan demand



Exogenous shocks to deposits

Factors that could account for the exogenous increase in deposits are domestic wage increases, remittances, new-found oil revenues, the prevalence of a large underground economy, and monetary policy shocks which alter the quantity of deposits via a stable money multiplier (these factors are embedded in the vector Ψ). However, it should be noted that the money multiplier – which links the monetary base to the broader money supply – is an identity with no prescription of causality (Goodhart 2009). Therefore, changes inflows of remittances, new oil finds, and so on could engender endogenous responses in excess bank reserves, which are a subset of the monetary base.

Figure 4: An exogenous deposit shock and liquid assets



Therefore, let us examine the case of a positive shock while all other factors are held constant. A negative shock would involve the opposite outcome. The increase shifts

outward the deposit curve *DD* to DD' (see figure 4). In this case, the extra deposits would not necessarily expand business loans as this is dependent on many factors independent of the banks. These extra funds could be stored as liquid assets and excess liquidity by the banking sector.

As noted earlier, this tendency is well documented in the recent literature that focuses on the issue of excess bank liquidity. Consequently, liquid assets increase from *LA* to LA'. In addition, the hoards of liquid assets and reserves enable banks to purchase foreign exchange once the foreign currencies are available in the domestic foreign exchange market. However, there could be a foreign currency constraint – meaning the mismatch of available foreign currencies and the demand for these currencies (Khemraj 2009). Nevertheless, these shocks do not alter the spread but they increase the financial surplus of the depositors.

Change in $c'(L)$ and ρ in the loan market

$c'(L)$ and ρ are two exogenous variables in the system. To analyse how a change in either one of them affects spread and liquidity requires shifting up or down the $r_L^{\min}$ line. The analysis is done by performing the case where either $c'(L)$ and ρ increases. These results are summarised in figure 5 where the $r_L^{\min}$ line shifts upward to $r_L^{\min'}$.

Interest rate policy

In this section, the paper addresses the question of to what extent a policy of interest rate control could influence financial intermediation by increasing loans to businesses and reducing excess liquidity. It should be noted that when government fixes interest rate it takes away the prerogative of asymmetric market power of the banking sector. However, the impact of interest rate control on financial intermediation is largely dependent on the relative elasticity of the public's deposit demand (with respect to the deposit and/or the savings rate) and the business sector's loan demand (relative to the lending rate).

Figure 6 presents the case of a reduction of the loan rate – assuming the deposit rate remains uncontrolled – from $r_L^{\min}$ to r_{LC} (note r_{LC} = the controlled loan rate). It is assumed that the change in the loan rate has no effect on the deposit rate (this assumption will be relaxed later in the paper). The diagram suggests that the expansion of credit and the reduction of excess liquidity depend on the business sector's elasticity of demand for loans. Note that Lp2 represents a loan demand curve that is relatively more elastic than Lp1. Should the policy be successful in diminishing all excess bank liquidity at the point where $L_2^* = D^*$, interest rate control would have to be accompanied with accommodative monetary policy of an expansion of bank deposits by the central bank. Otherwise, business credit expansion will cease at L_2^*.

Figure 5: The effects of a change in ρ and $c'(L)$

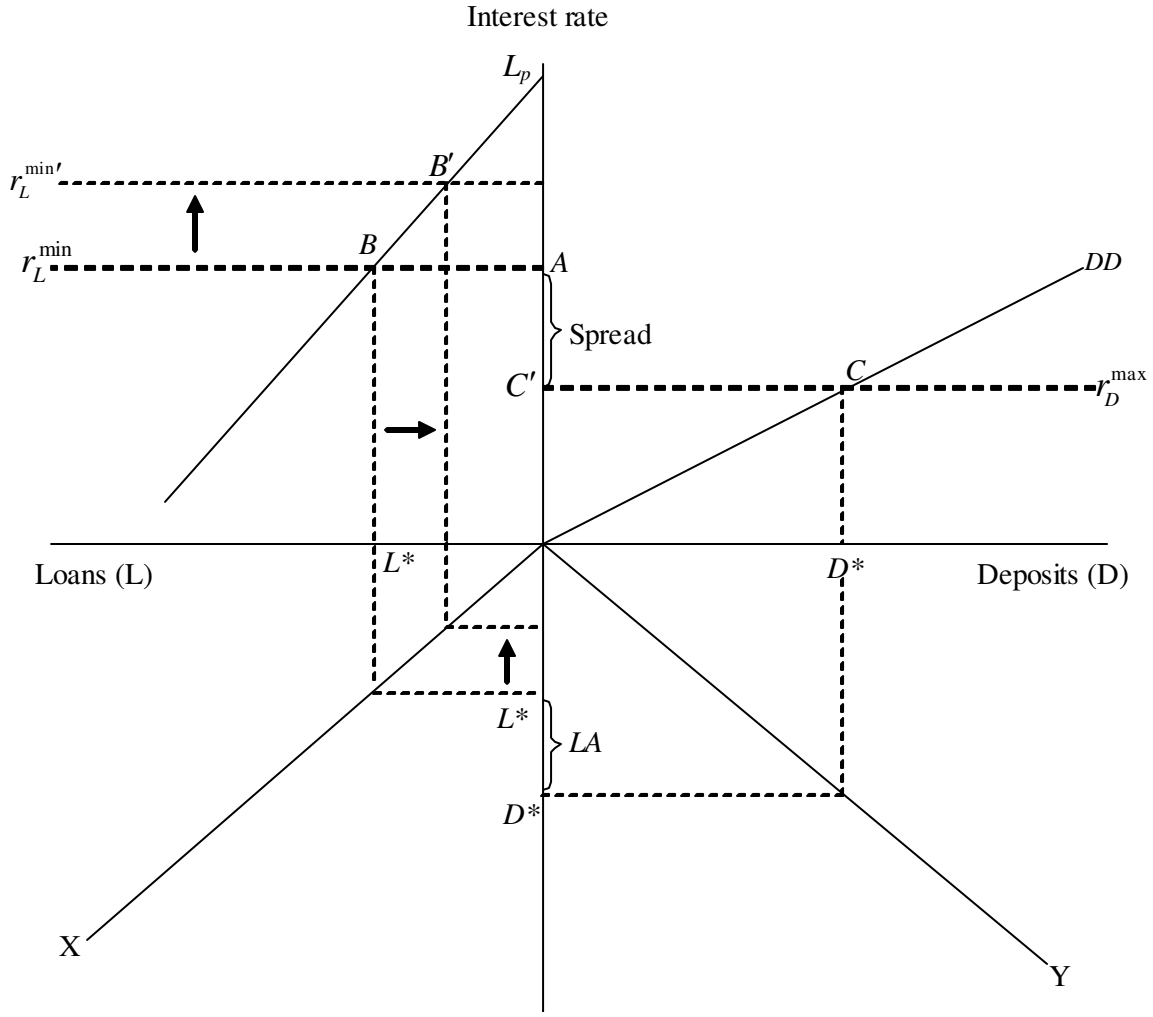
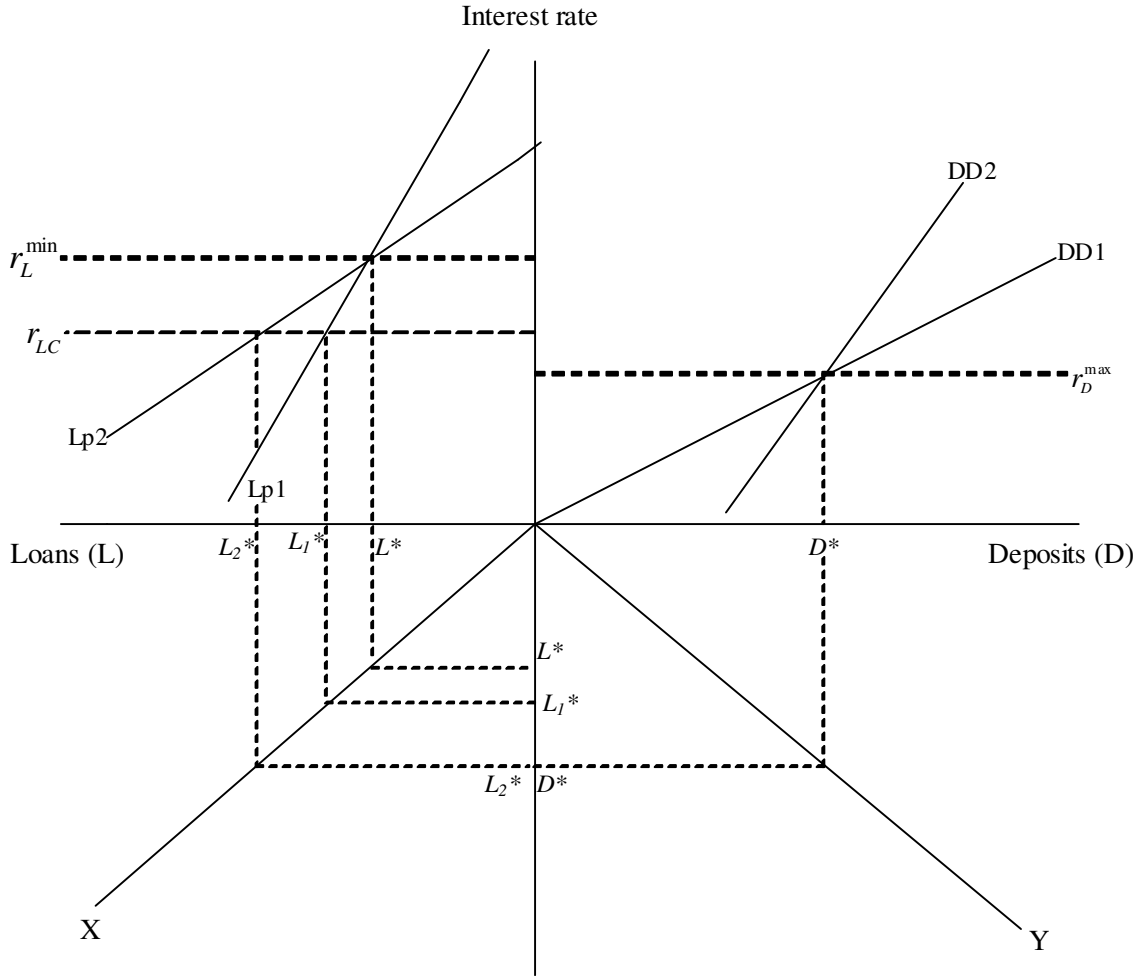


Figure 6: The effects of loan rate control



An alternative policy could be to make private investments more productive so as to shift out the demand curve rather than manipulate the lending rate. As implied by figure 6, the expansion of credit results from the movement along the demand curve; a shift in the curve, on the other hand, owing to industrial policies that make private investments more productive and profitable could be an alternative to interest rate control. However, to the extent the marginal cost of banking, $c'(L)$, is affected by the inefficiencies in the economic system and these are diminished by the policy framework, then such policies would enhance financial intermediation[6]. In addition, business investment surplus increases when there is an outward shift of the demand curve.

[6] Note here that the cost of banking is assumed to be affected by the cost structure of the real economy.

Figure 7: Deposit rate control that affects the loan rate

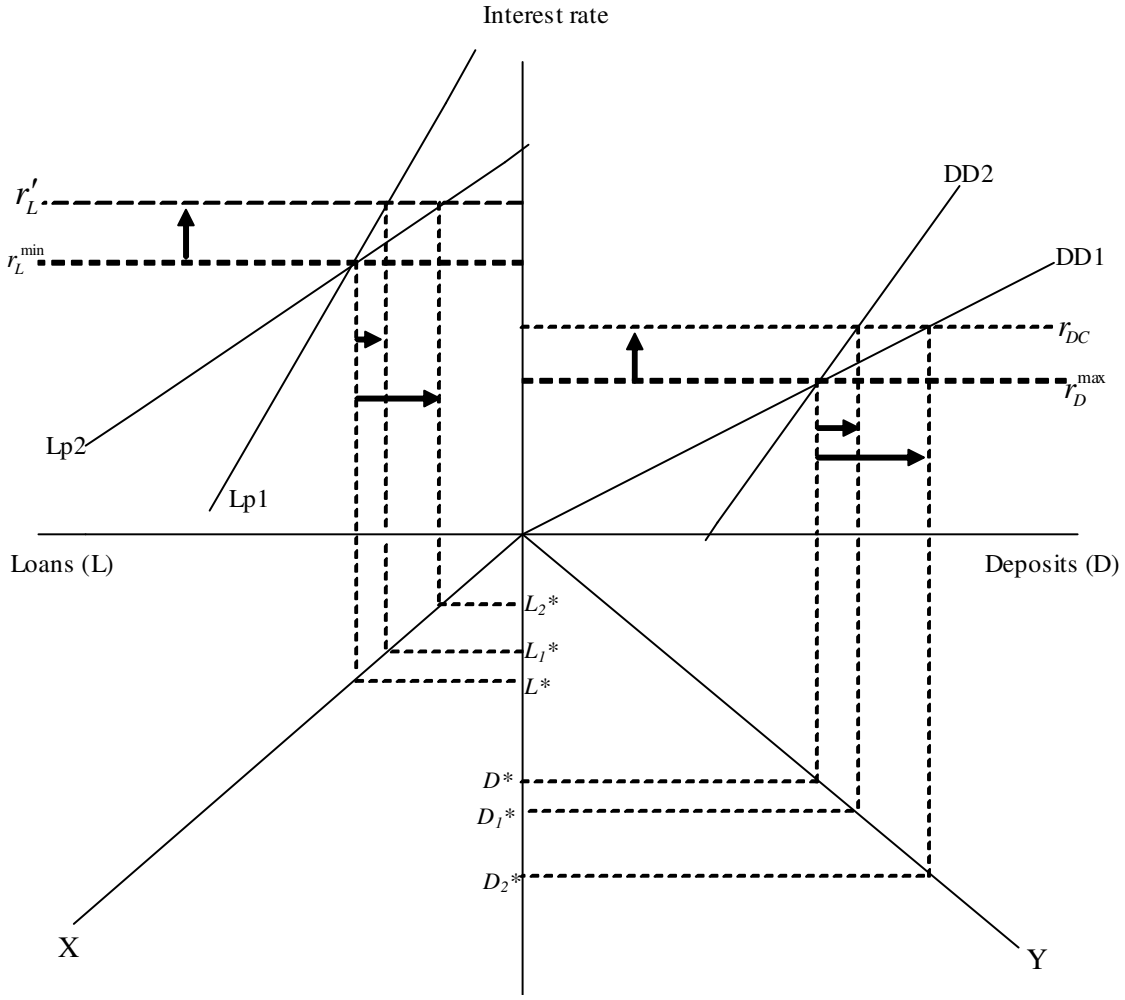


Figure 7 outlines the effect of a policy mandate that increases the deposit rate. However, it is assumed banks would seek to maintain a mark-up between the loan and deposit rates. Therefore, as the deposit rate is increased from r_D^{max} to r_{DC} the loan rate adjusts accordingly (but not necessarily in the same proportion). The degree of the increase in the society's deposit supply depends on the elasticity. On the asset side, the demand for loans declines – with the extent of the decline being sensitive to the elasticity. It is obvious from the diagram that the policy of increasing the interest rate reduces financial intermediation and increases excess liquidity. What occurs when the loan rate is also controlled to remain at r_L^{min} ? In the latter case financial intermediation is not necessarily increased even though the policy is successful in mobilising deposits. However, financial intermediation could be increased by policies that engender an outward shift in the demand for loans rather than a movement along the demand curve.

5. Conclusion

This article applied the established banking model of Klein (1971) and Frexias and Rochet (1999) to developing economies taking into consideration the very liquid nature of the banking industry and the persistently high loan-deposit rate spread in these economies. Moreover, the article was not intended to present a new theoretical oligopoly model of the banking firm. Rather the intention was less ambitious whereby an established oligopoly theoretical framework was utilised to examine financial intermediation, excess bank liquidity, and distribution in a banking context. The loan and deposit rates were derived as a mark up over a relatively safe foreign interest rate. Therefore, the foreign rate anchors the domestic structure of interest rates and it is the truly exogenous interest rate. Moreover, the paper proposed the idea that banks possess the ability to determine the loan and deposit rates, while the public accepts the rates as given – hence the notion of asymmetric market power.

The model was used to analyse the distribution of financial surplus among banks, depositors and borrowers. In a de-repressed financial system, the private oligopolistic banks would tend to maintain the spread in order to transfer surplus to themselves from depositors and borrowers. It was suggested that exogenous loan demand and deposit demand shocks change the distribution of financial surplus and lead to changes in intermediation although spread remains constant. The analysis also suggested that spread, distribution and financial intermediation would respond to changes in the marginal cost of banking and the probability of loan default. Finally, the paper also examined the effectiveness of interest rate control on financial intermediation and excess liquidity. The key insight is that a policy of loan and/or deposit rate control depends on the relative effectiveness of the society's deposit supply elasticity versus the elasticity of demand for loans.

This article did not address three issues that are the are the subject of future research: (i) the behaviour of bank liquidity preference and its implication for real output; (ii) the mechanism determining the demand for foreign assets by commercial banks; and (iii) the addition of foreign exchange risk to the oligopoly model of the banking firm.

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Appendix 1

List of countries on which figure 1 is based:

Angola, Antigua and Barbuda, Bangladesh, Belarus, Belize, Botswana, Brazil, Bulgaria, Cameroon, Chad, Chile, Colombia, Costa Rica, Dominican Republic, Egypt, Estonia, Fiji, Georgia, Guyana, Honduras, Jamaica, Kenya, Kyrgyz Republic, Korea (Republic of), Latvia, Lithuania, Madagascar, Malawi, Mauritius, Mexico, Moldova, Mongolia, Namibia, Nigeria, Paraguay, Peru, Philippines, Romania, Russia, Solomon Island, Singapore, South Africa, Sri Lanka, Suriname, Tanzania, Trinidad and Tobago, Uganda, Ukraine, Uruguay, Venezuela, and Zambia.