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FINANCIAL SECTOR REFORMS IN UGANDA (1990-2000): INTEREST RATE SPREADS, MARKET STRUCTURE, BANK PERFORMANCE AND MONETARY POLICY

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To my sisters
Faustine Nakazibwe and Regina Nakake

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PREFACE

Financial Institutions (FIs) are essential for mobilising and allocating scarce financial resources into desired development activities and for transmitting monetary policy from the central bank to the rest of the economy. As such, they have a key role in fostering economic growth. Issues related to the financial sector thus underlie much of the discussion on economic reform. However, although the financial sector has appeared prominently in many reform programmes, there is little direct evidence of the overall effects of financial reforms. In this dissertation, we focus on four aspects of the economic reform debate, using Uganda's experience from its financial sector reforms which were implemented in the 1990s, namely, interest rate spreads, market structure, bank performance and monetary policy. The study is organised into four chapters and relates mainly to commercial banks since they are the dominant Financial Institutions in Uganda.

Chapter 1 outlines the process of and experience with financial sector reforms in Uganda during the period 1990-2000. It indicates that although reform measures led to encouraging results in terms of increasing monetisation and achieving a steady real GDP growth in a stable macroeconomic environment, performance of the financial system fell short of expectations in other respects. This was evidenced by a number of developments: wide spreads between lending and deposit rates, low profitability and poor asset portfolios of commercial banks, excess reserves, incidents of liquidity/solvency problems and bank closures. Competition within the financial system doesn't appear to have improved as expected either, while concentration of the market persisted. Consequently, the implementation of monetary policy remained constrained due to weaknesses in the financial sector. These developments are the focus of discussion in the chapters that follow.

An implication of high interest rate spreads is that efficiency of the financial system was not improved as expected by the financial sector reforms. Chapter 2 provides evidence on the determinants of commercial bank interest rate spreads using data covering the period 1994-1998 and two measures of the spread, namely the ex-ante spread (ISPR) and the ex-post spread, (or Net Interest Margin [NIM]). The empirical findings yield

support for the hypothesis that ex-ante spreads reflect interest rate risk, liquidity risk and insolvency risk premiums. However, risk factors reduce the Net Interest Margins of banks. Lack of competition, costs of excess reserves and short-term borrowing at BoU or in the inter-bank market get translated into high ex-ante spreads although they are not necessarily associated with high Net Interest Margins of banks. Large banks seem to have lower ex-ante spreads. However, there is no evidence of scale economies. Dependence on non-interest income lowers ex-ante spreads and Net Interest Margins of banks. Although default and exchange rate risks reduce the Net Interest Margins of banks, they are not important reasons for banks deciding to raise ex-ante spreads. Higher overhead costs are not reflected in higher ex-ante spreads, though they are associated with higher Net Interest Margins of banks. Inflation also appears to be an important factor in raising spreads. There are, however, significant disparities in effects across market segments. The evidence supports policies that are directed at improving technology and risk and financial management, at strengthening supportive information and bank supervision, at developing inter-bank, securities and equity markets and at maintaining macroeconomic stability.

Chapter 3 analyses the relationship between market structure and profitability in Ugandan commercial banking by testing two hypotheses, both of which predict a positive structure-profitability correlation but have contrasting policy implications: the Market Power and the Efficient-Structure hypotheses. While the Market Power hypothesis relates high profitability to the ability of firms to exercise market power in pricing, the Efficient-Structure hypothesis links high profitability to efficiency of firms in producing and marketing products. Using two samples of panel-data covering the period 1993-1999, a measure of profitability (Return on Assets) is regressed on efficiency and market structure variables. The full sample data supports neither of the two explanations for the structure-profitability relationship. However, some evidence is found to partially support the Efficient-Structure hypothesis using data from selected banks. Given that Market Power does not seem to explain the structure-profitability relationship, no beneficial efficiency effects are predicted from an anti-merger or de-concentration public policy.

The last chapter investigates the role of credit market imperfections in the transmission of monetary policy in Uganda during the period 1994-2000. In order to identify a credit channel of monetary transmission, we study the responses of two credit variables (total bank loans and lending rates) to base money (an indicator of monetary policy). Among all the tests conducted, we do not find evidence of a significant role of either variable in the transmission of monetary policy shocks to output. These results indicate that the presence of credit market imperfections is more likely to limit, rather than amplify the impact of an expansionary monetary policy on the economy as predicted by the "credit view." The evidence further, suggests that neither of the two credit variables performs well as a leading indicator or an information variable for monetary policy in Uganda. Possible disruptive effects of credit market imperfections on monetary policy further highlight the need for financial sector policies to address informational problems.

The issues discussed in this dissertation are of great significance, since they relate to the development of Financial Institutions. That Financial Institutions perform their intermediation role effectively is essential for the success of several aspects of reform programmes. In particular, the results of the studies in this dissertation may be of great value to policymakers in identifying conditions under which financial liberalisation can either be beneficial or costly, and in suggesting how financial sector reform strategies should proceed.

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Justine Nannyonjo
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CHAPTER 1

FINANCIAL SECTOR REFORMS IN UGANDA (1990-2000): AN OVERVIEW

Abstract

This chapter outlines the process of and experience with financial sector reforms in Uganda during the period 1990-2000. It indicates that although reform measures led to encouraging results in terms of increasing monetisation and achieving a steady real GDP growth in a stable macroeconomic environment, performance of the financial system fell short of expectations in other respects. This was evidenced by a number of developments: wide spreads between lending and deposit rates, low profitability and poor asset portfolios of commercial banks, excess reserves, incidents of liquidity/solvency problems and bank closures. Competition within the financial system doesn't appear to have improved as expected either while concentration of the market persisted. Consequently, the implementation of monetary policy remained constrained due to weaknesses in the financial sector.

Key Words: Financial Sector Reforms; Uganda

1.0 INTRODUCTION

During the 1990s Uganda undertook the first necessary steps towards sustainable financial sector reforms.[1] Uganda's financial system had for a long time been characterised by several distortions: statutory interest rate ceilings, directed credit, accommodation of government borrowing, exchange controls and informal modes of intermediation. The formal financial sector was also concentrated by two domestic commercial banks with excessively large branch networks and high overhead costs. In addition, securities, equities and inter-bank markets were either non-existent or operating inefficiently. Other constraints included deficiencies in the management, regulation and supervision of financial institutions and a low level of central bank autonomy. The economy also suffered political and social upheavals, as well as high inflation rates. The combination of these factors created an uncompetitive and inefficient financial system, and impeded monetary control and policy.

The aim of implementing financial sector reforms was to achieve flexible and competitive financial institutions, hence improving efficiency in the mobilisation and allocation of financial resources and in the conduct of monetary policy. Along with other reforms and adjustment measures, this would create the necessary conditions for non-inflationary economic growth. This chapter outlines the process of financial sector reforms and briefly reviews some of the post-reform experience, and is intended as an introduction to the empirical work. Before doing this, however, we will briefly review, in Section 1.1, the theoretical rationale for financial sector reforms. The reform process and the experience with the reforms are presented in Sections 1.2 and 1.3, respectively. Section 1.4 summarises and draws conclusions.

[1] Financial sector reforms involve measures to eliminate states of distress in financial institutions, changing institutions, adding new ones, elimination of distorting financial policies and practices and generally establishing the basis for greater efficiency in resource mobilisation and allocation.

1.1 THEORETICAL RATIONALE FOR FINANCIAL SECTOR REFORMS

Much of the theoretical rationale for the financial sector components of reform programs has been provided by the Financial Repression theory of McKinnon (1973) and Shaw (1973), who argue that repressive financial policies through measures such as interest rate ceilings, directed credit, high reserve requirements and restrictions of entry into the banking industry, reduce the rate of economic growth by retarding financial development. The major arguments in the literature against financial repression are outlined as follows:

- An administratively fixed nominal interest rate that holds the real rate below its equilibrium level depresses returns to savers, lowers savings and limits investment to the available savings. Financial savings via the formal financial system are also discouraged.

- With low interest rates in the formal financial system, informal or uncontrolled markets are likely to emerge with higher market clearing rates. This will in turn lead to differences in returns on investments financed in different markets.

- In the absence of rationing credit through the price system, funds are unlikely to be allocated to the most productive projects; instead they will be allocated to those with the lowest risk of default and the lowest transaction costs on loans.

- Interest rate ceilings discourage financial institutions from charging risk premiums, which may ration out a large number of potential borrowers with high-return projects.

- Selective or directed credit associated with financial repression will result in higher loan defaults, reduce flexibility and increase the fragility of the banking system.

McKinnon and Shaw, among others, hence prescribe financial liberalization and development as key economic policies for promoting savings mobilisation and efficient investment and accelerating growth. Financial sector reforms are, thus, undertaken along this line of argument. By raising real interest rates and making institutions more competitive and efficient, the reforms would lead to an increase in total savings and attract funds into the banking system, which in turn would increase investment through enhanced credit availability. Higher return projects not previously funded would also be undertaken after monetary reform because competitive institutions are more efficient than the informal market in channeling funds to projects.[2] Thus, economic growth would be enhanced.

Although this theory is simple and has been highly influential, it is also quite controversial. Among the critics of the Financial Repression hypothesis are Taylor (1983), van Wijnbergen (1982, 1983b), Buffie (1984) and Kohsaka (1984), who argue that if informal loan markets are prevalent, an increase in the real interest rate will not raise the rate of savings where portfolio reallocation is away from the informal sector. Although bank lending will rise as deposits increase, household lending will fall as asset holders shift resources into deposits from the informal credit market. Since funds that are moved out of the informal market into the domestic banking system are subjected to reserve requirements, the net supply of loans will fall.[3] Thus, if informal loan markets are prevalent, there may be a reduction in financial deepening and an adverse effect on output in the short and medium term. Further, with fixed exchange rates and exogenous world inflation, a decline in competitiveness simply reflects greater inflation in the domestic economy relative to the rest of the world. Combined with reduced financial deepening, this will generate lower steady-state output growth.

[2] Banks have scale economies relative to the informal market in collecting and processing information on borrowers.
[3] However, if foreign currency holdings are better substitutes for deposits, the supply of loans rises.

Buffie, Kohsaka, Taylor and van Wijnbergen indeed conclude that in practice, financial liberalisation is likely to reduce the rate of economic growth by reducing the total real supply of credit available to firms. Van Wijnbergen, however, does not rule out the possibility that the favourable effect of improved financial deepening on growth resulting from an increase in the savings rate, dominates the adverse impact of lower competitiveness on output due to an initial outburst of inflation, though there is no guarantee that this will occur.

The new literature on growth further indicates that taking into consideration all partial effects associated with financial development, the ambiguous effect of financial intermediation on the savings rate may be compounded. Jappelli and Pagano (1994) in particular, argue that the development of financial markets may offer households the possibility of diversifying their portfolios. In addition, the development may increase the borrowing options of households, thereby easing liquidity constraints, which may in turn lead to deterioration in the overall saving of the community and growth performance.[4] Financial development also tends to reduce the overall level of interest rates and to modify their structure by reducing the spread between the lending and deposit rates. These factors are bound to affect saving behaviour, though the effect is ambiguous in each case and depends in particular on the attitudes of banks and portfolio holders towards risk.

The Financial Repression theory is further criticised for ignoring effects of several distortions on financial markets, including those associated with government spending and taxes. Giovannini and de Melo (1993) and Agenor and Montiel (1996) in particular, stress fiscal discipline as a prerequisite for successful financial liberalization because government deficits are, in one way or another, financed by taxing the domestic monetary system through government-imposed controls.

[4] In Jappelli and Pagano's endogenous model, liquidity constraints on households raise the saving rate and foster productivity growth.

Stiglitz and Weiss (1981) point to further distortions that could be significant barriers to the efficient allocation of resources. They specifically argue that even after the removal of interest rate ceilings and other restrictions, voluntary credit rationing may occur in the banking system due to the presence of imperfect or asymmetric information between banks and their borrowers.

The reason is that while moderate increases in the lending interest rate would normally be associated with a higher volume of lending, increasing the rate beyond a certain level would reduce the expected return to the bank due to two actions. First, the quality of the pool of borrowers would change adversely in favor of those with high default risks (the Adverse Selection Effect). Second, a higher interest rate induces firms to undertake the more risky investments because they are associated with higher expected profits (the Incentive Effect).

Since the bank cannot directly observe the actions of the borrowers, it sets an interest rate that maximises its expected profits, rather than one that clears the market, and attracts borrowers with high probabilities of repayment to apply for loans. Hence, even if faced with an excess demand for loans at the optimal rate, a bank will not raise the loan rate or the collateral requirements to eliminate it; rather it will turn away loan applicants who are observationally not distinguishable from those who obtain loans. In a similar way, a bank with an excess supply of loanable funds must assess the profitability of the loans that a lower interest rate will attract, and in equilibrium no bank will lower its loan rate.

Equilibrium credit rationing has a number of important implications. First, it raises doubts about the role of intermediation in ensuring resource allocation efficiency in the cases where the expected returns on investments of excluded groups are higher than those of groups that do obtain loans (Stiglitz and Weiss, 1981). In accordance with the Stiglitz-Weiss Credit Rationing Analysis, Cho (1986b) argues that the financial liberalisation, which is usually recommended for developing economies, is not sufficient for full allocative efficiency of capital when financial markets are characterised by imperfect information. Cho specifically stresses the need for equity

finance to ensure optimal allocation of capital, in the presence of information costs regarding borrower risk. Finally, the link between monetary and fiscal policies and economic activity may be weakened. An expansionary monetary policy aimed at raising aggregate demand via lowering money market rates, would not be effective, since commercial banks would for instance not lower lending rates in response to the fall in money market rates.

Villanueva and Mirakhor (1990) among others, further point to macroeconomic stability and effective financial sector regulation and supervision as necessary conditions for the success of financial liberalisation. Their argument is that macroeconomic instability will raise the variance and positive covariance of project returns,[5] thus reducing the likelihood of loan repayment, lowering the profit maximising interest rates of financial institutions and increasing the need for credit rationing.[6] Weak bank supervision and regulation systems may further encourage banks to set high lending rates and provide high risk loans (endogenously increasing the riskiness of lending) given some form of deposit insurance scheme that protects banks against the consequences of losses on bad debts. In the absence of these conditions, complete liberalisation of interest rates is likely to lead to high real interest rates, wide spreads between lending and deposit rates, bankruptcy of financial institutions and loss of monetary control.

The appropriate sequencing, consistency and credibility of policy reforms may also, to a large extent, determine the success of any adjustment program. First, there is a general consensus that liberalisation of the financial system by decontrolling interest rates, increasing reliance on indirect instruments of monetary control and by strengthening domestic financial institutions and markets, precede opening the capital account of the balance of payments. Removal of controls on the capital account, with real domestic interest rates well below world levels, is likely to lead to large capital outflows and balance of payments crises (Agenor and Montiel, 1996).

[5] This implies that many or all investment projects would be affected adversely by poor macroeconomic performance.

[6] A critical assumption here is that any potential moral hazard in the bank that may be induced by economic instability is effectively contained by strict official supervision and prudential regulation, and that deposit insurance is either absent or appropriately priced.

Second, it is advocated that the trade regime (current account) be liberalised first, before gradual removal of restrictions on capital flows (Edwards, 1984; and McKinnon, 1973; 1993). Trade reforms require a real depreciation of the exchange rate, in order to offset the adverse effect of cuts on tariffs on the balance of payments, and thus stimulate exports and dampen imports. Removal of restrictions on capital flows, on the other hand, tends to be associated with an appreciation of the real exchange rate, which is likely to reduce profitability in export industries and have an adverse effect on the reallocation of resources, thus inhibiting the adjustment process. However, as noted above, a stable macroeconomic background is generally viewed as a prerequisite for the implementation of a full-fledged liberalisation of the financial sector.

Lastly, credibility is an important element in the timing of macroeconomic reforms. The credibility of a disinflation program may be, for instance, damaged if appropriate structural measures are not implemented prior to the adoption of a restrictive monetary and fiscal stance.

1.2 UGANDA'S FINANCIAL SECTOR REFORM PROCESS (1990-2000)

Financial sector reforms in Uganda were implemented as part of the stabilisation and structural adjustment program that was began in 1987. However, most of the financial sector reforms were not implemented until the 1990s, since policies introduced in the late 1980s were mainly directed at restoring economic growth in a more stable environment.[7]

By 1990, some success had been achieved in reducing inflation and encouraging growth, mainly through the removal of restrictions on prices and internal marketing and distribution systems, through fiscal discipline, a series of devaluations of the exchange rate and through sales tax reductions, (Appendix 1.1).[8] However, the financial system was still operating under controls. Foreign exchange was administratively allocated by

[7] For a further discussion on financial sector reforms see Kasekende and Ssemogerere (1994), Atingi-Ego (1996), Bigsten and Kayizzi-Mugerwa (1999) and Kasekende and Atingi-Ego (1999).

[8] Growth in broad money was reduced from 125 percent in 1988/89 to 57 percent during the financial year 1989/90; real GDP grew by 6 percent over the same period and inflation had been reduced to 27 percent by June 1990 from 239 percent recorded at end of June 1988 (Appendix Table A1.1).

the Bank of Uganda (BoU), along with the allocation of credit by commercial banks. Non-bank financial institutions were required to hold specific quantities of government securities, and interest rates on deposits and loans were administratively set by BoU. There were yet other problems in the financial sector slowing the progress of adjustment:

- A low domestic savings rate and a low degree of financial sector development (the M2/GDP ratio was estimated at 7 percent in 1990).

- Constraints faced by the central bank were undermining its ability as the monetary authority, to perform its functions. These constraints included political pressure to finance crop production, and weaknesses in the capacity to regulate and supervise financial institutions.

- Distress in the commercial banking sector. In particular, two domestic banks (Uganda Commercial Bank [UCB] and Cooperative Bank [COOP]) were insolvent.[9] These two banks together accounted for more than 50 percent of the assets of the commercial banking system.

- A general lack of public confidence in the banking system reflected by the wide use of cash rather than cheques as a means of domestic payments by the public, and a high ratio of currency in circulation to broad money (the cash/M2 ratio was about 41 percent in 1990).

- Other problems in the business environment included an increasing incidence of fraud, aggravated by inefficiency of the cheque clearing system at BoU and high inflation rates which eroded the real wages of bank staff; poor accounting and auditing practices and the consequent difficulty faced by banks in assessing the credit-worthiness of their clients.

[9] The major reasons for the liquidity problems of these two banks were excessive lending and investment in fixed assets as a result of a rapid expansion of their branch network.

- The slow progress of stabilisation and deficiencies in the bank financial services worsened the above structural problems. Continuing high levels of inflation (recorded at 32 percent in 1991) had, for instance, eroded the capital base of most commercial banks. The main financial services needed to support the real economy (such as term credit) were also deficient and many firms were uncreditworthy.

Beginning in 1990, a number of reforms were implemented in the financial sector in order to achieve the main goals of increased efficiency and financial deepening. The major developments in the reform process are indicated in Appendix 1.2 and are outlined below:

1.2.1 The Exchange Rate System

The exchange rate system was reformed through a number of steps. Foreign exchange bureaux were introduced in 1990, which brought about the absorption and legalisation of the formerly parallel market for foreign exchange. The forex bureaux were given the mandate to deal freely in exchange transactions at market-determined rates, while the public could buy or sell foreign currency freely from them.

To further liberalise the exchange rate regime, a Dutch exchange auction system was introduced in 1992. It was used as a mechanism for the financing of eligible imports using donor import funds. Under this system, all authorised dealer banks and eligible forex bureaux were permitted to bid for foreign exchange currency and each successful bidder paid the bid price. The lowest bid was adopted as the clearing rate until the next auction.

However, the market remained segmented since the bureaux exchange rate and the auction rate were market determined, while the foreign exchange sales through BoU were done at the official exchange rate. Thus, a premium existed that resulted from efficiency costs in the exchange system. To foster convergence of the exchange rates, and to eliminate the implicit tax on those coffee exporters who were required to surrender their proceeds to the BoU rather than to the bureaux, the weighted average

rate in the bureaux market was adopted as the official exchange rate. This took effect in March 1992.

The final stage in the evolution of the liberalised foreign exchange system was the introduction of the inter-bank foreign exchange market in November 1993. The inter-bank market dealings were initially restricted to authorised dealer banks. However, trading in foreign exchange by the bureaux continued alongside the inter-bank market, mainly to meet the needs of small customers. Coffee exporters were no longer required to surrender their proceeds to BoU. The weekly Dutch auction, the daily foreign exchange market at BoU and surrender requirements of excess invisibles for commercial banks, were abolished. All authorised dealers in foreign exchange were free to determine their exchange rates, and BoU ceased to set or announce the official exchange rate.[10]

A further set of reforms was initiated in 1992 under the Financial Sector Adjustment Credit (FSAC) program of the World Bank. First, direct crop financing was transferred from BoU to commercial banks, thus lessening the need for the involvement of the central bank in the allocation of credit. A number of steps were also taken to facilitate the shift from direct forms of monetary control to the use of indirect and market based monetary management:

The central bank started applying a stricter enforcement of the observance of statutory reserve requirements by commercial banks. In this regard, each commercial bank was required to open three accounts at the central bank: a statutory reserve account, a loans account and a transactions clearing account, for the purposes of facilitating monitoring and central bank transactions with commercial banks.

A treasury bill market was further established to facilitate monetary and fiscal discipline via open market operations. However, the treasury bill instrument would play a dual and conflicting role if used for monetary and fiscal discipline - thus there was a need to

[10] BoU may, however, intervene in the foreign exchange market to counteract short-term sharp and erratic exchange rate fluctuations, and to meet certain macroeconomic objectives such as stabilising prices.

develop different fiscal and monetary policy financial instruments. Implementation of monetary policy has since 1992/93 been done via the Reserve Money Program (RMP), which is directly controlled by BoU.

1.2.2 Regulatory and Legal Reforms

As liberalisation and deregulation of financial activities allowed market participants to assume greater risks, a strengthening of prudential regulations and bank supervision became necessary. In this regard, the BoU Statute was amended and a new Financial Institutions[11] Statute was introduced, in May 1993.[12] The Financial Institutions Statute (FIS) of 1993 clearly established the responsibility of BoU to supervise, regulate, control and discipline all financial institutions, insurance companies and pension funds institutions. The new regulatory and prudential guidelines included the following:

- Establishment of minimum capital adequacy and liquidity ratios, and the requirement that banks make appropriate provisions for loan losses.

- Introduction of prudential limits on the net open positions of foreign exchange holdings of each commercial bank. This measure was aimed at ensuring that banks conduct their foreign exchange activities in a sound and safe manner within the inter-bank market.

- A revision of the format of commercial banks' report forms, in order to improve the data reporting systems and enhance the supervisory role of the central bank.

- Stipulation of legal lending limits to individual borrowers, shareholders and insiders to ensure that banks extend credit in accordance with sound banking principles and to reduce the risk of bad debts. The aggregate insider-lending limit is 25 percent of the core capital. However, it has generally been noted that banks have largely failed to comply with requests to reduce insider loans partly because no meaningful penalties are being implemented.

[11] "Financial Institution" includes banks, credit institutions and building societies.
[12] For details on the statutes, see Bank of Uganda, Annual Report 1994/95.

- Establishment of a Deposit Insurance Fund (as part of the FIS of 1993), into which each financial institution is required to contribute a minimum of 0.2 percent of the average of its total deposits over a period of one year while the government contributes the rest. This requirement has, however, been assessed as being inadequate, especially in view of the insolvency of several banks which led to the financial sector crisis of the late 1990s. The scheme currently only covers deposits of up to Shs 3 million (approximately USD 2000) in the event of failure. Other efforts to strengthen the legal framework include the establishment of a credit rating agency in January 1998 and a commercial court to adjudicate on conflicts of commercial nature.

1.2.3 The Inter-bank and Capital Markets

The inter-bank shilling market was introduced in 1994/95. This would help limit BoU credit to commercial banks. Rules in the clearinghouse were also revised to eliminate the automatic access of commercial banks to BoU credit. The three accounts formerly held by banks at BoU were in this regard merged into one account, which would hold the minimum of the required reserves. Further, the Capital Markets Authority (CMA) was constituted during the financial year 1995/96.

1.2.4 Interest Rates

BoU controls on interest rates and credit have been gradually abolished to improve efficiency in the mobilisation and allocation of resources. The first move was made in November 1992, when key deposit and lending rates were linked to the average treasury bill yield on four preceding treasury bill auctions (reference rate), while all other rates were decontrolled.[13] The discount (bank) and rediscount rates were also to be reduced in line with developments in the reference rate. In July 1994, commercial banks were formally allowed to set their own interest rates based on their own analysis of market conditions. A further move in April 1995 towards a market interest rate structure involved de-linking the rediscount rate from the discount (bank) rate, and revising the

[13] Minimum rates on commercial bank long-term loans were set at 3 percentage points above the reference rate, and the minimum rates on savings and time deposits were set at 6 and 5 percentage points below the reference rate, respectively. Minimum lending rates for agriculture, term and selected credits were all set 3 points above the reference rate.

methodology for setting them.[14] The discount rate was to reflect developments in the inter-bank shilling market rates, while the rediscount rate was set at an adjustable margin above the reference rate, in line with underlying and prospective monetary developments.

1.2.5 Institutional Reforms

Institutional reforms have involved establishments of new banks (both foreign and domestic) and the development of non-bank institutions such as insurance companies and credit institutions. Although not successful, attempts to privatise the state owned Uganda Commercial Bank (UCB) were made during the review period. These measures were meant to introduce greater competition into the financial sector.

Insolvent and under-capitalised banks have been restructured by injections of shareholder finance, strengthening of managerial capacity, removal of bad loans from bank balance sheets and by reducing the branch networks where necessary. For example, the bad loans of UCB worth 72 billion (USD 70 million), were removed from its balance sheet and transferred to the Non-Performing Assets Recovery Trust (NPART), which was set up to recover the loans from defaulters in March 1997. Instead, UCB was recapitalised to the same magnitude through the issuance of an interest-bearing bond. In addition, the branches of UCB were reduced from about 169 in December 1993 to 66 in June 1998. The BoU was also restructured and re-capitalised to improve its operational efficiency.

The reforms were accompanied by measures to better integrate the domestic financial system with international markets. Among the measures taken was the removal of restrictions on the capital account in July 1997. How successful these policy reforms have been is, however, controversial. We review the evidence of their impact below.

[14] Initially the rediscount rate was set at 1 percentage point above the discount rate.

1.3 EXPERIENCE WITH FINANCIAL SECTOR REFORMS

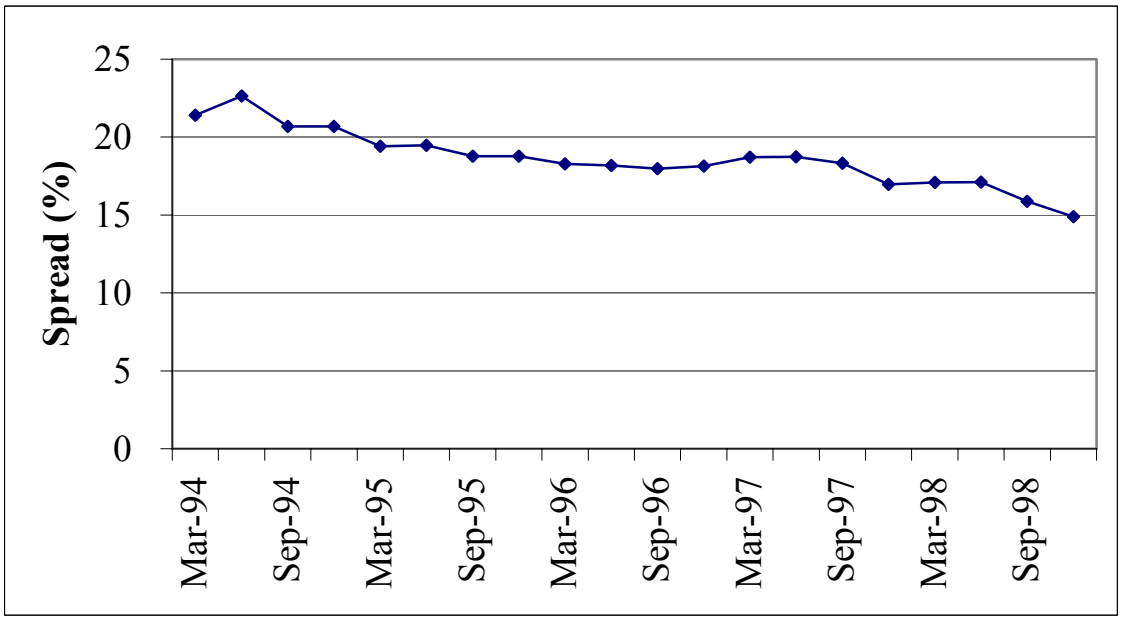
Financial sector reforms were very broad based, and were in turn part of a broader set of reforms, which included not only liberalisation of the economy in general but also macroeconomic stabilisation. Hence, it is difficult to disentangle the effects of financial reforms from those of other reforms that were taking place at the same time. Overall though, it appears clear that while the results achieved so far have been encouraging in some respects, substantial challenges still face the economy in regards to achieving efficiency of the financial system. Developments in key economic indicators are indicated in Appendix 1.3. In terms of positive developments, the exchange rate premium, which was recorded at 49 percent in 1990, has been virtually eliminated. Positive real interest rates were achieved and maintained, mainly through credible macroeconomic policies, which successfully reduced inflation to low levels. Except for a few slippages due to "unfavourable weather," inflation was kept under control, falling from 27 percent in 1990 to 2 percent in 2000. Fiscal deficits which were, earlier, blamed for monetary expansion and inflation, have in the recent years been brought to levels of less than 2 percent of total GDP. Domestic savings have been stimulated by positive real interest rates, leading to a rise in the ratio of savings/M2 from 13.8 percent in 1990 to 29.6 percent in 2000.

The financial system has experienced considerable growth and restructuring. Real assets of the banking system grew by an average annual rate of over 20 percent between 1993 and 2000; monetisation, as captured by the ratio of M2/GDP, increased from 7.3 percent in 1990 to 12 percent in 2000. The private sector, which was initially crowded out by government borrowing from the banking system, now receives more credit. The GDP growth rate averaged no less than 6 percent in the 1991-2000 period. Whether this growth effect is due to financial reforms is entirely another matter. It is difficult to control for other factors that were influencing macroeconomic performance at the same time. It is worthwhile noting that the rate of economic growth had already gained momentum during the early stages of the economy's recovery due to other factors, including increased availability of foreign exchange for import support and restoration

of security in large parts of the country.[15] In other respects, however, developments in the financial system were disappointing as evidenced below:

- Wide spreads between the lending and deposit rates appear to have been a problem following interest rate liberalisation (Figure 1.1). Failure to achieve competitiveness in the financial system is one possible explanation for this. Other possible explanations include high intermediation costs due to inefficient operational procedures, excess reserves and the continued presence of non-performing loans.

Figure 1.1 Spreads Between Lending and Deposit Rates (1993-1998)

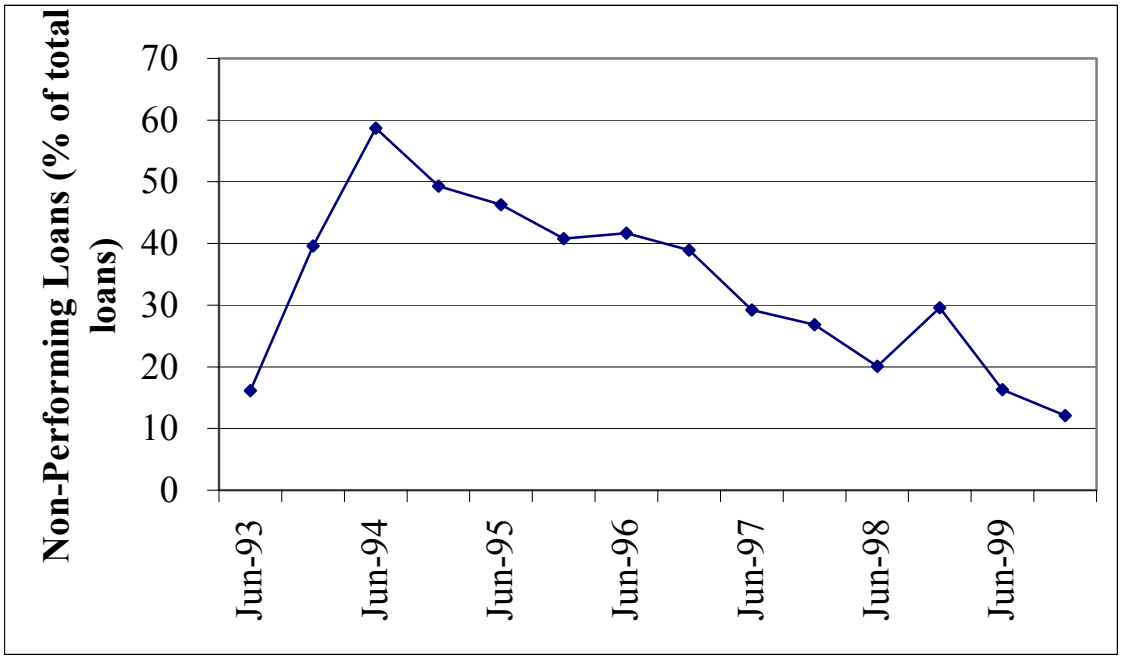


Note: Data used is end-quarter averages of bank spreads.

- It appears that bank restructuring did not yield the expected results. Despite some improvement, the quality of commercial bank assets remained weak during the post reform period. By the end of June1997, about 30 percent of all commercial bank loans in Uganda were non-performing, (Figure 1.2). This not only reflects weak management and procedures, but also poor credit discipline.

[15] See Bank of Uganda (1991): pp.15.

Figure 1.2 Asset Quality of Ugandan Commercial Banks (1993-1999)

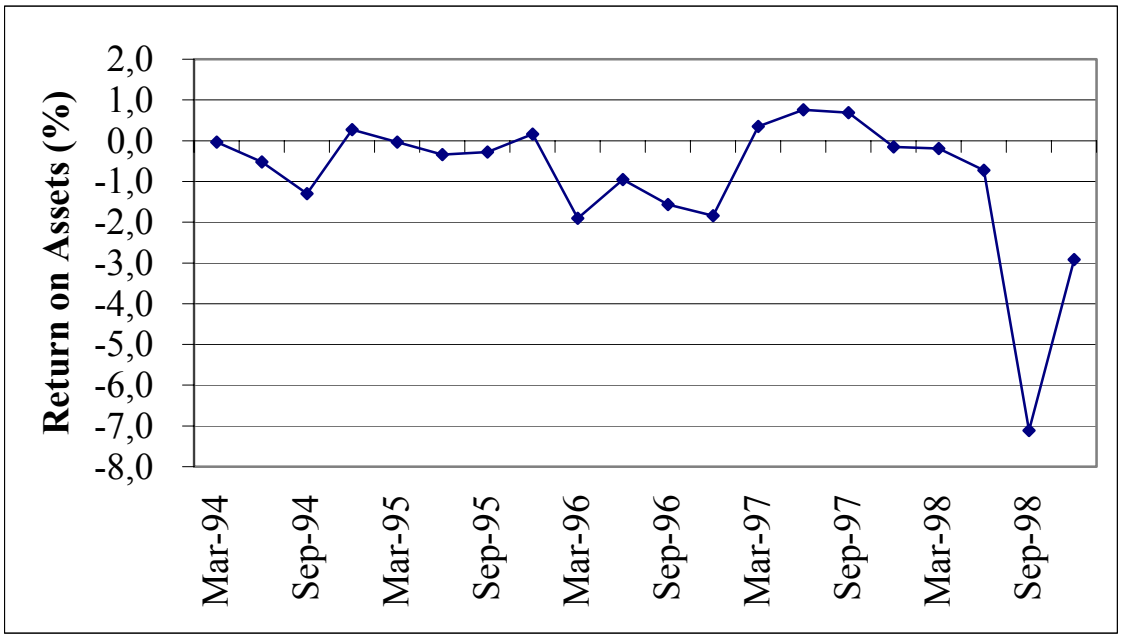


- Profitability of several banks deteriorated during the same period (Figure 1.3), which could be explained by the presence of non-performing loans in bank portfolio and the fight for deposits beyond limits of normal competition, including remuneration of deposits by banks experiencing liquidity problems.

All of the above indicators showed some worrisome signs, and hinted a progressive deterioration of bank soundness. Several banks indeed experienced solvency and liquidity problems and were closed down during the 1998/1999 financial year.[16] Inefficient bank management, lack of risk management capacity and ineffective bank supervision were the major explanations. Nevertheless, some banks showed significant improvements in performance after the reforms and seemed to grow faster than others.

[16] Four of the 20 banks in the financial system were closed down during the financial year 1998/99.

Figure 1.3 Profitability of Ugandan Commercial Banks (1994-1998)



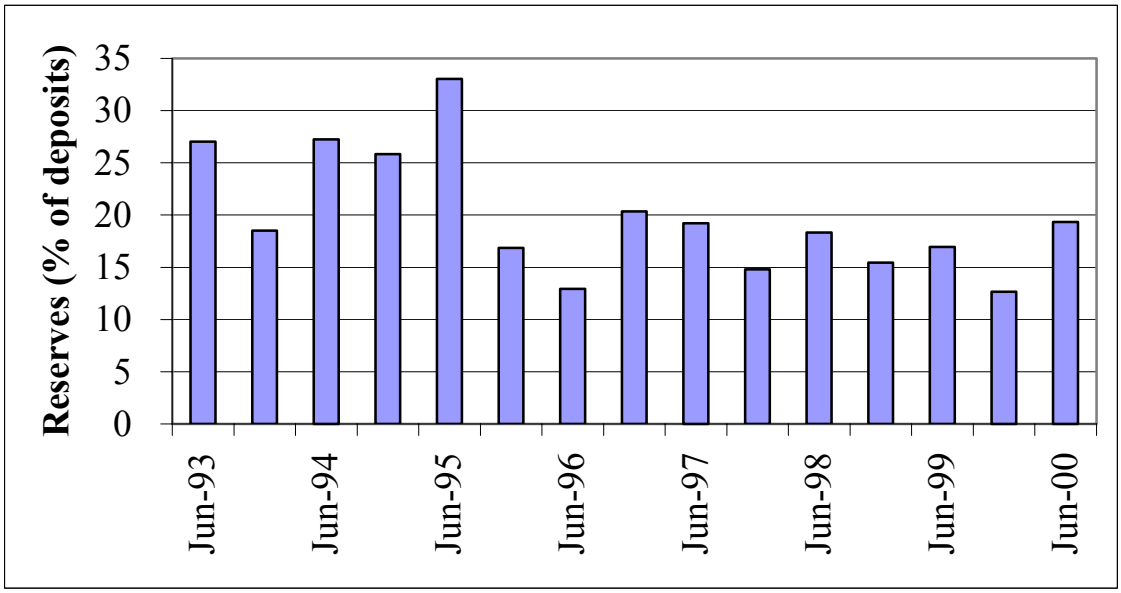
Note: Data used is based on selected banks.

- Competition remained limited while market concentration persisted during the review period despite entry of new banks into the system. The three-bank asset concentration index declined from 64 percent in 1993 to 45 percent in June 1998 resulting from an initial increase in competition, but rose to 61 percent in June 1999 following the closure of several banks and subsequent "flight to quality" where some banks lost deposits to other banks.

- The effectiveness of monetary policy remained constrained by weaknesses in the financial sector. Due to thin and illiquid securities and inter-bank markets, banks often held excess reserves (Figure 1.4).[17] This made the use of the reserve ratio as a monetary policy instrument ineffective. It further raised intermediation costs, widened the spreads between the lending and deposit rates and led to distortions in the allocation of credit.

[17] The average reserve ratio on deposits during the review period was 8.5 percent.

Figure 1.4 Reserves of Ugandan Commercial Banks (1993-2000)



1.3 SUMMARY AND CONCLUSIONS

Financial sector reforms in Uganda were prompted by a long-time recognition of the need to develop a financial system that would promote efficiency in mobilisation and allocation of resources, and that would provide a framework for implementation of effective monetary control. Attempts were hence made to achieve the above objectives through deregulating financial markets, strengthening of prudential regulations and supervision of financial institutions, restructuring distressed institutions, easing the restrictions of entry into the system, liberalising the capital account and adopting indirect instruments of monetary control. Although these measures led to encouraging results in terms of increasing monetisation and achieving a steady real GDP growth in a stable macroeconomic environment, performance of the financial system fell short of expectations in other respects. This was evidenced by a number of developments: wide spreads between lending and deposit rates, low profitability and poor asset portfolios of commercial banks, excess reserves, incidents of liquidity/solvency problems and bank closures. Not much appears to have been accomplished in enhancing the competitiveness in the financial system, while concentration of the market persisted. Consequently, the implementation of monetary policy remained constrained by weaknesses in the financial sector.

As this review indicates, there are still challenges facing the Ugandan government in terms of achieving an efficient financial system. Further research can, however, contribute to resolving the problems still inherent in the system, and can generally provide lessons on how financial reforms should proceed.

- The causes of wide spreads between lending and deposit rates need to be understood, as do problems associated with restructuring. Were high spreads due to lack of competition or high operating costs or were there some other causes? Wide spreads imply that the envisaged competition and efficiency in the financial system were not achieved.

- Why did restructured banks get into problems again? Why did some banks perform better and grow faster than others? In view of the high level of concentration, the answers to these questions will have implications for policy regarding acquisitions, mergers and entries.

- What role did the continued presence of market imperfections play in the transmission of monetary policy to the economy? These are the main issues that will be discussed in the chapters that follow.

APPENDICES

Table A1.1 Selected Economic and Financial Indicators for Uganda, 1985-1992 (*all figures are end of June unless otherwise stated)*

Year	1985	1986	1987	1988	1989	1990	1991	1992
Macroeconomic Indicators								
Real GDP Growth (%)	-3.0	0.8	3.8	7.6	6.0	5.8	5.2	3.1
Per Capita GDP Growth (%)	-4.6	-1.5	1.0	4.8	3.1	2.8	2.2	0.2
Fiscal Deficit/GDP (%)	390.6	414.8	463.0	4.4	3.8	5.4	4.2	7.6
Current Account (% of GDP) 1/	43.6	-381.2	-22.3	-8.9	-11.8	-16.2	-18.0	-18.1
Inflation (September 1989=100, %)	155.5	153.1	234.0	239.3	86.4	26.9	32.3	66.3
Official Exchange Rate (Shs/USD)	6.0	14.0	60.0	60.0	200.0	440.0	700.0	1166.0
Exchange Rate Premium (%) 2/	149.5	288.1	76.7	651.7	206.0	49.3	34.1	20.4
Financial Development Indicators								
Growth in Money Supply, M2 (%)	139.0	148.3	95.5	202.8	125.3	56.9	46.7	53.5
M2/GDP (%)	11.2	11.4	7.3	7.1	7.0	7.3	8.1	8.2
Cash/M2 (%)	38.9	44.4	47.7	53.5	48.5	40.9	40.6	39.7
Savings Deposits/M2 (%)	13.6	13.2	11.6	9.8	9.8	13.8	16.2	21.7
Share of Private Sector Credit (%)	50.3	54.2	37.2	71.7	80.7	88.5	90.3	70.0
Real Interest Rates								
Treasury Bill, 91days (%)	-133.5	-118.1	-199	-211.3	-43.4	16.1	-1.3	-27.3
Savings Deposits (%)	-137.5	-125.1	-206	-221.3	-53.4	6.1	-4.3	-31.3
Time Deposits (7-12 months, %)	-135.5	-123.1	-204	-219.3	-51.4	8.1	-2.3	-28.3
Maximum-Lending Rate (Agriculture, %)	-131.5	-115.1	-196	-215.8	-53.9	5.6	-0.3	-26.3
Rediscount (%)	-132.5	-118.1	-199	-207.3	-38.4	21.1	5.7	-23.3
Discount/Bank Rate (%)	-131.5	-117.1	-198	-208.3	-31.4	28.1	11.7	-17.3

1/ The current account figure excludes official transfers and is based on a calendar year; hence it is an end of December figure.

2/ The premium was sharply reduced by the currency reform of May 1987, from 929% in April 1987 to 76.7% in June 1987. The premiums shown in 1992 and 1993 are the market rate over the auction rate. The official rate was unified with the market rate in March 1992.

Source: Various issues of Bank of Uganda Quarterly and Annual Reports

Table A1.2 Financial Sector Reforms in Uganda: Major Developments (1990-2000)

Year	Development	Objective
1987/88 1989/90	- Initiation of the Economic Recovery Program (ERP). Measures taken included a currency reform with 1 new Sh = 100 old Shs, plus a 30% conversion tax; several devaluations of the exchange rate; a rise in petroleum prices and major agricultural crops; removal of restrictions from the marketing systems; repayment of government debt owed to the banking system; introduction of three Special Import Programs (SIPs) aimed at increasing and expediting the supply of foreign exchange (FE) required for imports.	- To restore economic growth in a more stable macroeconomic environment through limiting money supply growth, providing incentives for production, increasing efficiency in the marketing of produce and broadening the tax revenue base.
1990/91	- In July 1990, the formally parallel foreign exchange market was legalised and foreign exchange bureaux were licensed to deal in certain exchange transactions at market determined exchange rates. - The official exchange rate was also devalued.	- To improve efficiency in the foreign exchange market. - To narrow the spread between the official and the bureaux rates, and improve the incentives for the export sector.
1991/92	- Introduction of a foreign exchange auction in January 1992. - Establishment of the Treasury Bill Auction in April 1992. - Other financial sector reforms started through: . Transferring direct crop financing from BoU to commercial banks . Laying a foundation for the future Reserve Money Program (RMP) by requiring banks to open three accounts at BoU: statutory reserve, loan, and transactions clearing accounts. - Two commercial banks were licensed: Greenland and Allied 1/	- Further liberalisation of the foreign exchange market to stimulate its development. - To facilitate monetary and fiscal policy. - To Increase competition and efficiency in the financial system.

Continued…

Table A1.2 Financial Sector Reforms in Uganda: Major Developments (1990-2000)

Year	Development	Objective
1992/93	- Key deposit and lending rates were linked to the average treasury bill rate. All other rates were decontrolled in November 1992.	- A further step towards improving efficiency in resource mobilisation and allocation.
	- Beginning January 1993, Treasury bills of 180 and 270 days maturity were traded.	- Development of the Treasury bill market.
	- Revision of the BOU statute, and the enactment of the Financial Institutions Statute in May 1993.	- Strengthening supervision and regulation of the financial sector.
	- The formulation and conduct of monetary policy was to be guided by developments in the Reserve Money Program (RMP).	
	- Reduction in bank and rediscount rates from 31% and 30% to 26% and 25% respectively.	- Ease monetary policy.
	- Four commercial banks were licensed: Kigezi, Orient, International Credit, and Centenary Rural Development.	- Increase competition and efficiency in the financial system.
1993/94	- Financial sector reforms including enforcement of minimum capital adequacy requirements, introduction of prudential limits on net open positions of banks foreign exchange holdings, stipulation of legal lending limits on banks and improvements in the data reporting system of banks.	- To create an appropriate policy and regulatory framework conducive to increased competition and efficiency in the financial system, and strengthen the supervisory role of BoU.
	- Introduction of the interbank foreign exchange market in Nov. 93.	- To eliminate the segmentation and improve efficiency in the FE market.
	- Start of restructuring of Uganda Commercial Bank.	- To improve its operational efficiency.
1994/95	- Introduction of the coffee stabilisation tax in 1994.	- To reduce the rate of appreciation of the exchange rate.
	- Introduction of the 364 treasury bill at the end of 1994.	- To increase the range of instruments available for trading.
	- Introduction of the inter-bank shilling market.	- To enhance BoU's statutory role of lender of last resort to banks.
	- Revision of rules in the clearing house, and merging of three commercial bank accounts at BoU (statutory reserve, loan and transactions clearing) into one.	- To eliminate automatic access to BoU credit by banks.
	- A reduction of rediscount and discount rates from 19% and 20% in June 1994 to 14% and 15% in November 1995.	- In line with declining inflation and treasury bill rates.
	- In April 1995, the method for determining the bank and rediscount rates was changed to reflect developments in the inter-bank and treasury bill markets respectively, and in monetary policy changes.	- To promote a market related interest rate structure.

Continued…

Table A1.2 Financial Sector Reforms in Uganda: Major Developments (1990-2000)

Year	Development	Objective
1994/95	- Full liberalisation of interest rates in July 1994 by formally de-linking all commercial bank rates from the treasury bill rate. - Restructuring of BoU, Nile and Sembule banks begins. - Banks permitted to extend credit in foreign currency at a reserve ratio of 20%.	- Promote economic growth and financial development through increased efficiency in savings mobilisation, credit allocation and investment. - To improve their operational efficiency. - To be in line with the policy of liberalisation of the capital account.
1995/96	- BoU implemented a short-term borrowing facility for banks, allowing automatic, fully collaterised access to BoU funds. Minimum cash daily reserve requirements were replaced with a two week averaging system. - First stage of recapitalisation of BoU was implemented. - Transfer of UCB non-performing loans to NPART. 2/ - The Capital Markets Authority (CMA) was instituted. - Five commercial banks were licensed: Cairo International, Crane, Diamond Trust, Trans Africa and Trust.	- The two measures were aimed at improving short-term liquidity Management of banks, and promoting the development of the securities and inter-bank shilling market. - Further efforts to strengthen the financial sector. - This removed existing bad loans on the UCB balance sheet. - Measure towards the development of the stock exchange market. - To increase competition and efficiency in the financial system.
1996/97	- The BoU bill was introduced. - A rise in cash reserve ratios on demand and time deposits from 8% and 7% to 9% and 8%, respectively in September 1996. - Introduction of bearer bills in April 1997, and BoU started publishing information on interest rates.	- As an additional liquidity management tool during periods of faster than anticipated expansion of base money. - To control inflationary pressures that could emerge from the expansion of credit to the private sector. - To promote development of the money and capital markets.
1997/98	- The policy margin for the determination of the rediscount rate was increased from 2 to 3 percentage points in June 1998. - COOP bank was fully re-capitalised with assistance from USAID 3/ - Liberalisation of the capital account in July 1997.	- To control the volume of rediscounts during tight monetary policy. - To improve the liquidity of the bank and reduce its insolvency risk. - To facilitate a more global allocation of savings, and help channel resources to their most productive use. It increases availability of investable funds and provides access to foreign capital markets and cheaper credit. It broadens and deepens domestic capital markets.

Continued…

Table A1.2 Financial Sector Reforms in Uganda: Major Developments (1990-2000)

Year	Development	Objective
1998/99	- Several banks suffered acute financial distress:	*Reasons for bank closure*
	. International Credit Bank closed in September 1998.	- Insolvency due to non-performing insider loans.
	. Trust Bank and TransAfrica closed (TransAfrica later re-opened).	- Liquidity shortages.
	. Greenland bank closed in April 1999.	- Insolvency and violation of legal provisions on lending.
	. COOP Bank closed in May 1999.	- Insolvency due to poor loan portfolio, and ineffective internal controls.
	- Policy margin on bank rate increased from 2 percentage points in December 1998 to 4 percentage points in January 1999.	- Pursuit of tight monetary policy due to excess liquidity in the banking system.
	- Policy margin on the bank rate and rediscount rate was revised from 4% and 3% to 8.5% and 9%, respectively, in May 1999 before it was reduced to 2% and 3%, respectively, in June 1999.	- Pursuit of tight monetary policy due to excess liquidity in the banking system and depreciation of the exchange rate.
	- Increase in the proportion of vault cash eligible as reserve assets was increased from 30% to 50% for banks with a domestic network of at least 10 branches.	- To address structural problems associated with currency movements in upcountry areas.
1999/00	- Between October and December 1999, BoU implemented two interest rate interventions:	- To meet the increased liquidity demands of commercial banks arising from the "Y2K roll over problems."
	. A zero policy margin on the reference rate.	
	. A change in the rediscount policy, allowing all treasury bill instruments to be rediscounted.	
	- Effective January 2000, the minimum unimpaired capital requirements for all banks and credit institutions was raised to 2 billion and 1 billion, respectively.	- A stronger capital base provides a cushion for losses, safeguards depositors funds and improves incentives for the owners of banks to practice prudent management.
	- Trust Bank closed in November 1999.	- Insolvency.
	- Citibank starts operations.	- To increase competition and efficiency in the financial system.

1/ Allied bank was initially registered as Sembule bank.
2/ NPART refers to Non-Performing Assets Recovery Trust
3/ USAID refers to United States Agency for International Development
Source: Various issues of Bank of Uganda Quarterly and Annual Reports

Table A1.3 Selected Economic and Financial Indicators for Uganda, 1993-2000 (*all figures are end of June unless otherwise stated*)

Year	1990	1993	1994	1995	1996	1997	1998	1999	2000
Macroeconomic Indicators									
Real GDP Growth	5.8	8.4	5.4	10.6	7.8	4.5	5.4	7.7	5.1
Per Capita GDP Growth (%)	2.8	4.5	2.2	7.3	4.7	1.7	2.7	4.7	2.5
Fiscal Deficit /GDP (%) 1/	5.4	4.9	5.3	2.5	2.6	1.8	1.7	0.4	0.3
Current Account/GDP (%) 2/	-16.2	-14.3	-9.1	-16.0	-17.9	-20.5	-23.5	-24.1	Na
Inflation, (September, 1989=100, %)	26.9	-2.4	16	3.4	5.4	10.4	-1.4	5.3	1.9
Official Exchange Rate (Shs/USD)	440	1199.1	962.6	964.8	1041.4	1067.6	1231	1447.2	1565.6
Exchange Rate Premium (%) 3/	49.3	16	1.1	0.8	0.32	-0.01	-0.48	0.1	0.7
Financial Development Indicators									
Assets of Commercial Banks (Bill. Shs)	104.7	472.8	587.8	706.4	805.9	965.9	1279.8	1456.6	1801.5
Growth in Money Supply, M2 (%)	56.9	41.5	33.8	25.3	20.7	15.8	23.7	9.1	8.5
M2/GDP (%)	7.3	8.3	9.9	10.3	10.9	11.7	12.3	12.0	11.9
Cash/M2 (%)	40.9	32.9	33.6	33.6	34.5	31.3	27.4	29.9	29.4
Savings Deposits/M2 (%)	13.8	26.6	27.3	25.5	29.2	31.3	35.4	31.2	29.6
Share of Private Sector Credit (%)	88.5	80.8	106.2	171.7	130.1	128.3	152.2	109.5	97.6
Real Interest Rates (%)									
Treasury Bill (91 days)	16.1	26.4	-5.0	3.6	6.4	-0.6	8.3	2.8	16.5
Savings Deposits	6.1	17.4	-14.0	-0.4	-2.2	-7.1	5.6	-1.4	2.0
Time Deposits (7-12 months)	8.1	21.4	-10.0	4.6	5.4	1.5	13.7	4.0	8.3
Lending Rate (Agriculture)	5.6	29.4	5.3	16.1	15.4	11.3	22.9	17.7	20.0
Rediscount Rate	21.1	27.4	3.0	6.6	8.7	1.6	11.5	3.4	23.4
Discount/Bank Rate	28.1	28.4	4.0	8.6	10.0	4.7	16.0	5.9	25.1

1/ Fiscal deficit excludes grants.

2/ The current account figure excludes official transfers and is based on a calendar year; hence it is an end of December figure.

3/ The exchange rate premium during the period 1992-1993 is calculated as the difference between the bureaux exchange rate and the auction rate, otherwise it is calculated as the difference between the bureaux rate and official rate as a percentage of the official rate.

Source: Various issues of Bank of Uganda Quarterly and Annual Reports

CHAPTER 2

ON THE DETERMINANTS OF COMMERCIAL BANK INTEREST RATE SPREADS UNDER UNCERTAINTY: EVIDENCE FROM UGANDA

Abstract

In this chapter we analyse the determinants of bank interest rate spreads in Uganda using data covering the period 1994-1998 and two measures of the spread: the ex-ante spread (ISPR) and the ex-post spread (or Net Interest Margin [NIM]). The empirical findings yield support for the hypothesis that ex-ante spreads reflect interest rate risk, liquidity risk and insolvency risk premiums. However, risk factors reduce the Net Interest Margins of banks. Lack of competition, costs of excess reserves and short-term borrowing at BoU or in the Inter-bank market get translated into high ex-ante spreads of banks, although they are not necessarily associated with high Net Interest Margins. Large banks seem to have lower ex-ante spreads. However, there is no evidence of scale economies. Dependence on non-interest income lowers ex-ante spreads and Net Interest Margins of banks. Although default and exchange rate risks reduce the Net Interest Margins of banks, they are not important reasons for banks deciding to raise ex-ante spreads. Higher overhead costs are not reflected in higher ex-ante spreads, though they are associated with higher Net Interest Margins of banks. Inflation also appears to be an important factor in raising spreads. There are, however, significant disparities in effects across market segments. Finally, the results warrant some policy recommendations. Since high spreads reflect lack of competitiveness and inefficiency in the financial system, policies should be directed at improving technology and risk and financial management, at strengthening supportive information and bank supervision, at developing inter-bank, securities and equity markets and at maintaining macroeconomic stability.

Key words: Banks; Interest rate spreads; Uncertainty

2.0 INTRODUCTION

During the 1970s and 1980s, Uganda's financial system was highly repressed, inefficient and uncompetitive due to many factors. It was operated under controls on prices and selective and directed credit controls, it exhibited high operating costs, a high degree of concentration, state ownership and restricted entry. The economy also experienced political and social upheavals and high inflation rates, which worsened intermediation. In contrast, the 1990s saw a major trend toward liberalisation of financial markets in Uganda. As part of a far-reaching stabilisation and structural adjustment program, the government implemented a financial sector reform program that aimed at increasing financial intermediation, and at promoting competitiveness, efficiency and stability of the domestic financial system.

Over time, reforms have removed interest rate and exchange rate controls, eased the entry of new financial institutions, phased out directed credit programs and strengthened institutional regulation and supervision, and led to substantial restructuring of financial institutions. Policy measures were also taken to develop securities and inter-bank markets, and monetary policy has moved toward market-based instruments.[18]

These measures led to some positive changes in the sector, including: (1) a rise in financial intermediation and deepening resulting from increases in real deposit rates, (2) banking activity registering growth in deposits and assets and (3) an increase in the size and efficiency of the foreign exchange market. The economy's real GDP growth also averaged no less than 6 percent in the post-reform period. Nevertheless, there is reason to believe that competition and efficiency of the financial sector were not significantly improved by the reforms.

Financial liberalisation is expected to improve efficiency as competition between financial institutions increases, allowing rates to be set at market clearing levels. More competition in the financial sector would lower the margin between the deposit rate of interest (paid to savers) and the lending rate (paid by borrowers) so that the margin/ spread between the two rates would reflect competitive intermediation costs such as

[18] For a further discussion on the financial sector reform program, see Chapter 1.

costs of information gathering, risk taking, taxes imposed by government and normal profits. However, Uganda's bank interest rate spreads were persistently large, averaging 18 percent in the period 1994-1998.

Section 2.3 will show that high interest spreads in Uganda can in part be associated with failure to achieve competitiveness in the financial market, micro and macroeconomic uncertainty and other intermediation costs such as those due to borrowing and keeping excess reserves. Moreover, high spreads were not reflected in high profitability, as banks' Net Interest Margins (NIM) and Return on Assets (RoA) remained low on average - a reflection of functional inefficiencies. However, though Uganda's spreads were high according to international standards,[19] the experience was somewhat similar to that of other countries that liberalised their financial markets: Argentina, whose overall banking spreads were slow to converge to international levels during the 1990s (Catao, 1998); Kenya, whose spreads widened following liberalization (Ndungu and Ngugi, 1999) and Latin American countries in general, whose reforms do not appear to have significantly reduced spreads (Brock and Suarez, 2000).

There has been a growing consensus about the factors that have contributed to the wide interest rate spreads in Uganda.[20] However, there have not been any studies quantifying the impact of the various known influences. This chapter provides a framework for the decomposition of intermediation spreads into their key determinants. In so doing, it will allow us to ascertain if and why efficiency of the Ugandan financial institutions was not significantly improved by the reforms. The analysis is guided by the following specific objectives:

- To examine the trends of interest rate spreads and their key determinants (risk, financial market structure, costs, regulatory and macroeconomic factors).
- To empirically analyse the determinants of interest rate spreads.
- To draw policy implications for the future course of financial sector reforms.

[19] Between 1991-1996 weighted average spreads in the U.K and the U.S. averaged less than 3 percent (Randall, 1998).
[20] See for instance, Kasekende and Atingi-Ego (1999).

The theoretical model uses monopolistic market forms and risk aversion approaches for explaining firm behaviour, and hence emphasises the importance of market power and uncertainty in banks' decisions to set the spread. Section 2.2 will show that Uganda's financial system is segmented, with significant differences in age, ownership and performance across segments. The relationship between spreads and their determinants may, hence, vary across different market segments. For example, because young banks have no bad loans in their portfolio, they may engage in more risky lending by increasing the loan rate, thus increasing the spread. On the contrary, the managers of banks with a history of non-performing loans are not likely to raise lending rates so high as this would attract the more risky borrowers. An appropriate understanding of the behaviour of spreads in different market segments hence requires an examination of the institutional framework in which banks operate. The analysis will therefore combine descriptive and econometric approaches, and will use panel data (over both the full-sample and bank-group data). Besides providing some indication of the key determinants of spreads, the descriptive analysis will provide a basis for formulation of the econometric model and interpretation of empirical results. One-way error component fixed effects models, which include time specific variables, are developed for the empirical analysis.

Efficiency of bank intermediation can be analysed using the ex-ante spread, which is calculated as the difference between contractual rates charged on loans and rates paid on deposits, or the ex-post spread/Net Interest Margin (NIM), which is defined as the difference between interest revenue and interest expense, expressed as a percentage of average earning assets. Most of the empirical work done on this topic has used the Net Interest Margin (NIM) as the measure of efficiency (see for instance Ho and Saunders, 1981; Angbazo, 1997; Demirgüç-Kunt and Huizinga, 1998). However, the NIM has a number of shortcomings. One of these is that since interest revenue and interest expense are obtained from loan and deposit contracts of different plan periods, respectively, the Net Interest Margin may tend to understate or overstate the spread. For example, if a large proportion of the bank's non-performing loans were contracted at higher ex-ante rates, this measure would tend to understate the contracted or ex-ante lending rate. Moreover, a reduction in Net Interest Margins need not signal improved bank

efficiency; it could, for instance, instead be attributed to a higher loan default rate, which may reflect a deterioration of banks in monitoring borrowers. However, although we argue that the ex-ante spread is a more precise measure of efficiency, we use both measures of the spread in the analysis in order to compare our results with earlier findings, while maintaining the difference between the two terms.

This case study aims to contribute to empirical research in a number of ways. It adds to the scarce empirical literature on the determinants of interest rate spreads. There is very little research done on the African reforming economies regarding this topic. The findings of this study will not only test existing firm-theoretical arguments which explain bank spread behaviour, but will also have important implications on financial sector policies. Besides capturing the empirical advantage of using panel data, this study covers a wide range of explanatory variables, which include risk, market structure as well as macroeconomic factors. Earlier work has ignored at least one of these factors. Specifications by Ho and Saunders (1981) and Angbazo (1997), for instance included risk and financial structure factors, but ignored macroeconomic factors. On the other hand, Demirgüç-Kunt and Huizinga (1998) and Randall (1998) included macroeconomic and financial structure factors in their specifications, but ignored risk factors.

The remainder of the chapter is organised as follows: In Section 2.1, we review the theory and empirical evidence of the determinants of the interest rate spreads. Section 2.2 provides a descriptive analysis of the relationship between bank interest spreads and their key determinants. In particular, this section highlights the fact that due to differences in age, ownership and performance, there are likely to be disparities in determinants of interest spreads across market segments. The methodology and data are discussed in section 2.3. Sections 2.4 and 2.5 discuss the empirical findings and policy recommendations. Section 2.6 summarises the findings and concludes the chapter.

2.1 A LITERATURE SURVEY

A number of theoretical models on the determinants of optimal bank interest spreads base their arguments on risk and risk aversion, financial market structure, high fixed and operating costs, the existence of regulatory constraints and other macroeconomic factors. We discuss each of these below:

2.1.1 Risk and Risk Aversion

Managers of financial firms face a variety and a complexity of risks, which affect their optimal decisions. One such risk is the investment or default risk in connection with the assets held by the bank; as a creditor the bank faces the risk that its debtors are not able or willing to meet their obligation at the agreed upon time, and that the market's evaluation of the assets of the firm and thus their yield, fluctuate. However, financial firms that make loans or buy bonds with long maturities are generally more exposed to credit risk than financial institutions that make loans or buy bonds with short-term maturities.

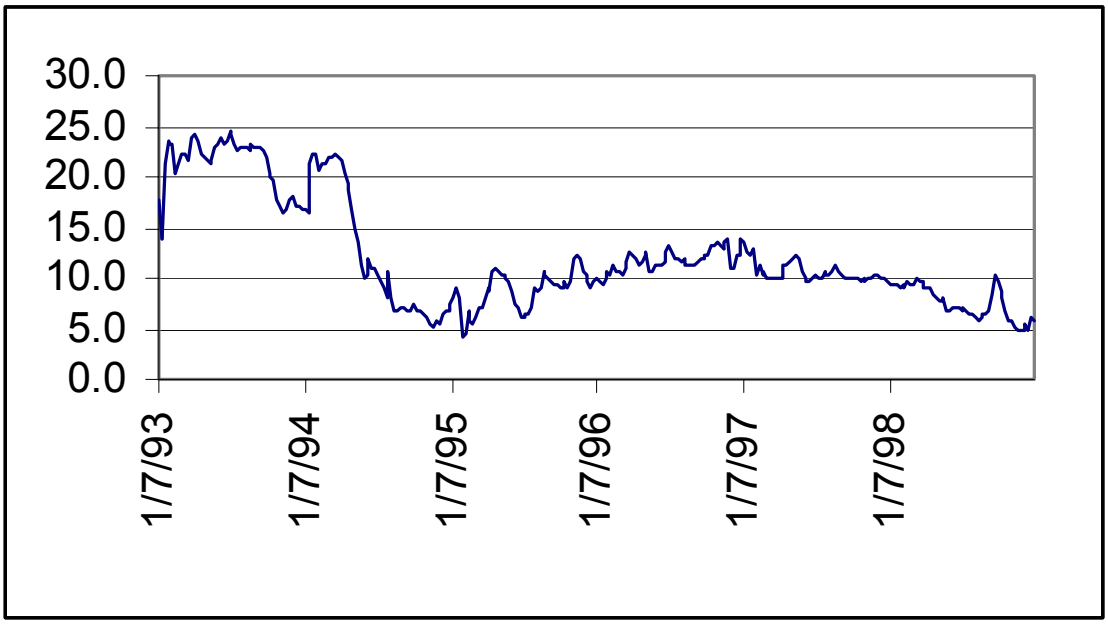
On the other hand, there is withdrawal or liquidity risk connected with the bank's liabilities; as a debtor, the bank faces the possibility that its creditors may be unwilling to extend or renew their credit to the bank, or that they may be willing to do so only on different terms. Of course this type of risk assumes a particular weight in the case of demand deposits, where the creditor has a contractual right to withdraw all his funds at any time, without any restrictions or penalties. In situations where withdrawals are larger than normal and when, perhaps, other banks are facing similar abnormally large cash demands, the cost of additional funds rises and their supply becomes restricted or unavailable.

A more serious liquidity risk may result and thus threaten the solvency of the financial institution if some of its less liquid assets must be sold off at low "fire-sale" prices in order to meet the withdrawal demands of liability holders. Another source of liquidity risk arises when lending commitments which allow a borrower to take down funds from a financial institution on demand, create a demand for liquidity which must be met by the financial institution running down its cash assets, selling off other liquid assets or borrowing additional funds.

The bank is also exposed to interest rate risk whenever it holds shorter-term or longer-term assets relative to liabilities. A common argument is that to a large extent, the movements of interest rates are determined by the strategy of the central bank. If the central bank smoothes or targets the level of interest rates, unexpected interest rate shocks and interest rate volatility tend to be small. Accordingly, the risk exposure to a financial institution from mismatching the maturities of its assets and its liabilities also tends to be small. However, to the extent that the central bank targets the supply of the bank reserves and allows interest rates to be determined by market forces, the volatility of interest rates can be very high (Saunders, 2000).

Figure 2.1 shows the movements in interest rates for the Uganda 91-day Treasury Bills (TBs) for the 1993-1998 period. As this figure indicates, interest rates were volatile during the entire period. While the observed fluctuations may partly be explained by the liquidity position of commercial banks (which have been the major participants in the TB market), they have largely been attributed to variations in the weekly issuance of Treasury Bills according to the desired developments in reserve money (see Bank of Uganda, 1994/95). In particular, under the current reserve-targeting monetary policy regime, the key instrument of monetary policy in Uganda is open market operations. Open market operations influence domestic interest rates as well as the monetary base, since the sales or purchases of government securities by Bank of Uganda (BoU) will affect their price and return, and interest rates on bank deposits and other financial accounts are usually influenced by returns on government securities. Thus, a tight monetary policy based on an increase in the issuance of government securities will lead to a shrinking monetary base, a contraction of bank credit and a rise in interest rates.

Figure 2.1 Interest Rates on the 91-Day Treasury Bills (1993-1998)



Note: Data used are weekly-annualised discount rates.

A number of theoretical models examine the choice of optimal interest spreads for banks under uncertainty and risk aversion. Ho and Saunders (1981), Zarruk (1988) and Wong (1997) show that the more risk-averse banks will set higher optimal spreads.[21] A risk-averse bank, which can lend in both the loan and inter-bank markets, also attaches a risk premium to the loan to compensate for the credit risk (Wong, 1997). Wong, however, argues that when credit markets are characterised by informational problems, either in the form of adverse selection or in the form of moral hazard (along the arguments of Stiglitz and Weiss, 1981), optimal bank interest spreads may be lowered, as banks will set lower loan rates in order to reduce credit risk by partially discouraging the high risk investments and less risk-averse borrowers (ceteris paribus).

A financial institution, which holds undiversified foreign assets or liabilities, exposes itself to foreign exchange risk in addition to default, liquidity and interest rate risk, due to possible changes in the exchange rates. Other forms of risk faced by financial

[21] Allen (1988) however argues that pure interest rate spreads may be reduced when cross elasticities of demand between bank products are considered, as diversification of services enables banks to improve the management of their inventory exposure.

institutions include operational risk, which arises due to, for instance, human error and fraud, technological failure, contractual disputes and catastrophes.

Risk carries the implication that banks with more risky loans and higher interest rate and liquidity risk exposure would select higher loan and deposit rates to achieve higher desired bank spreads.

2.1.2 Operating Costs, Implicit and Explicit Taxes

Central to the real or operating decisions of financial institutions are the costs of inputs, or the factors that are used in producing services, with labor and capital being the most important ones. However, the availability of technology such as computers, visual and communications systems is essential for the most efficient management and combination of these inputs in order to produce financial output at the lowest possible cost. If banks were fully efficient, they would maximize profits at the lowest possible cost. However, there are a number of sources of cost inefficiency in banking. Important among these is operational inefficiency, such as branch offices that use excessive labor, as opposed to financial inefficiency that involves excessive interest rate payments (see Berger et al 1991, 1997). High operating costs widen the spread between deposit and loan rates and reduce the size of the financial system.

The operating cost ratios of banks may also be raised through implicit and explicit taxation. Cash reserve requirements usually imposed on financial institutions are, for instance, often viewed by financial institutions as similar to a tax and a positive cost of undertaking intermediation. Moreover, inflation increases the reserve requirement tax; leading to a substantial drop in the real deposit rate and the real demand for money, thus further raising the operating resource cost ratios. Conventional taxes such as interest withholding taxes, stamp duties, transaction taxes, value added taxes, profit taxes and licence fees which are levied on the financial intermediation are yet another cause for a rise in operating cost ratios, and do widen the spread between deposit and loan rates of interest. They therefore reduce the real volume of financial intermediation and hence saving and investment, as do higher operating costs.

A few theoretical models exist, which view the real resource aspects as a crucial element in any attempt to understand the determinants of interest rate spreads. This approach is particularly emphasised by Wong (1997) who shows that under decreasing absolute risk aversion, bank optimal interest spreads would increase with an increase in the marginal administrative cost of loans. First, a marginal increase in the administrative cost makes loans more costly to grant. This induces the bank to reduce the amount of loans by charging a higher loan rate, ceteris paribus. Second, it decreases the bank's profit in every possible state. This induces the bank to raise its loan rate, as it becomes more risk averse and thus, less willing to take on more risky loans.

2.1.4 Market Structure

Two main hypotheses explain the likely impact of market structure on the conduct and performance of banks, and implicitly on competition. According to the traditional Structure-Conduct-Performance hypothesis (SCP), banks are able to extract monopolistic rents in concentrated markets by their ability to offer lower deposit rates and higher loan rates. Empirically under this hypothesis, we would expect to find a positive relationship between interest rate spreads and market concentration, indicating non-competitive behaviour.

The more recent Efficient Structure (ES) hypothesis, however, asserts that efficient firms increase in size and market share due to their ability to generate higher profits, which usually leads to higher market concentration. Under this hypothesis, a bank will maintain good profits regardless of whether it increases spreads, due to either lower costs achieved through superior management or the use of improved technology. Thus, a positive relationship between market share and Net Interest Margin for instance, reflects a causal link between efficiency and profitability and not between market concentration and profitability.

2.1.5 Regulation and Legal Framework

Regulations are imposed to ensure stability and viability of the financial system. They protect depositors and borrowers against the risks of business failures of financial institutions and they secure effective implementation of monetary policy. They also

protect consumers and investors. Furthermore, authorities use regulations to control and to adjust (up or down) the level of entry of new institutions for various reasons. The regulatory and legal framework includes monetary policy and prudential purpose regulations, the legal environment, the adequacy of commercial law and the efficiency of the judicial system. Relevant to a liberalised financial system are regulations, which are imposed on financial institutions mainly for prudential purposes. One common form of regulation is capital regulation.

A bank's capital account not only provides a source of funds, in addition to deposits and other debt liabilities, but it protects the financial institution, its liability holders and regulators against the risk of insolvency. A number of theoretical arguments show that banks' adjustments to capital have a relationship with risk taking and interest spreads.
In an option-pricing framework, maximisation of the value of stockholders' equity entails maximisation of the option value of deposit insurance through increasing leverage and asset risk (Merton, 1977; Black et al., 1978; Kareken and Wallace, 1978; Dothan and Williams, 1980; Marcus and Shaked, 1984; Diamond and Dybvig, 1986; Benston et al, 1986). Banks will hence have incentives for excessive risk taking, in a fixed-rate deposit insurance system.

In this framework, the incentives of banks to increase leverage and asset portfolio risk depend on the levels of leverage and risk. Banks can in effect issue additional deposit liabilities without having to pay a default risk premium, and the marginal benefit from doing so increases as the asset risk increases. Similarly, the marginal benefit from increasing asset risk increases as the leverage increases (equity capital decreases). Since changes in bank capital (risk) are in part exogenously determined by a changing banking environment, banks will more or less continuously respond to changing marginal benefits by making adjustments to risk and capital levels.

The relationship between changes in bank risk and capital depends upon the relative magnitudes of the changing marginal benefits, the preferences of bank managers and costs of asset risk and leverage. Lower capital would, for instance, tend to be associated with higher risk levels, if bank behaviour were dominated by exploitation of the fixed-

rate deposit insurance subsidy. If, on the other hand, bank behaviour is influenced by a combination of leverage and risk related cost factors, capital and risk would be adjusted in the same direction (see Shrieves and Dahl, 1992).

Saunders et al (1990), for example, show that managers, as agents of stockholders, may have an incentive to reduce the risk of bank insolvency below the level desired by stockholders, if the wealth of managers largely takes the form of firm specific and industry specific human capital. In that case they would have a great deal to lose personally in the event of the bank's insolvency. Thus, managers of banks with high-risk asset portfolios may compensate for increases in asset risk by setting low leverage (high capital) and vice versa.[22]

A number of authors focusing attention on regulatory policy also point to a positive relationship between capital and risk in banks: Merton, 1972; Kahane, 1977; Koehn and Santomero, 1980; Kim and Santomero, 1988. Using a mean-variance framework, these authors argue that regulation of bank capital will yield the opposite results of those desired by regulators. Their reasoning is that imposing capital requirements on banks causes leverage and asset risk to become substitutes such that banks which experience involuntary reductions in leverage (regulatory increases in capital), will offset the capital restriction by shifting their portfolios from low risk to more risky assets. Similarly, relaxation of restrictions on capital causes banks to hold relatively low risk assets.

A number of theoretical models analyse the relationship between optimal spreads and bank capitalisation under uncertainty.[23] Zarruk (1989) shows that under decreasing risk aversion an increase in a bank's equity capital increases the bank's spread. Zarruk and Madura (1992), however, prove that with deposit insurance, an increase in capital-to-deposits decreases the bank's spread under non-increasing risk aversion; otherwise it is indeterminate. Wong (1997) shows that an increase in the bank's equity capital has a

[22] Using data from a sample of US FDIC-insured commercial banks, Shrieves and Dahl (1992) empirically establish that risk exposure and capital levels are simultaneously related and that the majority of banks mitigate the effects of regulatory induced capital increases by increasing asset risk posture and vice versa.

[23] In these models it is assumed that a minimum capital adequacy requirement is imposed upon the bank.

negative impact on the spread when the bank faces little or no interest rate risk; otherwise, the effect is ambiguous. This author argues that in the presence of decreasing absolute risk aversion, an increase in equity capital provides an incentive for a bank to extend more risky loans by lowering the loan rate. However, the enlarged capital base also allows the bank to issue more variable rate deposits while still meeting the capital adequacy requirement. The resulting increase in the variability of the bank's profits may then induce the bank to extend less risky loans by raising the loan rate.

The Legal Environment

Legislation, such as antitrust laws, is imposed because of the existence of conflict-of-interest situations and the prevalence of excessive market power. Khatkhate and Riechel (1980) argue that without these laws the responsiveness, flexibility, versatility and dynamism of the financial system are impaired. Banks particularly need protection in securing loans and in obtaining legal redress in the event of borrower default. Under an inefficient legal environment, banks are bound to be more cautious and less flexible about extending credit facilities to new clients. Interest spreads would widen, as banks would then have to attach a high-risk premium to lending rates.

2.1.6 Macroeconomic Environment

The financial sector and the pace of financial development are to a large extent affected by the general macroeconomic conditions. McKinnon (1973) and Shaw (1973) both emphasise low and stable inflation as part of, and as a prerequisite for, financial development. Unanticipated inflation is likely to lead to portfolio shifts towards short-term instruments, such as currency. Inflation also reduces the real yield of bonds and other assets, and makes the functioning of capital markets difficult (Wai and Hugh, 1973). Inflation uncertainty further increases the dispersion of expected inflation, and therefore raises the dispersion of ex-ante real interest rates. Some investors view the real interest rate as relatively high, while others view it as relatively low. In general, uncertainty caused by macroeconomic instability leads to economic inefficiency, since allocation of capital can only be optimal if agents correctly estimate the same real rate of interest when making their decisions involving the intertemporal allocation of resources.

2.1.7 Inter-bank Market Rate

Assuming that a bank can be a net lender or borrower in the inter-bank market, an increase in the inter-bank market rate makes lending in the loan market less attractive than lending in the inter-bank market. This induces the bank to invest less in loans by charging a higher loan rate (ceteris paribus). This effect (the substitution effect) is therefore unambiguously positive. On the other hand, if the bank is a net borrower in the inter-bank market, its profit drops as the inter-bank market rate rises. Assuming decreasing absolute risk aversion, Wong (1997) argues that the bank will be less eager to take risk and will thus charge a higher loan rate to reduce lending. The effect (income effect) is in this case positive and reinforces the substitution effect. This implies that a net borrower in the inter-bank market should raise its loan rate in response to an increase in the inter-bank market rate. However, if the bank is a net lender in the inter-bank market, the income effect becomes negative and works against the substitution effect, in which case the total effect on the optimal lending rate is indeterminate.

2.1.8 Empirical Evidence

Ho and Saunders (1981) use cross-sectional regressions and quarterly data from a sample of major U.S. banks during the period 1976-1979, to estimate the determinants of Net Interest Margins and the pure spread,[24] or mark-up. They find that the main determinants of bank Net Interest Margins are transactions uncertainty and mark-ups used to cover implicit interest payments to depositors. To estimate the determinants of the pure spread, Ho and Saunders (1981) relate the intercept of the first regression (assumed to be the pure spread, or mark-up) to the variability of the interest rates. They find a significant positive relationship for those bonds, which have a one-year maturity. This indicates that fluctuations in interest rates are important in explaining the spread. Smaller banks are also found to have, on average, larger transactions spreads than larger banks, and the difference is largely explained by market structure factors that make it possible for smaller banks to extract additional producers rent.

[24] The pure spread here refers to the margin due to transactions uncertainty.

Using U.S. data for different size classes of commercial banks for the period 1989-1993, Angbazo (1997) finds that the Net Interest Margins of commercial banks reflect both default and interest rate risk premium, but with significant disparities across bank sizes. The interest margins of money-centre banks[25] are affected by default risk, but not interest rate risk, which is consistent with their greater concentration on short-term assets and Off Balance Sheet (OBS) hedging instruments. In contrast, super-regional banks[26] are sensitive to interest rate risk, but not to default risk. The interest margins of smaller local banks are sensitive to both interest rate and default risk. Capital adequacy (which is a proxy for insolvency risk) and management quality are found to be positively related to bank interest margins, and non-interest bearing assets lead to higher required margins to compensate banks for foregone interest on earning assets. Interest margins for all bank groups, excluding the smaller local banks, are significantly affected by administrative expenses, indicating that larger banks are more likely to continue to compete for funds by incurring deposit related expenses.

Using bank level data from 80 countries (developed and developing) during the period 1988-1995, Demirgüç-Kunt and Huizinga (1998) find that differences in interest margins reflect a variety of determinants: bank characteristics, macroeconomic conditions, taxation, deposit insurance regulation, market structure and legal and institutional factors. Banks in countries with a more competitive banking sector have smaller margins and are less profitable. Higher degrees of bank concentration and capital ratios are associated with higher interest margins. Banks that rely heavily on deposits are less profitable due to high operating expenses of branch networks. Domestic banks have lower margins and profits compared to foreign banks in developing countries, while the opposite holds true in industrially developed countries. The corporate tax burden is fully reflected in high margins, and variations in interest margins reflect variations in operating costs. Inflation is associated with higher realised interest margins and greater profitability. Efficiency in the legal system and lack of corruption are both associated with lower realised interest margins and lower profitability. An explicit deposit insurance scheme also lowers Net Interest Margins.

[25] Money-centre banks rely heavily on non-deposit or borrowed sources of funds.
[26] Super-regional banks engage in a wide range of wholesale commercial banking activities.

Randall (1998) examines interest rate spreads in the East Caribbean using annual data for the period 1993-1998 and finds that operating expenses are key determinants of the observed spreads. Demirgüç-Kunt and Huizinga (1998) and Randall (1998), however, ignore risk factors.

A number of empirical studies also suggest that credit contraction in bank lending may influence bank Net Interest Margins because of: (1) loan rate stickiness caused by credit rationing (Berger and Udell, 1992), (2) constraints on bank competition (Cottarelli and Kourelis, 1994), (3) deposit rigidities caused by differences in local market concentration (Neumark and Sharpe, 1992)[27] and (4) because of bank rate smoothing in relationship lending (Petersen and Rajan, 1994). An implication for interest margins is that differences in loan and deposit rate adjustments in banks (due to credit rationing, lack of competition or local market concentration) will be reflected in the cross sectional variation of the Net Interest Margins. Similarly, if relationships increase credit availability and /or affordability, then banks which lend under relationship, may exhibit lower (and less volatile) interest margins than non-relationship lenders.

Barajas, Steiner and Salazar (1999) use a reduced form equation of a bank profit maximisation model to examine why interest rate spreads in Colombia were not significantly reduced by the economic reform program which was started in the 1990s. Their results indicate that the Colombian system on the whole was not competitive throughout the 1970s and 1980s, charging for loans using an average mark-up of 29 percent over marginal costs. However, although the average spread did not change between the pre-liberalisation (1974-88) and post-liberalisation (1991-96) periods, its composition did, with a significant reduction in market power and an increase in the responsiveness to loan quality. Non-performing loans were a significant factor in widening the spread, especially in the post-liberalisation period, which reflected a more prudent behaviour towards credit risk and/or an improvement in reporting of non-performing loans.

[27] Neumark and Sharpe (1992) find that banks in concentrated markets are slower to raise interest rates on deposits in response to rising market interest rates, but are faster to reduce them in response to declining market interest rates. Thus, banks with market power skim off surplus on movements in both directions.

Catão (1998) examines the causes of high intermediation spreads in Argentina in the 1990s, using a dual currency model of the banking industry. He observes that while the operation of the currency board, and the far-reaching liberalisation and financial sector reforms initiated in 1991, had boosted banking sector productivity, banking spreads remained well above OECD levels. Second, he finds that spreads had been substantially higher for peso-denominated than for U.S. dollar-denominated transactions, despite the continuing peg of the peso to the U.S. dollar for over seven years, as well as free choice of intermediation in either currency by agents. Catão (1998) finds that the persistence of high intermediation spreads for the average peso and U.S. dollar transaction mainly resulted from high administrative costs and provisioning expenses associated with credit risk and the sizeable stock of problem loans in the economy, all of which remained above OECD levels. Tight prudential requirements and exchange risk had also played a role, though to a much lesser extent. Market concentration was a further significant factor in explaining spreads, but only in the peso segment of the credit market. This was explained by some degree of monopoly power exercised by local banks on non-tradable producers and households which had limited access to international markets

Using a two-step procedure, Brock and Suarez (2000) explore the determinants of bank spreads for Latin America (Argentina, Bolivia, Chile, Colombia, Mexico, Peru and Uruguay) during the mid-1990s. In the first step, a regression of bank spreads is run for a cross section of banks on bank specific variables. The constant term in these regressions is used as a measure of the "pure spread" for the country's financial system, i.e. the portion of the spread that cannot be explained by bank specific characteristics. In a second step, the constant terms are regressed against macroeconomic variables.

The results from the first step show that increases in the capital asset ratio are associated with higher spreads in Bolivia and Colombia, and not for the other countries. The liquidity ratio is positively correlated with the spread for all countries, and statistically significant for Bolivia, Colombia and Peru. High operating costs raise spreads in all of the countries, as do high levels of non-performing loans, though the size of these effects differs across the countries. In Colombia, higher non-performing loans are associated with higher spreads, while they are associated with lower spreads in each of the other

countries. This could reflect inadequate provisioning for loan losses, or the fact that banks with a high proportion of bad loans may lower spreads as a way of trying to grow out of their troubles. Reserve requirements in a number of countries also still seem to act as a tax and get translated into higher spreads. Further, uncertainty in the environment facing banks appears to increase interest spreads; interest rate volatility is generally positively correlated with the "pure spread," excluding Colombia and Peru. A higher inflation rate also raises the spread in Bolivia, Colombia, Chile and Peru, but has the opposite effect in Argentina.

In summary, bank interest spreads are affected by perceived market risk, market structure, costs that include those due to inter-bank borrowing, excess reserves and regulation restrictions which may distort the market and macroeconomic factors. Since efficiency of the financial institutions is important for investment and growth, monetary and credit policies as well as profitability of banks, it is of great importance to investigate the factors, which have led to high interest spreads in Uganda. In so far as spreads retard financial development and effectiveness of monetary and credit policies, these results are relevant considerations in any future restructuring of the financial sector. Banks will also gain financial management tools that will prove to be useful in the face of increased uncertainties over the future course of interest rates.

2.2 DESCRIPTIVE ANALYSIS

This section relates developments in the market structure, performance of banks and macroeconomic environment to the observed trends in the spreads. Because the empirical study covers only the period 1994-1998, the descriptive analysis concentrates on this period.

2.2.1 Market Structure and Composition of the Financial Industry

By June 1998, the financial system consisted of the central bank and 20 commercial banks, compared to the 14 which existed in 1993. In addition, there were 38 Non-Bank Financial Institutions (NBFIs), compared to 31 in 1993. Commercial banks dominated the financial sector, accounting for more than 90 percent of its assets.

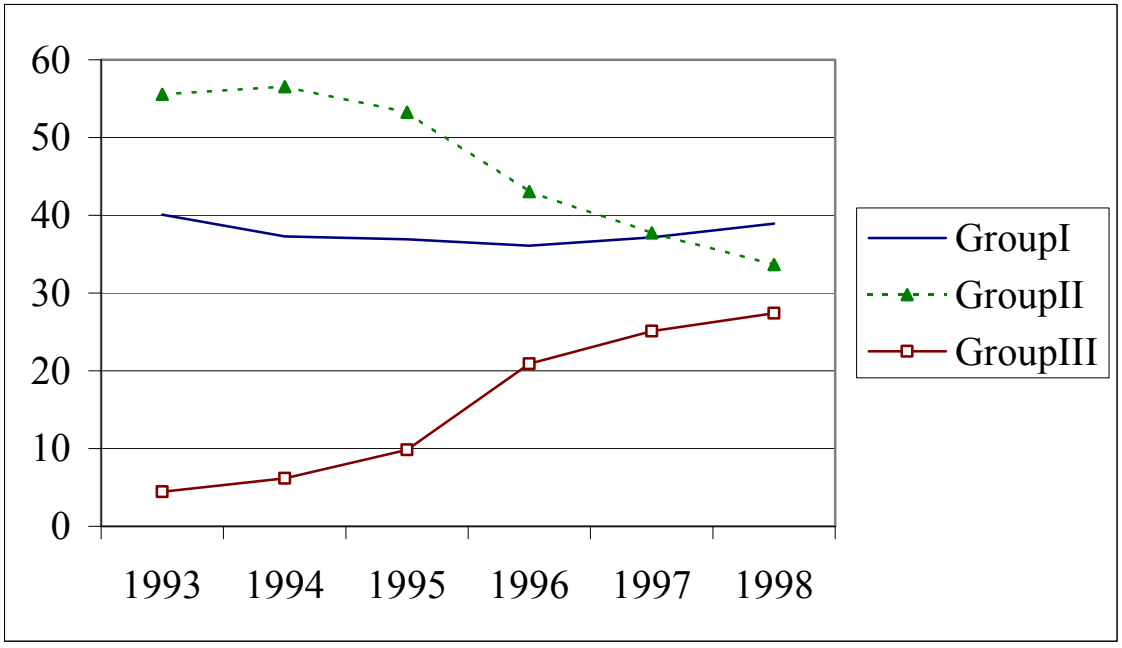
The initial effect of entries of new banks into the financial system was an increase in competition, and a reduction in the degree of concentration in the banking sector, from a three-bank asset ratio of 64 percent in 1993/94 to about 45 percent in 1998. The reduced (but still high) level of concentration is consistent with the declining (but high) level of spreads over the period. The banking market is also segmented. Although, this contributed to the narrowing of interest spreads through competition for deposits, it made their further narrowing difficult due to profit pressures on marginal banks. Due to differences in age, ownership and performance, the 20 commercial banks, which existed in 1998, were divided into three distinct groups.

Group I consists of four foreign banks and a half state-owned bank: Barclays, Standard Chartered, Stanbic, Baroda, and Tropical, respectively. These banks have been key players in the development of commercial banking in Uganda. Stanbic (formerly called Grindlays) started operations in the early 1900s, Standard Chartered in 1912, Barclays in 1927; Baroda began in 1953, while Tropical bank (formerly Libyan bank) started operations in the early 1970s. Having been operating for so long, these banks have acquired more experience in banking, which should be reflected in high efficiency compared to that of other banks. It is worthwhile noting that Group I banks had very few or no branches during the review period (Appendix A2.1). The operations of these

banks were also concentrated in the large towns, which points out their high level of risk-aversion.

Group II includes the largest bank UCB that was until the year 2001, state owned, and COOP bank,[28] which was owned by the state, sponsored co-operative movement. During the review period, these two banks were important to the Ugandan economy because of their size, local ownership and extensive branching. However, until the early 1990s both banks were experiencing liquidity and solvency problems, which were mainly attributed to management deficiencies. The two banks underwent restructuring beginning in the financial year 1993/94. Two other banks experienced similar problems to those of UCB and COOP: Nile and Allied. They were also restructured beginning in the financial year 1994/95. The four banks were re-capitalised during the restructuring process. It is worthwhile noting that the share of the market held by this group of banks fell from 54 percent in 1993 to 34 percent in 1998 (Figure 2.2). This group was not only considered risky by the public, but faced competition from Group I and Group III banks.

Figure 2.2 Market Share of Assets, 1993-1998 (%)



[28] Cooperative bank was closed in May 1999.

Group III includes about 10 banks most of which were established in the 1990s, with both foreign and domestic ownership. Most of these banks not only had the advantage of tax-exemption, they had the opportunity to start fresh, without bad loans in their portfolios, and with the possibility of adopting recent banking technologies at the time of their inception. The market share of assets of this group grew from 4 percent in 1993 to 27 percent by the end of June 1998 (Figure 2.2). The increase in market share is attributed to the increase in the number of banks in this group, as well as to aggressive competition for deposits with the larger banks by bidding up deposit rates. Competition with the more established banks partly explains the falling trend in spreads during the review period. Unlike Group I banks, however, Group III banks have not yet acquired much experience in banking, and are likely to face management deficiencies. Details on market segmentation are shown in Appendix A2.1.

2.2.2 Balance Sheets

Assets

Appendix A2.2 is a detailed balance sheet for all Ugandan commercial banks during the period 1994-1998. Total real assets of the banking system rose by about 118 percent from Shs billion 588 in 1994 to Shs billion 1280 in 1998. The three principal earning assets of all groups of banks are advances and discounts, investments in other banks and government securities. Though advances and discounts constituted the major asset in each bank's portfolio throughout the period, a drop in their contribution to total assets was observed by Group I and Group II banks beginning in mid-1996, (Figure 2.3). This drop was mirrored by an offsetting rise in investments in banks both inside and outside of Uganda, and an increase in government security holdings by Group I and II banks (Figures 2.4 and 2.5).

While the tendency for banks to moderate the risk to their returns by portfolio shifts into, for instance, foreign assets and risk-free government securities may reduce the probabilities of bad outcomes for their portfolios, it may have negative implications for the amount of credit left to be allocated to the private sector. Group III banks, however,

increased their level of lending beginning in 1996 before levelling it out in 1997, and registered a drop in government security holdings in mid-1996, just before a 1997 increase.

Figure 2.3 Portfolio Shifts - Loans and Advances, 1994-1998 (% of total assets)

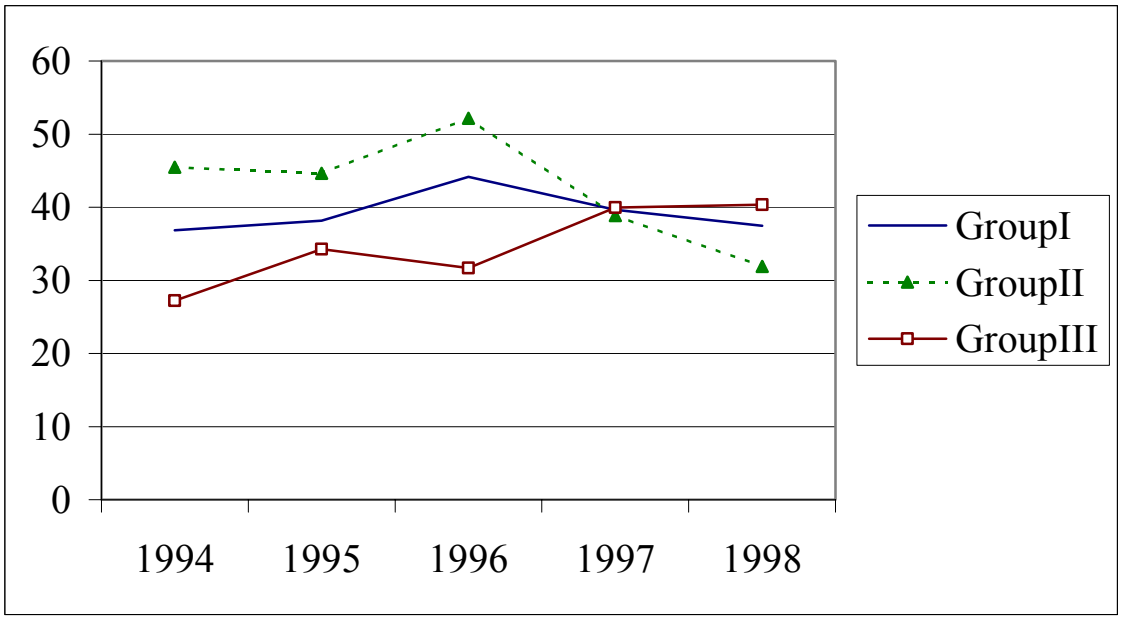


Figure 2.4 Portfolio Shifts - Foreign Assets, 1994-1998 (% of total assets)

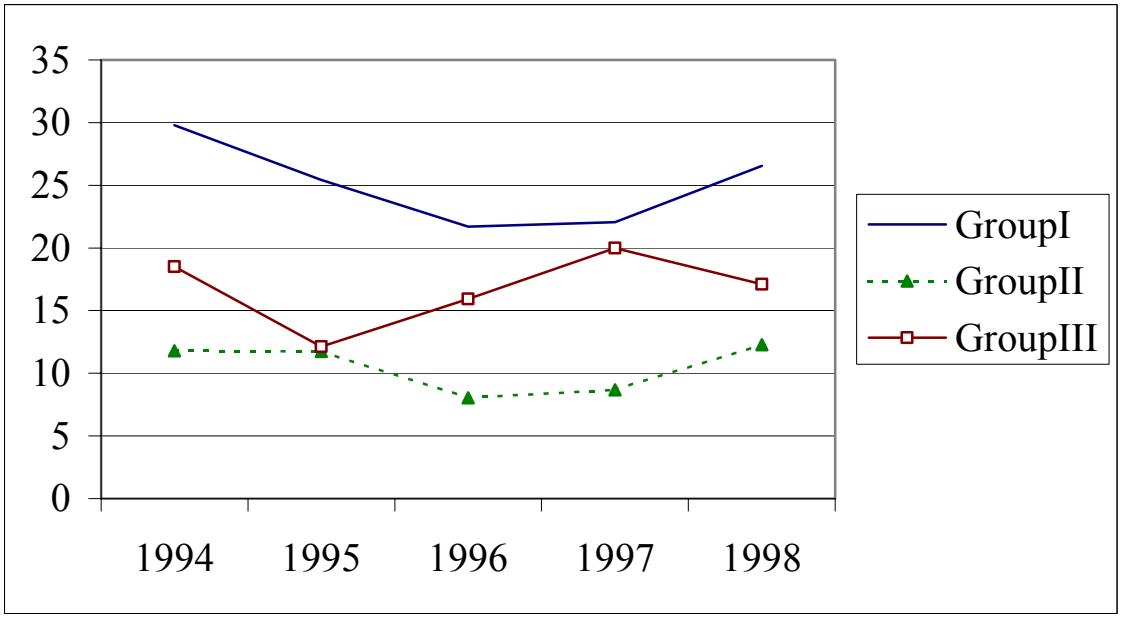
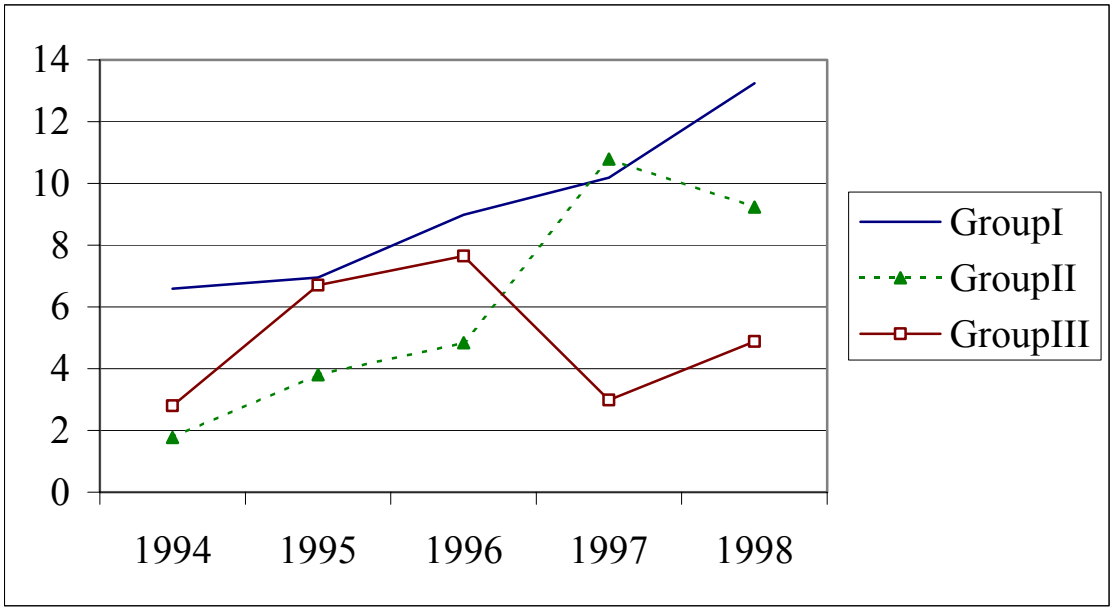
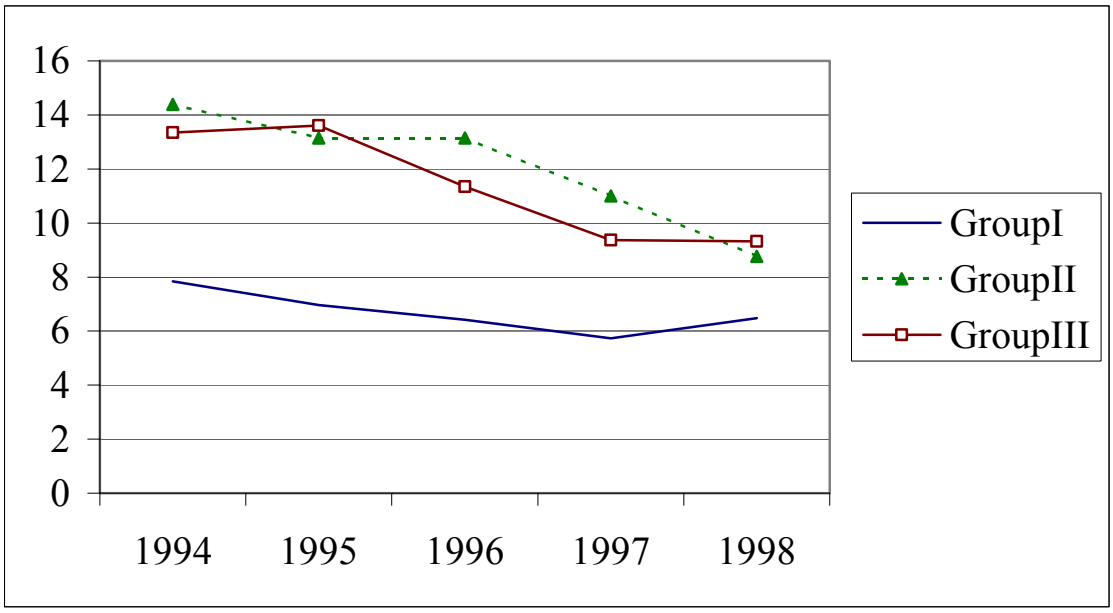


Figure 2.5 Portfolio Shifts - Government Securities, 1994-1998 (% of total assets)



A high level of advances and loans in this asset structure, combined with the shifts in bank portfolios could imply that liquidity and default risks were major risks faced by commercial banks in Uganda during the review period. It is also worthwhile noting, that although the share of fixed assets to total assets of Group II and III banks was falling, it remained higher than that of Group I banks throughout the period. This indicates that Group II and III banks were more exposed to liquidity risk than Group I banks (Figure 2.6).

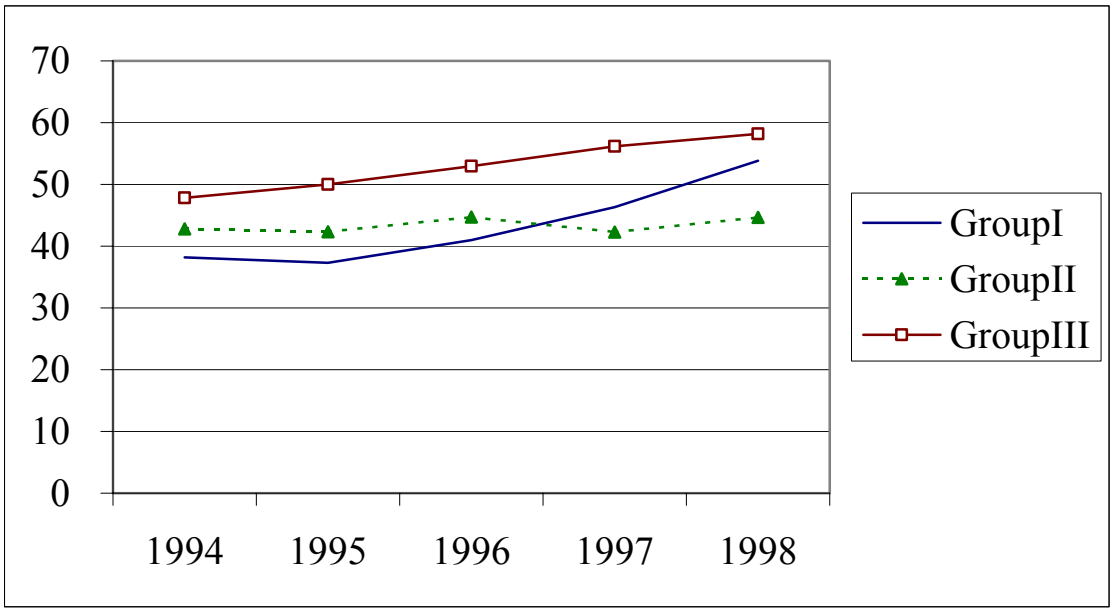
Figure 2.6 Share of Fixed Assets, 1994-1998 (% of total assets)



Liabilities

The major source of funds for the commercial banks is private sector deposits, which account for, on average, more than 50 percent of funds for all bank groups. There are two broad categories of deposits: demand deposits on which low or no interest rates are paid, and time and savings deposits on which higher interest rates are paid. An important trend in the supply of time and savings deposits is that they have been rising since 1995, particularly among Group I and Group III banks, which is mainly due to a rise in the deposit rates offered on them (Figure 2.7). A rise in the share of these deposits and their rates partly explains the fall in spreads noted after 1996. The supply of time and savings deposits to Group II banks, however, was relatively constant during the review period, perhaps because interest rates offered by this group were lower than those offered by the other groups. UCB, for instance, offered 6 percent for time deposits in June 1998, while Group I (Stanbic) and Group III (Crane) banks offered 11 percent and 15 percent rates for time deposits, respectively.

Figure 2.7 Time and Savings Deposits, 1994-1998 (% of total deposits)



The second source of funding is borrowing from banks outside of Uganda, which different groups of banks rely on in varying degrees. Foreign liabilities, for instance, accounted for 23 percent of total assets belonging to Group I banks, while they accounted for 7.5 percent and 17.5 percent of the assets of Groups II and III banks, respectively, in June 1998 (Appendix A2.2). Other non-deposit liabilities include borrowings from banks in Uganda, which range from 0 to 3 percent of total assets for all groups, borrowing from BoU (0 to 4 percent of total assets for all bank groups) and capital.

Overall, the liability structure of bank balance sheets reflects a shorter maturity structure than the asset portfolio does, given that the relatively more liquid instruments, such as deposits and inter-bank borrowings, are used to fund less liquid assets such as loans. An implication for interest rate spreads is that maturity mismatch or interest rate risk and liquidity risk, are likely to have been exposure concerns for bank managers. The participation of banks in foreign currency borrowing and lending, is also likely to have exposed their income flows to foreign exchange risk.

2.2.3 Performance of Banks

This section provides a comparative analysis of movements in the spreads of the three groups of banks, while relating them to the performance of banks using key monitoring system ratios.

Interest Rate Spreads

Table 2.1 indicates averages of the spreads for different groups of banks. The average ex-ante spread was 18 percent and the maximum was 34 percent. This compares favourably with an average spread of 21 percent for Colombia (Barajas, Steiner and Salazar, 1999) but is much higher than the average of 7 percent reported for East Caribbean countries (Randall (1998). There were, however, some differences between the behaviour of spreads for different groups of banks. Group I had the highest range in spreads, with a minimum spread of 5 percent and a maximum spread of 34 percent.

Table 2.1 Interest Rate Spreads, 1994-1999 (%)

The Ex-ante Spread	Mean	Std.Dev	Min	Max
All banks	18.4	4.8	4.8	34.2
Group I	17.7	6.6	4.8	34.2
Group II	18.8	2.8	13.2	26.6
Group III	18.8	4.2	9.3	27.5
Effective Spreads				
All banks	3.3	1.8	-0.8	9.7
Group I	3.2	1.2	-0.6	7.3
Group II	2.2	1.7	-0.8	9.7
Group III	3.9	1.9	0.0	8.4

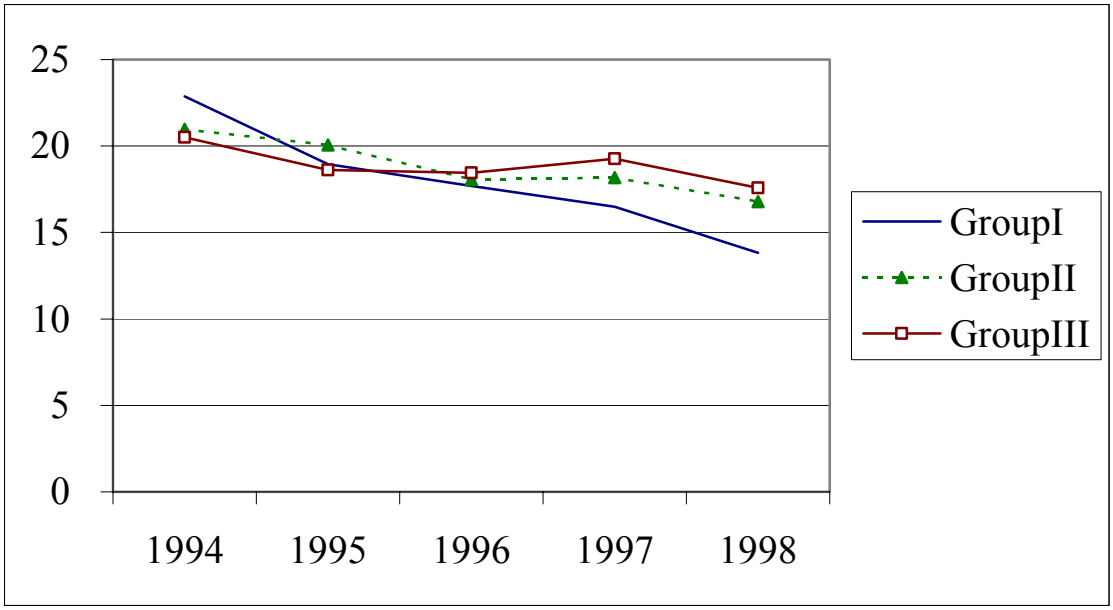
1. The ex-ante spread is defined as the difference between the weighted average lending and deposit rates.
2. The effective spread is defined as the difference between the average yield on advances and discounts and average interest expense on deposits.

Figure 2.8 indicates further that the spreads for all bank groups were falling, but those of Group I fell faster than those of the other groups, beginning in 1995. An explanation is that the lending rates of Group I remained relatively lower beginning in 1995, while its weighted average deposit rates were rising. The lending rates of Group II were in line with all other group rates. However, it had the lowest weighted average deposit rates (4 percent), partly because it did not receive an increase in the supply of time and savings

deposits (Figure 2.7). This also explains why the spreads of Group II remained higher than those of Group I beginning in 1996. The lending and deposit rates of Group III were higher than the averages of all other banks. This group is said to have been competing aggressively for deposits especially beginning in 1995, to increase its market share (see Kasekende and Atingi-Ego, 1999). Details of the movements in the spreads are indicated in Appendix A2.3.

As this analysis indicates, part of the observed falling trend in spreads is due a re-composition of deposits. While interest rates on time and savings deposits did not increase substantially throughout the period, their share of total deposits for Group I and Group III banks began increasing in 1994, thus increasing the average interest cost of bank deposits (Figure 2.7 and Appendix A2.3). Group II maintained higher spreads compared to Group I due to its lower interest costs.

Figure 2.8 Interest Rate Spreads, 1994-1998 (%)



Aside from competition for deposits, a number of factors may explain the observed trends in spreads. These factors include administrative costs, provisions for bad debt, explicit taxes and risk, which raise financial intermediation costs. Quarterly data does not allow for precise estimates of the explicit tax burden. However, the majority of Group III banks could not have been affected by this burden since they were exempt

from taxes, on entry. High intermediation costs were further reflected in effective spreads which averaged only 3 percent (Table 2.1).

Profitability

The major profitability indicators relevant to our study are Net Interest Margin (NIM) and Return on Assets (RoA). Net Interest Margins averaged 2.3 percent (Table 2.2) and remained relatively low throughout the period (Figure 2.9). This level is, for instance, only one-third of that reported for Colombia,[29] and about half of that reported for East Caribbean countries by Randall (1998). Unlike the other financial systems, high spreads in Uganda were not reflected by high profitability. There was also a difference in profitability among different bank groups, with a Return on Assets (RoA) for Group I at 0.5 percent, averaging higher than that for other groups.

Table 2.2 Profitability, 1994-1998

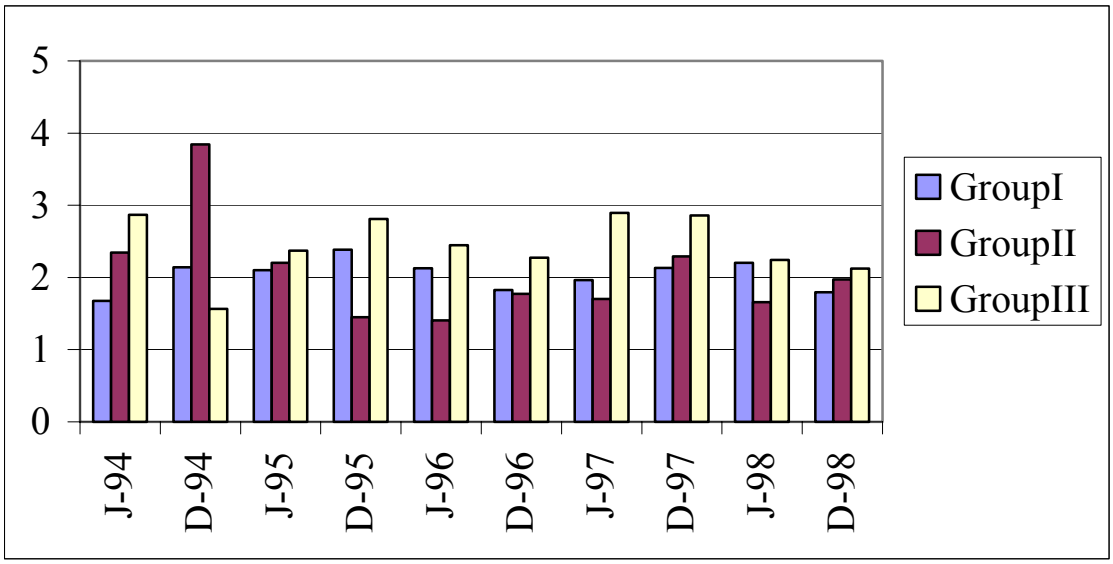
Net Interest Margins (%)	Mean	Std.Dev.	Min	Max
All banks	2.25	1.49	-2.69	8.46
Group I	2.22	0.72	0.43	4.63
Group II	2.04	1.46	-2.51	7.23
Group III	2.39	1.84	-2.69	8.46
RoA, inclusive of provisions (%)				
All Banks	0.18	1.99	-12.8	5.20
Group I	0.53	1.88	-6.05	3.13
Group II	-0.04	2.00	-12.80	3.27
Group III	0.06	2.03	-6.74	5.20

1.The Net Interest Margin is defined as the difference between the interest earnings and expenses of a bank, expressed as a percentage of its interest earning assets.

2.Return on Assets (RoA) is defined as net income before tax (inclusive of provisions), expressed as a percentage of total assets.

[29] See Barajas, Steiner and Salazar (1999).

Figure 2.9 Net Interest Margins, 1994-1998



Operating Costs

During the review period, operating costs as a ratio of earning assets averaged 4 percent, and Group III recorded the highest average at 5 percent, while Group I showed the lowest average at 3 percent (Table 2.3).[30] Operating costs were largely accounted for by staff costs and "other" non-interest expenses. However, as Figure 2.10 indicates, operating cost ratios for all groups of banks were falling especially after 1995. While the fall in operating costs may be partly explained by an increase in earning assets during the same period (see Appendix A2.3), it can largely be attributed to the structural reforms, which led to the reduction of staff costs in Group I and Group II banks (Appendix A2.4). Notable among the reforms was a reduction of the branch network of UCB from 169 branches recorded in 1993, to 66 in 1998.[31] Overall, however, the overhead cost ratios of the Ugandan banks were lower than, for instance, the 7-8 percent recorded for Colombia and the 9 percent for Argentina (Demirgüç-Kunt and Huizinga, 1998).

[30] As a ratio of total assets, the figures in Table 2.3 should have been lower than 4 percent.

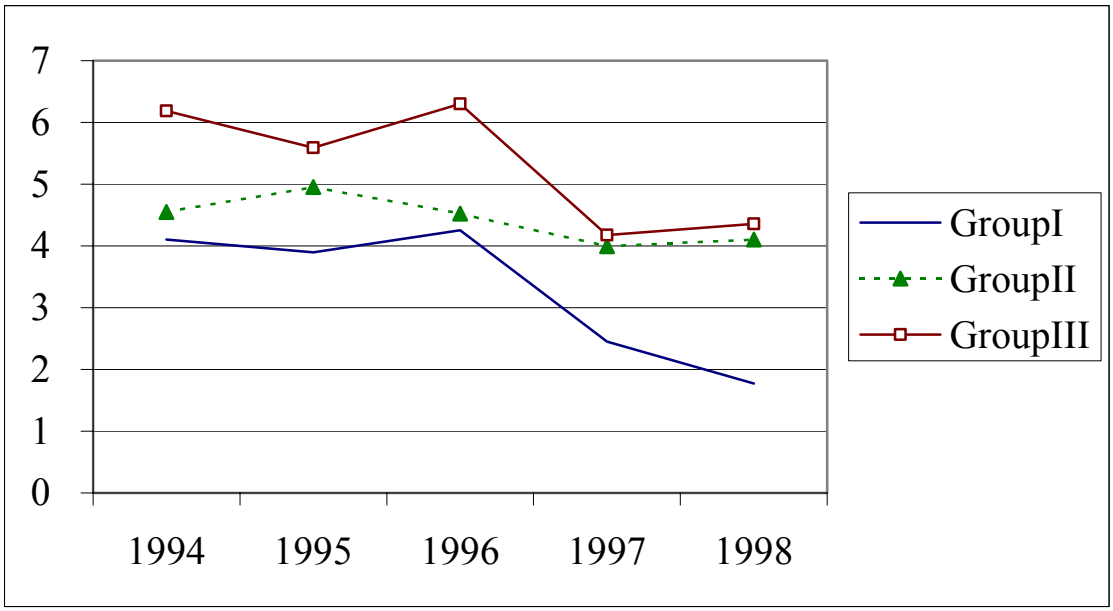
[31] On the contrary, although "other" operating costs of Group III banks were reduced over the period, their staff costs rose by 9 percent, perhaps because a number of them opened up branches. "Other" operating costs of Group I and Group II banks also increased by 17 percent and 12 percent, respectively.

Table 2.3 Operating Costs, 1994-1998 (% of earning assets)

	Mean	Std.Dev.	Min	Max
All banks	4.4	3.7	0.4	19.3
Group I	3.2	3.3	0.8	16.5
Group II	4.4	2.3	1.4	17.9
Group III	5.2	4.3	0.4	19.3

Note: Operating costs include costs on salaries and wages, premises and fixed assets, depreciation and motor vehicles.

Figure 2.10 Operating Costs, 1994-1998 (% of earning assets)



Asset Quality

During the review period, the quality of bank assets was generally poor. Non-performing loans as a percentage of total loans averaged 27 percent (Table 2.4), which was much higher than the 5-7 percent recorded for Colombia (Barajas et al, 1999), and Argentina's roughly 15 percent (Catão, 1998). Group II had the highest average at 56 percent, and a maximum of 88 percent, while Group III had the lowest average at 13 percent. There are a number of explanations for the accumulation of bad loans. These include over-lending without effective screening and monitoring of loans, poor project performance and lack of responsibility and discipline on the part of some borrowers.[32]

[32] For a detailed discussion on the causes of default, see Kasekende and Atingi-Ego (1996).

Nevertheless, as Figure 2.11 indicates, there was an improvement in the asset quality of Group I and II banks beginning in 1996. However, as Kasekende and Atingi-Ego (1999) note, the improvement in asset quality (measured by the decline in the ratio of non-performing loans to total loans) does not entirely reflect improvement in the way banks measure and manage credit risk. The transfer of UCB's bad loans to the Non-Performing Assets Recovery Trust (NPART) in March 1997, for instance, led to a substantial drop in bad loans of Group II banks. In addition, many efforts were made to improve the credit culture in Uganda: NPART was created to recover all loans owed to UCB, a credit rating agency was introduced in January 1998 and a commercial division of the high court was established to examine and resolve disputes of commercial nature. Banks also simply became more risk-averse and reluctant to extend new credit.

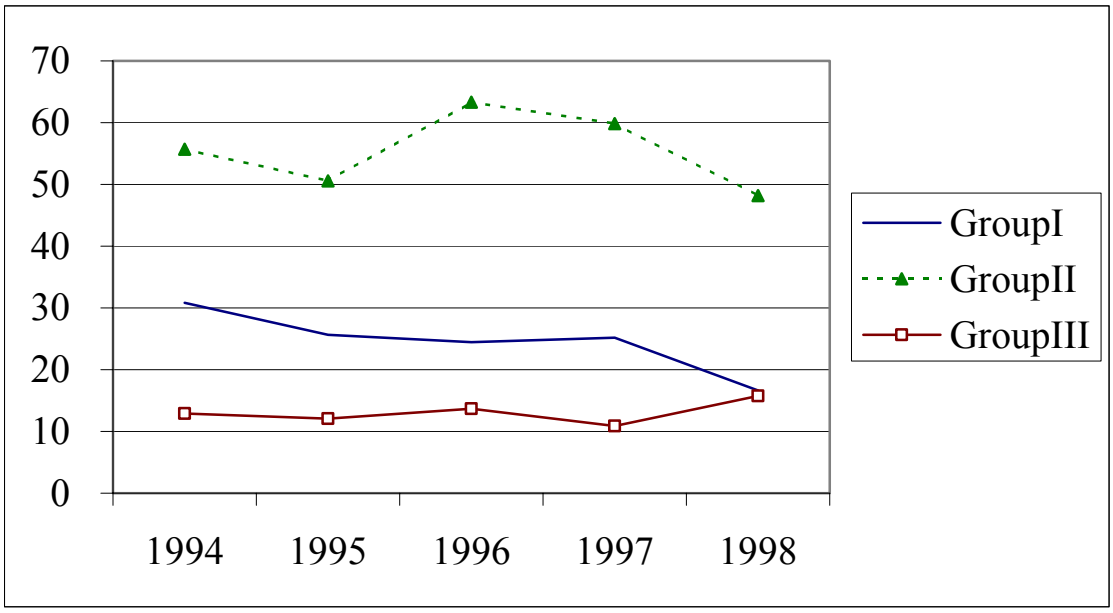
Group III banks, however, registered deterioration in asset quality beginning in 1997. This is not surprising, since this is the only group that increased lending after 1996 (Figure 2.3). High levels of non-performing loans accumulated over a period of years, led to a reduction in the Return on Assets of banks, through direct losses of income and higher costs through provisioning. Higher ratios of non-performing loans to total loans are hence, expected to be reflected in higher spreads.

Table 2.4 Asset Quality: Non-Performing Loans and Provisions, 1994-1998 (% of total loans)

	Mean	Std.Dev.	Min	Max
All banks: Non-performing loans	27.0	25.0	0.0	87.8
Provisions	15.4	18.4	0.0	82.2
Group I: Non-performing loans	24.2	18.5	3.0	70.8
Provisions	11.6	12.8	0.6	61.6
Group II: Non-performing loans	55.5	19.6	7.6	87.8
Provisions	32.5	22.0	0.3	82.2
Group III: Non-performing loans	13.1	17.4	0.0	83.1
Provisions	8.5	12.6	0.0	74.5

Note: Non-performing loans are defined as loans that are 90 days or more past due or are not accruing interest, expressed as a percentage of total loans.

Figure 2.11 Non-Performing Loans, 1994-1998 (% of total loans)



Liquidity

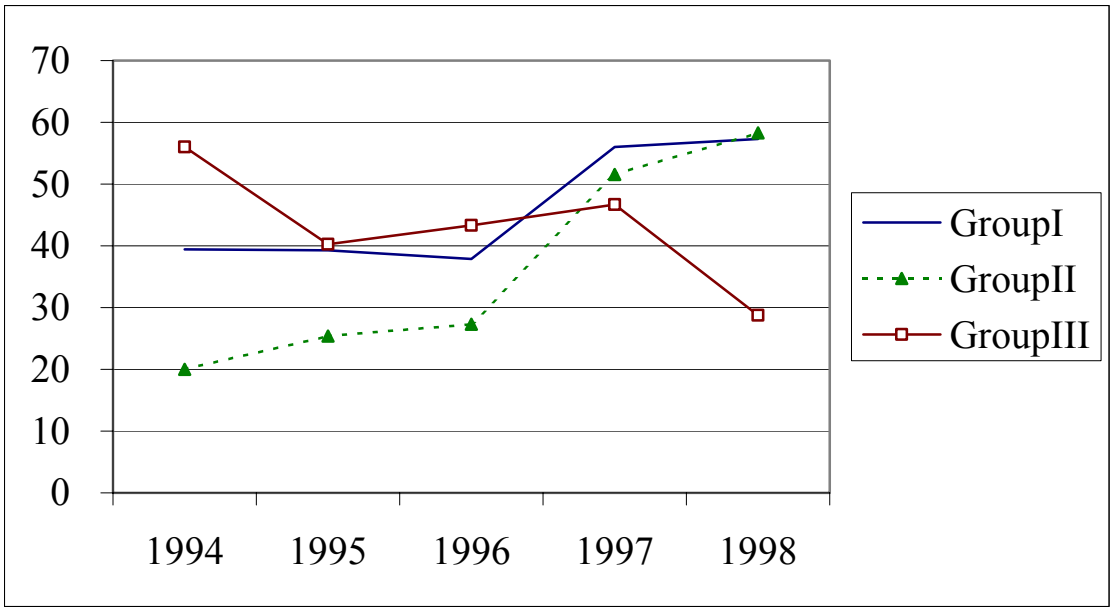
Banks in Uganda are each required to hold a minimum amount of liquid assets of 30 percent of the bank's demand and time liabilities. Table 2.5 indicates that the liquidity of banks, measured as the ratio of liquid assets to total deposits, averaged 42 percent. Furthermore, Figure 2.12 indicates that the liquidity position of Groups I and Group II banks improved during the review period. Group III banks, however, seem to have started experiencing liquidity problems in 1997, which is not surprising since it was at this time that their level of non-performing loans began rising. Also, since this group increased their lending commitments after 1995, they were particularly exposed to liquidity risk.

Table 2.5 Liquid Assets, 1994-1998 (% of total deposits)

Liquid assets	Mean	Std.Dev.	Min	Max
All Banks	42.2	33.0	-79.0	237.6
O/w Balances at BoU	15.3	11.0	0.0	82.6
Group I	46.4	20.4	-0.9	99.7
O/w Balances at BoU	14.4	7.2	0.0	34.7
Group II	36.9	24.1	-16.0	96.0
O/w Balances at BoU	14.2	8.5	0.0	53.6
Group III	42.3	42.5	-79.0	237.6
O/w Balances at BoU	16.5	13.8	0.0	82.6

Note: Liquid assets are defined as the sum of cash, balances held at BoU and other commercial banks (minus borrowing from BoU and other banks), other money at call, Treasury bills and government stocks maturing within a period of 91 days and five years, respectively and discountable commercial bills and notes.

Figure 2.12 Liquid Assets, 1994-1998 (% total deposits)



It is further noted that balances at BoU for all groups of banks generally exceeded the required average reserves (8.5 percent), indicating that commercial banks on average kept excess reserves. Two main reasons explain why banks desire keeping excess reserves. First, the absence of an active secondary market means that banks must have ready cash for clearing requirements. Government securities, which are the least cost alternative of keeping reserves, are not quite as liquid as cash since until late 1999 only bills with 91 days left to maturity could be rediscounted. Second, the inter-bank market is not functioning efficiently since very few banks are willing to participate, mainly due

to credit risk concerns. Excess reserves, however, raise operating cost ratios against earning assets, and are likely to be reflected in high spreads.

Capital Adequacy

Under the 1993 Financial Institutions Act, banks are subjected to minimum capital adequacy requirements: a core capital level of not less than 4 percent of total risk adjusted assets plus risk adjusted off balance sheet items. As of December 31, 1996, requirements for the total net worth of a bank were: (1) total capital of not less than 8 percent of total risk adjusted assets plus risk adjusted Off Balance Sheet (OBS) items and (2) a minimum value of paid up capital of not less than Shs 0.5 billion and Shs 1 billion for local and foreign banks, respectively.[33]

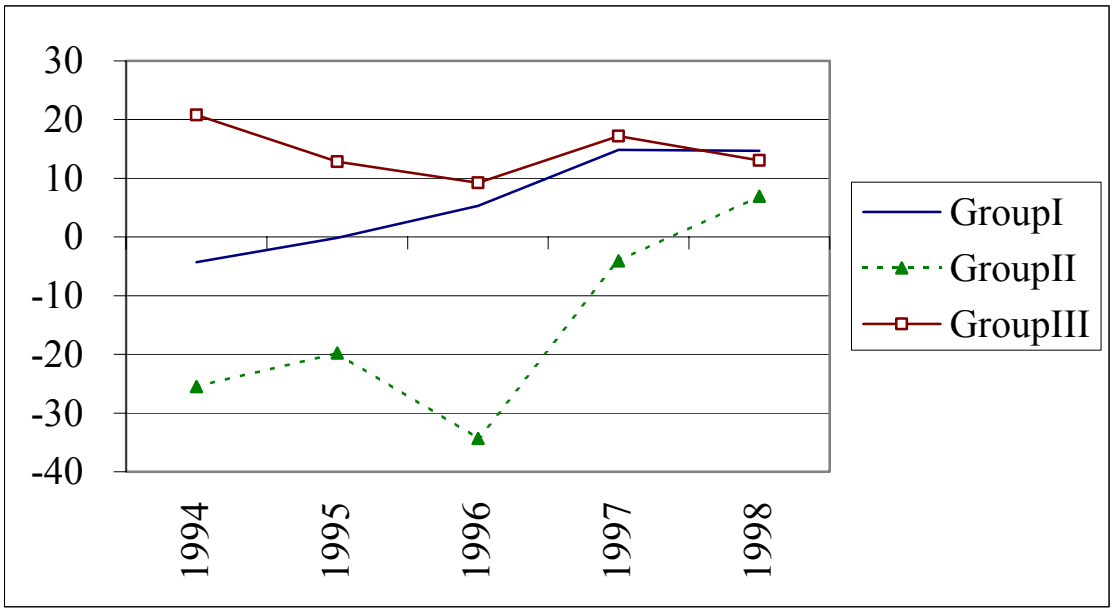
Table 2.6 shows that although, on average all banks met the capital adequacy requirements, in all bank groups there were some banks which were faced with insolvency. This is indicated by negative minimum capital adequacy ratios for all groups. Group II banks were particularly exposed to insolvency risk between 1994 and 1996, but improved their capital base in 1998 subsequent to being re-capitalised (Figure 2.13). A deterioration in capital ratios was also noted for Group III banks during 1994-1996 and 1997-1998, which is not surprising since several of these banks experienced solvency problems and were closed down in the late 1990s, for example, ICB and Greenland banks.

Table 2.6 Core Capital, 1994-1998 (% of risk-weighted assets)

	Mean	Std.Dev.	Min	Max
All banks	4.7	25.5	-118.3	94.5
Group I	6.8	13.7	-49.0	46.5
Group II	-15.1	26.5	-118.3	20.6
Group III	14.2	25.0	-77.2	94.5

[33] Effective January 2000, the minimum unimpaired capital requirements for all banks and credit institutions was raised to Shs 2 billion and Shs 1 billion, respectively.

Figure 2.13 Core Capital, 1994-1998 (% risk-weighted assets)



Repricing Gap

Table 2.7 indicates that on average Group I banks had 1 percent more assets to be repriced within one year, as a percentage of net assets, while Group II and Group III banks had 7.5 percent and 11 percent more interest rate sensitive liabilities than assets, respectively. An implication is that the earnings of Group II and III banks were more exposed to interest rate changes, for example, in the inter-bank shilling market.

Table 2.7. The Repricing Gap, 1994-1998 (% of net assets)

	Mean	Std.Dev.	Min	Max
All banks	-6.5	18.1	-123.9	40.5
Group I	1.2	11.1	-29.2	40.5
Group II	-7.5	14.5	-42.7	32.6
Group III	-11.2	21.7	-123.9	25.3

Note: Repricing gap is defined as the difference between assets and liabilities whose interest rates will be repriced or changed over one year. Rate sensitive assets are defined as: Government securities + advances and discounts + net due from other banks. Rate sensitive liabilities are defined as: total deposits + borrowing at BoU.

Other reasons that banks require high lending rates and restrict their lending include constraints to the enforcement of debts and to the seizure and liquidation of loan collateral, due to weaknesses in the legal system. Such factors tend to increase borrowers' incentives to default, which ceteris paribus, foster the incidence of bad debt. Employee malfeasance is yet another important risk that raises the cost of banking.

In summary, this section has highlighted a number of weaknesses in the Ugandan financial system, which could be related to high spreads. Although competition was increased by the entry of new banks, the market remained highly concentrated and segmented during the review period. This was a hindrance to efficiency in the allocation of resources, it made it possible for X-inefficient banks to survive and allowed some banks to set intermediation spreads above costs. Most of the major banks' portfolios are characterised by non-performing loans, which is a reflection of weak bank management and procedures and a poor credit disciplinary environment of the sector. Weaknesses in interest rate management are also indicated by big repricing gaps for some banks. Further, since banks have been allowed to intermediate freely in domestic and foreign currency, their earnings are likely to have been exposed to exchange rate risk. At the same time, due to weaknesses in the legal system, banks still face constraints in the enforcement of debts and in the seizure and liquidation of loan collateral. The combination of these factors also had a negative impact on bank profitability, which remained weak during the review period.

Moreover, many of these problems were compounded by the underdevelopment of the securities, inter-bank and capital markets. High interest spreads can have negative effects on economic growth since they contribute to disintermediation and reduce private investment. Thus, to the extent they are distortionary, underlying problems in the banking system need to be addressed in order to narrow the spreads, improve efficiency in resource allocation and bring about positive effects on economic growth.

2.3 ECONOMETRIC ANALYSIS

2.3.1 The Theoretical Model

The model is based on the dealership bank model[34] of Ho and Saunders (1981), McShane and Sharpe (1985) and Allen (1988), which has been extended by Angbazo (1997) to include default risk as a determinant of the spread.

Assumptions

Assume that the bank is a risk-averse monopolist dealer in loan and deposit markets, where loan requests and deposit funds are viewed as stochastic; thus they tend to arrive at different times and at random time intervals. The bank sets a loan rate $R_L = (r + b)$ at which it extends new loans and a deposit rate $R_D = (r - a)$ at which it accepts new deposits. The interest rate r is the market rate, while a and b are fees (net of transaction costs) for the provision of deposit and loan immediacy of service, respectively.

The bank is assumed to make decisions in a single period horizon, during which bank rates are posted prior to observing the demand for services. These rates are held constant and there is at most one loan or deposit arrival in this period with the same transaction size Q (for multiple arrivals of loans and deposits, Q would be the sum of all loan and deposit transactions). Because deposits and loans are assumed to be of long-term maturity, and because of uncertainty over transaction arrivals, the bank faces an interest rate risk whenever there is a mismatch in duration of its loans and deposits at the end of the decision period and the short-term rate of interest changes. Banks also face potential losses from defaults on principal and interest payments. Optimal loan and deposit rates are selected to minimise the risks that may result from interest rate changes and loan defaults.

[34] The dealership bank model draws on the framework of Stoll (1978), Ho and Stoll (1981) and Amihud and Mendelson (1980), in order to analyse the pricing decisions of banks.

The initial holdings consist of the net credit $I_0 = (L_0 - D_0)$ plus cash assets C_0 where L_0 and D_0 are outstanding loans and deposits from the previous period, with current period rates of return of r_L and r_D, respectively. The rate of return on the cash account is the expected market rate r. Loan and deposit transactions are assumed to be of a fixed size, (Q) but the rates (or time) of arrival of loan demand and deposit supply are generated by independent Poisson processes with interest-margin dependent parameters;

$\psi_a = \gamma - \phi a,$

$\psi_b = \gamma - \phi b.$

where γ and ϕ are constant parameters, and ψ_a and ψ_b represent probability functions for the arrival of a deposit supply and a loan demand and depend on the fees a and b, charged for deposit and loan services, respectively. The development of inventory during the period is affected by the discrepancy in the arrival process of loan and deposit orders. In particular the terminal value of net credit and cash, respectively, may be represented as:

$$I_T = (1 + r_I + \tilde{V}_I) I_o$$
$$+ (1 + R_L + \tilde{V}_L) Q \quad \text{with probability of } \psi_b$$
$$- (1 + R_D) Q \quad \text{with probability of } \psi_a$$

$$C_T = (1 + r + \tilde{V}_c) C_0$$
$$- (1 + r + \tilde{V}_c) Q \quad \text{with probability } \psi_b$$
$$+ (1 + r + \tilde{V}_c) Q \quad \text{with probability of } \psi_a$$

The $(\tilde{V})$s are stochastic variables that represent the uncertainty associated with loan return $(\tilde{V}_L)$, money market rates $(\tilde{V}_c)$ and the return on net credit $(\tilde{V}_I)$, and are normally distributed with mean $E(\tilde{V}) = 0$ and variance σ^2.

The bank is assumed to be facing interest rate risk, pure exogenous default risk and the interaction between the two. The interaction of default risk and interest rate risk is explained by the joint distribution of loan returns and the money market rates, which is assumed to be bivariate normal, with non-zero covariance. The bank selects optimal

margins *a* and *b* in order to maximise the expected utility of the net change in its terminal wealth ΔW_T, conditional on a deposit or loan transaction Q occurring. Hence the objective function is given by:

$$\underset{a,b}{\text{Max}}\, EU(\Delta W_T) = \psi_a EU(\Delta W_T \,|\, deposit) + \psi_b EU(\Delta W_T \,|\, loan). \qquad 1$$

The optimal spread for the bank is the sum of the loan and deposit interest margins (a + b) and is given by;[35]

$$S^* = \frac{\gamma}{\phi} - \frac{U''(\overline{W})}{4U'(\overline{W})}\left[(Q + 2L_0)\sigma^2(L) + 2Q\sigma^2(\mathrm{C}) + 2(C_0 - Q)\sigma(CL)\right] \qquad 2$$

The first term γ/ϕ, measures the risk neutral spread of the bank.[36] A large γ and a small ϕ will result in a large γ/ϕ ratio and hence the spread *S*. That is, a bank facing relatively inelastic demand and supply functions in the markets in which it operates may be able to exercise monopoly power (earn producers rent) by demanding a higher spread than possible if banking markets were competitive. Consequently, the ratio γ/ϕ provides some measure of producer's surplus or monopoly rent element in bank spreads or margins.

The second term is a first order risk adjustment term, and depends on the bank management's coefficient of risk aversion, R = - $U''W/U'W$, pure default risk, $\sigma^2(L)$, money market interest rate volatility, $\sigma^2(C)$ and the interaction between default risk and interest rate volatility, $\sigma(CL)$. Note that credit risk problems may be correlated with interest rate risk if loan losses are related to cash problems caused by market rate changes. In practice, however, since banks are faced with a variety of risks which affect their optimal decisions, the term $\sigma(CL)$ may represent an interaction between, for instance, liquidity risk and default risk, or between liquidity risk and interest rate volatility. Liquidity risk may be closely related to credit risk if the portfolio of a bank has a high level of non-performing loans possibly leading to liquidity problems for the

[35] For the derivation of equation 2, see Angbazo (1997).
[36] This would be the spread if the coefficient of absolute risk aversion, R = - U''W/U'W, was zero and the bank was, therefore, an expected wealth maximizer.

bank, and may also be related to interest rate risk if a mismatching of asset and liability maturity and duration creates a demand for liquidity in order to meet loan commitments.

The second term in equation 2 characterises the underlying risk factors for the desired spread between loan and deposit rates. It implies that banks faced with more default risk on loan repayment and higher interest rate risk exposure will set higher loan and deposit rates to achieve higher desired interest rate spreads. More risk averse banks would also charge higher spreads. A further implication of equation 2 is that even if a market were highly competitive, positive bank margins would still exist, as the price of providing deposit/loan immediacy, provided that bank management is risk averse and faces transactions' uncertainty (Ho and Saunders, 1981; Saunders and Schumacher, 2000).

However, since this model is based on the dealership framework, which was originally intended for the analysis of trading activities of security dealers, it fails to consider some relevant aspects of the operation of a bank. For example, administrative costs associated with the maintenance of loan and deposit contracts, as well as effects of bank regulation are ignored. Alternative firm theoretical approaches yield many of the implications as the Angbazo's Augmented Dealership model, but consider other factors that are significant in determining optimal interest spreads. Examples of these factors are operating costs and the inter-bank market rate (Wong, 1997). More recent empirical studies include the macroeconomic indicators such as inflation and implicit and explicit taxation (see for instance Demirgüç-Kunt and Huizinga, 1998). Our empirical specification takes several factors into account: institutional costs, regulatory costs and macroeconomic factors, which are not explicitly considered in the theoretical model, but may nevertheless be important in determining spreads.

2.3.2 Empirical Specification

Earlier empirical studies have mainly used the Net Interest Margin as the dependent variable due to a lack of data on the ex-ante interest rate spread at the bank level. Using the Net Interest Margin as a measure of the spread, however, carries a number of weaknesses. Since the Net Interest Margin is derived from the difference between the interest earnings and expenses of a bank, it may tend to either understate or overstate the

ex-ante spread because interest income and expense are obtained from loan and deposit contracts of different past plan periods. Further, since the Net Interest Margin includes all interest earning assets and liabilities, it may deviate from the marginal spread which reflects the marginal costs and revenues of the banks, particularly in cases where banks hold a significant amount of low interest bearing government securities as well as non-interest bearing reserves (Brock and Suarez, 2000).

Ex-post measures of the spread may also lead to ambiguity with regard to the interpretation of empirical findings. For example, according to economic theory default risk, as proxied by the ratio of non-performing loans to total loans will lead to a higher spread due to a mark-up on the prime lending rate (or default risk premium) to compensate the bank for the risk involved. However, a high level of default risk reduces the Net Interest Margin of a bank. Thus, it would lead to a negative relationship between the Net Interest Margin and the ratio of non-performing loans to total loans. This ambiguity would apply to all forms of risk faced by a bank.

To highlight this ambiguity, and in order to compare our empirical findings with earlier findings, we estimate two separate regressions. One way error component fixed effects models which include time specific variables are developed to investigate the determinants of the ex-ante spread and Net Interest Margin, which are both assumed to be affected by risk, market structure, costs, regulatory and macroeconomic factors. In the first specification, we use the ex-ante spread (ISPR) as the dependent variable. In the second specification, we use the Net Interest Margin (NIM) as the dependent variable as follows:

$$ISPR_{it} = X'_{it}\beta_{IS} + M'_{t}\rho_{IS} + \mu_{it} \qquad i = 1,.....N_t; t = 1,.....T \qquad 3$$
$$\mu_{it} = \omega_i + \vartheta_{it}$$
$$NIM_{it} = X'_{it}\beta_{NIM} + M'_{t}\rho_{NIM} + \varepsilon_{it} \qquad i = 1,.....N_t; t = 1,.....T \qquad 4$$
$$\varepsilon_{it} = \lambda_i + \nu_{it}$$

where i denotes banks and t denotes time. N_t ($N_t \leq N$) denotes the number of banks that existed in year t. This model is unbalanced in the sense that there are N banks observed over a varying time period (T_i for i = 1, N). *ISPR* is the observed or reported spread

between loan and deposit rates and *NIM* is the Net Interest Margin. β is a *Kx1* vector of coefficients on *K* included explanatory variables (not including the constant) that represent bank specific characteristics which influence the ex-ante spread (ISPR) and Net Interest Margin (NIM). X_{it} is the *i*th observation on the K explanatory factors. M_t is a vector of variables that affect all banks at a given point in time but vary through time (or time specific variables), for example, inflation and exchange rates. ρ is a vector of coefficients on the time specific variables. μ_{it} and ε_{it} denote the disturbance terms of equations 3 and 4, respectively. ω_i and λ_i in the disturbance terms represent the unobservable bank-specific effects that are not included in the regression, such as unobserved managerial skills of the bank executives and are assumed to be fixed parameters to be estimated. The remaining disturbances, ϑ_{it} and ν_{it}, vary by bank and time and represent all other market imperfections and regulatory restrictions impacting the ex-ante spread (ISPR) and Net Interest Margin (NIM) randomly. The X_{it} and M_ts in equations 3 and 4 are assumed to be independent of ϑ_{it} and ν_{it}, respectively, for all banks *i* and across time *t*.

The fixed effects, (ω_i and λ_i) and the coefficients on the observed explanatory variables, (βs and ρs), are estimated using Ordinary Least Squares (OLS). However, given that the banks are of varying sizes, they are expected to exhibit different variations. In this case the regression disturbances would no longer have the same variances across banks. For instance, even after controlling for differences in bank sizes, we would expect to observe greater variation in the profitability (Net Interest Margins) of large banks compared to small banks. The presence of heteroskedasticity in the error makes the OLS method inefficient since the conventionally estimated variance matrix for the least squares estimator is no longer appropriate.[37] One way to avoid making misleading inferences from erroneous standard errors, if in fact heteroskedasticity is present, is to compute an estimate of the true variance of the least squares estimator.[38]

[37] See Green (1993); Baltagi (1995); Griffiths, Hill and Judge (1997).
[38] Assuming that the variances are the same for all observations of each bank, each bank specific variance can be estimated using the bank mean-squared residual and then used to compute an estimate for the variance of the least squares estimator.

2.3.3 The Data

The data used is a quarterly unbalanced or incomplete panel on Ugandan commercial banks, and covers the period 1994-1998. This period is selected because it was not until 1994 that commercial banks were free to determine their spreads. Also, most of the other financial sector reforms were not implemented until 1993. The data is an unbalanced panel in the sense that since 1993 there was an entry of new banks into the financial system, while other banks dropped out of the market. However, no bank has exit and then re-entered the market. The total number of banks increased from 14 in 1993 to 20 by September 1998, but dropped to 19 banks in December 1998. In some cases, banks did not report their interest rates. Hence, some series had randomly missing entries. Of the 19 banks existing in December 1998, 17 were included in the analysis. Together they accounted for 96 percent of total assets of the banking system.

Estimates of bank performance indicators such as profitability, liquidity, asset quality, capital adequacy and operating cost ratios were obtained from the quarterly income statements and monthly commercial bank balance sheets, which were found at Bank of Uganda. It was assumed that the data on the Ugandan commercial banks was reliable mainly because during the review period, the data reporting of the financial system was improved by the revision of the format of commercial banks' report forms and the strengthening of bank supervision. However, the method used in computing the performance indicators by Bank of Uganda changed over time. To obtain consistency in the indicators, they were all recomputed using the same method. The rest of the data was that on macroeconomic variables such as discount rate, inflation and exchange rate. It was obtained from monthly, quarterly and annual reports published by Bank of Uganda.

2.3.4 Empirical Variables

The dependent variables are the ex-ante spread (ISPR) and the Net Interest Margin (NIM). Monthly weighted lending and deposit interest rates were averaged to obtain quarterly average rates for each bank. The spread for each bank was calculated as the difference between the quarterly weighted average lending and deposit rates. However, for purposes of scaling, the obtained figure was divided by (1 + weighted average deposit rate). The Net Interest Margin (NIM) was calculated as the difference between the interest earnings and expenses of a bank, as a percentage of its interest earning assets.

As a proxy for market concentration, we include the share of the largest three banks in total assets of the banking system (MCA). Under the traditional Structure-Conduct-Performance (SCP) hypothesis, the higher the share of the market that is controlled by a few large firms, the greater the possibility that market participants will agree to collude and raise prices above costs, therefore extracting extra profits. Hence, the existence of a positive relationship between MCA (proxying market structure) and spreads would imply that the market structure is not competitive.

However, under the Efficient-Structure hypothesis firm-specific efficiencies that arise from factors such as superior management and enhanced technology, allow firms to increase their market share at the expense of the relatively inefficient firms, leading to market concentration. Hence, we may obtain either a negative relationship or an insignificant relationship between the market share variable and spreads, yet a positive relationship between market share and Net Interest Margins if high profitability is due to efficiency. To isolate the effects of efficiency on the performance of banks from the effects of market concentration, we include the share of advances and loans (MADTD) for each bank.

The ratio of time and savings deposits to total deposits (TASTD) is included to account for the effect of a recomposition of deposits on spreads. A higher supply of time and savings deposits is expected to reduce the spread through higher average interest costs. Another measure included is the ratio of non-interest income to total income (NIITI). It

is expected that a bank which relies heavily on non-interest income, such as, that from fee based services will set lower interest spreads. The ratio of non-interest expense to average earning assets (OPEAS) is also included to measure the effect of operating costs on the spreads. High operating costs would be reflected in high interest spreads.

The interest risk exposure is constructed to reflect the repricing or funding gap ratio of a bank. The measured exposure is the net position in the one-year or less, rate-sensitive assets, expressed as a percentage of net assets. Though a number of banks do not pay interest on demand deposits, demand deposits are included in the measurement of interest rate sensitive liabilities. Even if no interest is paid on demand deposits, banks pay implicit interest in the form of not charging the full amount for checking services through its fees. Individuals may also draw down (or run off) their demand deposits when interest rates rise, forcing the bank to replace them with higher yielding interest-bearing rate-sensitive funds (Saunders, 2000).

To obtain a proxy for interest rate risk (IRR), the repricing gap ratio is multiplied by the change in the average Treasury-bill rate[39] per quarter. The repricing gap hypothesis suggests that interest rate exposure is positively correlated to the average repricing gap. Thus, the higher the level of rate sensitive liabilities compared to assets subject to being repriced in a given period, the higher the interest rate risk a bank is likely to face by either having to borrow funds from the inter-bank market at say a higher interest rate, which in turn reduces its net interest income. A bank faced with a big repricing gap is hence expected to set a higher premium to compensate for its possible reduction in net interest income.

Credit risk is measured by the ratio of non-performing loans to total loans (NPA) and is expected to have a positive effect on the spread for two reasons: (1) a high level of non-performing loans reduces the Return on Assets (RoA) of a bank and (2) it may lead to an increase in operational costs, as the bank must intensify its monitoring and incur additional expenses for working out or selling off these loans.[40]

[39] The change in the Treasury bill rate is an average in rates of all the different maturity bills: 91, 183, 273 and 265.
[40] See Berger and De Young (1997).

Another measure of risk considered is the liquidity risk. The analysis uses the ratio of liquid assets to total deposits (LASDP) as a proxy. As the proportion of the liquid assets to total deposits of a bank declines, its liquidity risk rises, leading to higher liquidity risk premiums in the spreads. To account for the interaction between liquidity and credit risks of a bank, we include the product of liquidity risk and credit risk proxies ([LASDP][NPA]).

Another variable of interest is the ratio of reserves to total deposits, which would be treated as an implicit tax on the bank, due foregone interest by keeping reserves at BoU. Since liquid assets of a bank include reserves, we use the ratio of liquid assets to total deposits (LASDP) that is also used as a proxy for liquidity risk, to account for the effects of reserves on spreads. We argue that since higher levels of reserves are expected to lead to higher spreads, while higher levels of liquid assets would lower spreads, the relationship between the ratio of liquid assets to total assets (LASDP) and spreads, will depend on the relative weight attached by a bank to the costs of being illiquid, and to the interest foregone by keeping excess reserves. Insolvency risk is measured by the ratio of core capital to net assets (CCAS). The impact of this variable will depend on whether the risk aversion of a bank is decreasing or increasing.

A number of macroeconomic indicators are included in the equations: (1) Inflation (AVINF) is a measure of macroeconomic risk. It is expected to raise spreads for several reasons; For example, it reduces the real value of the capital of banks and increases their operating costs through direct increases in expenditure. Annual inflation (recorded monthly) was averaged to obtain quarterly inflation. (2) The rate of depreciation of the exchange rate per quarter (ERDP) is included to estimate foreign exchange risk, and is expected to have a positive effect on spreads. (3) The average BoU rate (discount rate) to commercial banks per quarter (AVBOU) is included to capture the effects of cost of additional funds obtained by a bank, either from BoU or from the inter-bank market.[41] A summary of the empirical variables is indicated in Table 2.8.

[41] Since the financial year 1994/95, the BoU rate is set at an adjustable margin above the inter-bank market rate to reflect developments in the market rates.

Table 2.8 List of Variables used in the Empirical Specification

Variable	Proxy	Definition
Ex-ante Spread	ISPR	((1 + WALR) – (1 + WADR))/(1 + WADR)
	WALR	Weighted average lending rate
	WADR	Weighted average deposit rate
Net Interest Margin	NIM	Net interest income/Earning assets
Concentration	MCA	Share of largest 3 banks in total assets
Efficiency (size)	MADTD	Bank's share of advances and discounts
Recomposition of deposits	TASTD	Time and savings deposits / Total deposits
Share of non-interest income	NIITI	Non-interest income / Total income
Operating costs	OPEAS	Non-interest expenses / Earning assets
Interest rate risk	IRR	(Repricing Gap)(Change in the average Treasury bill rate)
Insolvency risk	CCAS	Core capital / Net assets
Default risk	NPA	Non-performing loans / Total loans
Liquidity risk	LASDP	Liquid assets / Total deposits
Cost of keeping reserves	LASDP	Liquid assets / Total deposits
Cost of additional borrowing	AVBOU	Average discount rate
Macroeconomic risk	AVINF	Average inflation per quarter
Exchange risk	ERDP	Average change in exchange rate per quarter (%)

1. Earning assets are defined as the sum of balances at other banks, government securities, BoU schemes, loans and other assets, less provisions.
2. Net assets are defined as: Total assets – Provisions.

2.4 EMPIRICAL RESULTS

Table 2.9 presents the results from estimations of equations 3 and 4 (pg.68) and the model fixed effects tests, using the data from the full sample of banks. While the theoretical model indicated an interaction between default risk and interest rate risk, it turned out that the most plausible interaction was between default risk and liquidity risk; that is, banks which were faced with high credit defaults were also likely to be faced with liquidity problems. Thus, (LSDP)(NPA) was included in columns *ii* and *iv*, as the interactive term. Columns *i* and *ii* present the regression results based on the ex-ante spread (ISPR) as the dependent variable, excluding and including the interactive term, respectively. Columns *iii* and *iv* present the results based on the Net Interest Margin (NIM) as the dependent variable, excluding and including the interactive term, respectively. Tests for fixed effects in all the equations rejected the null hypothesis saying that they were not significant, indicating that there were some factors that were

not explicitly included in the model, which affected individual bank ex-ante spreads/Net Interest Margins.

Table 2.9 Empirical Results for the Full Sample Data

Dep.Variable	ISPR	ISPR	NIM	NIM
	(*i*)	(*ii*)	(*iii*)	(*iv*)
MCA	0,0685*	0,0663*	-0,0151***	-0,0143
	(0,0252)	(0,0258)	(0,0087)	(0,0090)
MADTD	-0,0475	-0,0539***	0,0067	0,0091
	(0,0321)	(0,0328)	(0,0114)	(0,0123)
TASTD	-0,1004*	-0,1012*	-0,0164*	-0,0161*
	(0,0193)	(0,0191)	(0,0055)	(0,0056)
NNIITI	-0,0362*	-0,0366*	-0,0227*	-0,0226*
	(0,0117)	(0,0117)	(0,0057)	(0,0056)
OPEAS	0,0899	0,0834	0,0660***	0,0684***
	(0,0711)	(0,0709)	(0,0375)	(0,0385)
IRR	0,8410**	0,8296**	-0,4674*	-0,4633*
	(0,4150)	(0,4136)	(0,1790)	(0,1795)
CCAS	-0,0120	-0,0077	0,0131*	0,0115**
	(0,0100)	(0,0111)	(0,0044)	(0,0054)
NPA	-0,0057	0,0010	-0,0362*	-0,0386*
	(0,0140)	(0,0144)	(0,0058)	(0,0080)
LASDP	-0,0051	-0,0023	-0,0020	-0,0030
	(0,0077)	(0,0090)	(0,0022)	(0,0024)
(LASDP)(NPA)		-0,0156		0,0057
		(0,0256)		(0,0096)
AVBOU	0,0885	0,0860	-0,0120	-0,0110
	(0,0884)	(0,0885)	(0,0226)	(0,0229)
AVINF	0,1099*	0,1110*	0,0217***	0,0213***
	(0,0358)	(0,0357)	(0,0127)	(0,0127)
ERDP	-0,0003	-0,0004	-0,0106	-0,0106
	(0,0518)	(0,0516)	(0,0193)	(0,0195)
Adj.R-squared	.7602	.7597	.6966	.6960
Model Test	F (28, 283) = 36.21*	F (29, 282) = 34.90*	F (28, 283) = 26.50*	F (29, 282) = 25.55*
Fixed Effects	Chi-sq. (16) = 295.18*	Chi-sq. (16) = 292.53*	Chi-sq. (16) = 296.67*	Chi-sq. (16) = 294.75*
	F (16, 283) = 27.87*	F (16, 282) = 27.39*	F (16, 283) = 28.09*	F (16, 282) = 24.89*
No. of Obs.	312	312	312	312

1. White/Hetro. corrected covariance matrix used.
2. Standard errors are given in parentheses below the coefficient estimates.
3. (*), (**), (***) means the coefficient is significantly different from zero at 1 percent, 5 percent and 10 percent level of significance respectively.

In the ISPR equations, the coefficient on the MCA variable is significant at a 1 percent level and is positive, indicating that market concentration or non-competitive behaviour was a significant factor in allowing some banks to raise interest spreads. The coefficient on the MCA variable is not significant in the NIM equation that includes the interactive

term (LASDP)(NPA) (Column *iv*). It is possible that although ex-ante spreads were raised by the market power of some banks, profitability of the banking system was not affected much by market power, perhaps because of high intermediation costs.

In the ISPR equation which includes an interactive term between default and liquidity risk (column *ii*), the coefficient on the efficiency variable (MADTD) is negative and significant at a 10 percent level, though we find later on that it is significant only in the results obtained using Group II data – the group with the highest share of the market.

The coefficient on the TASTD variable is negative and significant in both the ISPR and NIM equations, indicating that the observed trend in spreads could partly be driven by the recomposition of deposits; spreads were lower during periods when the supply of time and savings deposits was higher, due to an increase in interest costs, and vice versa. Differences in bank sources of income as measured by the ratio of non-interest income to total income also have an impact on ex-ante spreads and Net Interest Margins. The coefficient on (NIITI) is negative and significant in the ISPR and NIM equations. An implication is that banks, which rely more on non-interest income, need not seek compensatory income by setting higher ex-ante spreads. However, this depresses net interest income and hence profitability, meaning that lending activities are more profitable than fee based services.

The evidence shows that operating costs (OPEAS) were not significant in bank decisions in setting ex-ante spreads, and it will be shown later that the results are consistent for all bank groups. Higher operating costs were, however, reflected in higher interest margins in the full sample data, and later on we show that this was consistent with the operations of Group I and Group III, but not with those of Group II.

The coefficient on the interest rate risk variable (IRR) is positive and significant in the ISPR equations, indicating that banks with a high repricing gap set higher spreads to receive compensation for the foregone income, due to volatility in interest rates. The coefficient on the interest rate risk variable is, however, negative in the NIM regressions - an indication of poor interest rate risk management (or mispriced interest rate risk). The coefficient on the ratio of core capital to net assets variable (CCAS), which is a proxy for insolvency risk, is not significant in the ISPR equations. An implication is that insolvency risk was not important in bank managers' decisions in determining the ex-

ante spreads. Higher equity capital, however, seems to be associated with higher Net Interest Margins, which is consistent with the fact that banks with higher capital ratios tend to face lower costs of funding due to lower prospective bankruptcy costs. Higher equity also means that a bank needs to borrow less in order to support a given level of assets. Well-capitalised banks therefore tend to be more profitable. This result is similar to that of Berger (1995) and Demirgüç-Kunt and Huizinga (1998).

The coefficient on the default risk variable (NPA) is negative and not significant in the ISPR equations and negative and significant in the NIM equations. This could indicate that while the profitability of banks was significantly reduced by a high level of default on the part of borrowers, banks did not attach a high enough premium to the lending rates. Pure liquidity risk, the interaction between liquidity and default risks and excess reserves are not found to have a significant effect on bank spreads although we later on find that this does not apply to all banks.

Turning to the macroeconomic indicators, it is found that the cost of additional funds, as proxied by the average discount rate (AVBOU), was not a significant factor in affecting the decisions made by banks to set optimal spreads. This is not surprising given that during the review period, commercial banks were restricted from borrowing from BoU. Indeed, banks held reserves in excess of requirements (Table 2.5). However, we show later on that Group I banks passed the additional costs of borrowing onto their customers. The coefficient on the inflation variable (AVINF) is positive and significant in the ISPR equations, indicating that banks raise spreads to compensate for some of their losses due to higher inflation rates. This is further shown by a positive and significant coefficient on the inflation variable in the NIM equations. The coefficient on the exchange rate risk variable (ERDP) is not significant in both the ISPR and NIM equations, though we later on show that exchange rate fluctuations affected the Net Interest Margins of Group I and Group II banks.

2.4.1 Inter-Group bank comparisons

As highlighted in Section 2.2, the Ugandan financial system is segmented and we expect variations in the effects on spreads due to operational differences among segments of the market. To test for structural differences between segments, we imposed restrictions that all the slope coefficients on the explanatory variables were different across bank group data. The results of the tests are indicated in Table 2.10. Excluding Net Interest Margins, which are not significantly different across Group I and Group III banks, there appears to be structural differences across the three segments of the market. We examined inter-group differences in the effects on ex-ante spreads and Net Interest Margins by running regressions using data from each bank group. Tables 2.11, 2.12 and 2.13 present the results from Group I, Group II and Group III data, respectively.

Table 2.10 Tests of Structural Differences between Bank Groups

Groups		ISPR	NIM	CV (5%)
I and II	F(12,148)	2,706**	2,078**	1,750
I and III	F(12,210)	3,614**	1,110	1,750
II and III	F(12,194)	4,633**	2,134**	1,750

Group I data consists of 94 observations of five banks. Group II data contains 78 observations of 4 banks and Group III data includes 140 observations on a varying number of banks. The fixed effects for Group II data regressions were only significant in the NIM equation which included an interactive term between default and liquidity risks, thus the results reported in the other documented regressions using Group II data, are based on OLS without bank dummies.

Consistent with the hypothesis that market concentration allows some banks to raise interest rates above costs, the coefficient on the MCA variable is positive and significant in the ISPR equations of Groups I and Group II data (Tables 2.11 and 2.12). However, the increase in ex-ante spreads was not matched with a significant change in the Net Interest Margins of these banks. For Group III banks, market concentration seems to be associated with lower ex-ante spreads and lower Net Interest Margins (Table 2.13). This finding is consistent with the fact that this group competed with the more established

banks, which enabled the group to obtain a larger share of the market, but also reduced its ex-ante spreads and Net Interest Margins through increased interest costs.

Market share (MADTD) does not seem to have a significant effect on the ex-ante spreads and Net Interest Margins of Group I banks. However, higher market shares seem to be associated with lower ex-ante spreads for Group II banks. Under the Efficient-Structure hypothesis, efficient banks would increase their share of the market even if they reduced prices for services. However, as indicated in Section 2.2, although Group II reduced its operating costs and made efforts to rebuild its capital base, its performance indicators remained below the average for all banks, with an average Return on Assets (RoA) recorded at –0.04 percent (Table 2.2) and core capital recorded at –15 percent (Table 2.6). The negative relationship between market share and ex-ante spreads could not, therefore, have been explained by an economy of scale advantage over small banks, which could possibly enable this group to make higher profits than other banks at any given price for financial services. Nor could it be due to their ability to under-cut other bank groups in prices, while maintaining high profits. Rather, it could be attributed to weak pricing policies.

For Group III banks, market share has no significant relationship with ex-ante spreads. However, higher market shares are associated with lower Net Interest Margins (Table 2.13, Column *iv*). This result could be explained by the fact that the interest costs of this group increased fast beginning in 1995 due to an increase in the supply of time and savings deposits and a rise in the deposit rates it offered. The level of bad loans of this group also started increasing beginning in 1997, while its liquidity position started deteriorating (Figure 2.3 and Figure 2.12). Hence, although higher deposit rates enabled this group to increase its share of the market, its Net Interest Margins were lowered due to an increase in intermediation costs. Given this situation, it can be argued that while competition of the banking system was stepped up by the entry of new banks, it led to financial inefficiency, whereby excessive deposit rates are paid by banks. Indeed, the observed falling trend in spreads is not necessarily explained by a fall in operating costs (which were not significant in explaining movements in the ex-ante spreads anyway).

Rather, this trend could be partly attributed to a rise in deposit rates offered by banks that were in need of liquidity that could be used to cover for operating losses.

Consistent with the full sample results, the recomposition of deposits (TASTD) is associated with lower ex-ante spreads for all groups of banks, but displays a higher effect on the spreads of Groups I and III banks whose supply of time and savings deposits increased during the review period. It is noted that the recomposition of deposits reduced the Net Interest Margins of Group III banks (Table 2.13, Column *iv*). This is not surprising since average interest expenses for this group were higher than those of other bank groups.

Higher non-interest income as measured by (NIITI) is associated with lower ex-ante spreads of Group III banks. However, reliance on non-interest income does not affect the ex-ante spreads of Group I and Group II banks. Apparently more reliance on non-interest income depresses the Net Interest Margins of all the bank groups.

Higher operating costs (OPEAS) are not reflected in the spreads of all bank groups. However, higher operating costs are associated with higher Net Interest Margins of Group I and Group III banks. A possible explanation is that while Group I banks had the lowest operating cost ratios, their higher incentives for staff and improvements in technology during the review period could have led to lower average unit costs through more efficient use of labour and capital (Appendix A2.4). This should have increased their revenue by allowing a broader array of financial services to be provided to customers.

The effect of increased operating costs on the Net Interest Margins of Group III banks was however higher, which was most likely because this group had higher effective returns from lending since they had a lower level of non-performing loans. Most of Group III banks had also been in operation for only a few years and were still expanding their operations. It is observed that this group increased its ratio of staff costs to total operating costs between 1994 and 1998. Related to this was the establishment of new

branches by some banks, which should have improved their Net Interest Margins (see Appendices A2.1 and A2.4).

A justified policy implication here, is not necessarily one of encouraging banks to reduce spending, but rather one of re-allocation of operating costs in favour of efficiency-enhancing areas such as technology. While this has a long-term implication that the larger and more cost efficient banks might drive smaller banks out of the market, thus leading to the increased dominance of large firms and to a concentration in the production of financial services, it has potential benefits in terms of increasing profitability and competition in the medium-term.

For Group I banks, equity capital (CCAS) is not reflected in the ex-ante spreads. However, higher equity capital is associated with higher Net Interest Margins, which is consistent with the fact that well capitalised become more profitable. Higher equity capital is positively related to the ex-ante spreads of Group II banks, which could reflect managers' incentives to reduce the risk of insolvency below the level required by stockholders. This would not be surprising given that Group II banks experienced liquidity and solvency problems before they underwent restructuring. The effect of higher capital on ex-ante spreads was, however, not reflected in higher Net Interest Margins of Group II banks, possibly due to high intermediation costs.

For Group III banks, higher equity capital is associated with lower ex-ante spreads. It is possible that higher equity capital provided incentives to the managers of these banks, to engage in more risky lending by lowering the lending rate, thus reducing the ex-ante spreads. As Figure 2.2 indicates, this is the only group whose share of loans in the asset portfolio increased after 1996. Similar to the case of Group I banks, higher equity capital is associated with higher Net Interest Margins of Group III banks.

While the Net Interest Margins of all bank groups were significantly reduced by default risk as proxied by (NPA), none of the bank group ex-ante spreads seemed to be positively associated with default risk. This could be an indication of weaknesses in default risk assessment. Moreover, for Group II banks whose profitability was most

affected by default risk, the coefficient on the NPA variable is negative and significant in the ISPR equations. A possible explanation is that since this group had a very high level of non-performing loans, its managers found it reasonable to lower lending rates to the levels used by other banks. Raising them too high might increase default risk by encouraging higher risk borrowers and investments. The bad management hypothesis cannot, however be ruled out, whereby past poor underwriting and monitoring practices could have led to a high level of non-performing loans, although it took time for them to appear.

Liquidity risk as measured by (LASDP), was not an important consideration in the setting of ex-ante spreads of Group I banks. In the NIM regression, the coefficient on the interactive term between default and liquidity risk is negative and significant (Column *iv*). This could imply that if banks increased their holding of liquid assets such as government securities and reserves due a rise in credit market risk, their Net Interest Margins would fall possibly due to a combination of falling market rates, foregone interest on reserves and credit default.

For Group II banks, an increase in pure liquidity risk is associated with higher ex-ante spreads (Table 2.12, Column *ii*). Thus, an increase in the ratio of liquid assets to total deposits reduced the ex-ante spreads of Group II banks. Higher holdings of liquid assets were, however, associated with lower Net Interest Margins of Group II banks (Column *iv*). The interaction between liquidity and default risks seems to have a positive effect on the ex-ante spreads as well as the Net Interest Margins. This could imply that if a holding of more liquid assets were due to a rise in credit market risk, it would lead to a rise in the spreads of Group II banks due to the premium, which banks would attach to the spreads to compensate them for the foregone income by keeping, for instance, excess reserves. The Net Interest Margins of banks would also increase, not only due to the premium but also by banks investing in safer assets such as government securities and reducing borrowing and penalty costs associated with being illiquid.

For Group III banks, a high level of liquid assets led to an increase in ex-ante spreads, implying that Group III banks attached more importance to the foregone income by

keeping excess reserves than to costs related to liquidity problems. This is consistent with the observed combination of a reduction of the investment in risk free government securities in this group (Figure 2.5) in 1996, and a willingness to engage in more risky lending, thus exposing itself to future default risk (Figure 2.3), while at the same time exposing itself to even more liquidity risk by reducing the share of liquid assets to total deposits. High premiums due to foregone interest on reserves were, however, not reflected in higher Net Interest Margins, perhaps due to high interest costs as well as the an increase in costs incurred from credit defaults and short-term borrowing of this group from BoU beginning in 1997.

Beyond bank specific variables, uncertainty in the macroeconomic environment affected bank spreads. Additional costs of borrowing from BoU or the inter-bank market were reflected in the ex-ante spreads of Group I, although they were not reflected in the ex-ante spreads of Group II and Group III banks. They were not reflected in the Net Interest Margins of all bank groups, either. Higher inflation was associated with higher ex-ante spreads of all bank Groups, though it did not significantly raise their Net Interest Margins. However, none of the bank group ex-ante spreads were significantly affected by exchange rate changes (ERDP), although the Net Interest Margins of Group I were increased while the Net Interest Margins of Group II were reduced, both due to changes in the exchange rate.

Lastly, the constant in the regressions on Group II bank data was significant and positive in both the ISPR and NIM regressions, indicating that the effect of other factors which were not explicitly included in the model were important in raising the ex-ante spreads and Net Interest Margins of Group II banks. It is however noted that the magnitude of the coefficients in the NIM regressions is only about half (0.07) of that in the spread regressions (0.15). This could imply that the effects which were not included in the model (although having a similar effect across Group II banks) were more distortionary to the allocation of resources than efficient enhancing, thus welfare reducing.[42]

[42] If these effects had not led to welfare losses, an increase in the ex-ante spreads would have given a proportional increase in earnings (NIM) to the banks.

Table 2.11 Empirical Results for Group I Data

Dep.Variable	ISPR	ISPR	NIM	NIM
	(*i*)	(*ii*)	(*iii*)	(*iv*)
MCA	0,1721*	0,1717*	-0,0081	-0,0060
	(0,0442)	(0,0444)	(0,0103)	(0,0098)
MADTD	0,0373	0,0357	-0,0386	-0,0297
	(0,1448)	(0,1501)	(0,0239)	(0,0228)
TASTD	-0,1417*	-0,1415*	-0,0049	-0,0059
	(0,0464)	(0,0468)	(0,0078)	(0,0075)
NNIITI	-0,0194	-0,0195	-0,0115***	-0,0107
	(0,0220)	(0,0218)	(0,0069)	(0,0068)
OPEAS	0,0978	0,0954	0,0767**	0,0898*
	(0,1571)	(0,1615)	(0,0324)	(0,0294)
IRR	-0,1763	-0,1793	-0,0372	-0,0207
	(0,9335)	(0,9314)	(0,2005)	(0,2072)
CCAS	-0,0757	-0,0774	0,0282**	0,0380*
	(0,0537)	(0,0548)	(0,0130)	(0,0125)
NPA	-0,0211	-0,0238	-0,0262*	-0,0114
	(0,0270)	(0,0449)	(0,0072)	(0,0087)
LASDP	0,0354	0,0337	-0,0110*	-0,0022
	(0,0224)	(0,0330)	(0,0037)	(0,0055)
(LASDP)(NPA)		0,0050		-0,0277**
		(0,0609)		(0,0130)
AVBOU	0,2801**	0,2814**	0,0014	-0,0058
	(0,1199)	(0,1206)	(0,0290)	(0,0284)
AVINF	0,1457**	0,1461**	0,0269	0,0251
	(0,0625)	(0,0630)	(0,0192)	(0,0186)
ERDP	0,0047	0,0058	0,0385***	0,0326***
	(0,0802)	(0,0820)	(0,0200)	(0,0196)
Adj.R-squared	.8862	.8847	.4755	.4836
Model Test	F (16, 77) = 46.27*	F (17, 76) = 42.99*	F (16, 77) = 6.27*	F (17, 76) = 6.12*
Fixed Effects	Chi-sq. (4) = 78.98*	Chi-sq. (4) = 71.92*	Chi-sq. (4) = 24.90*	Chi-sq. (4) = 16.71*
	F (4, 77) = 25.35*	F (4, 76) = 21.84*	F (4, 77) = 5.84*	F (4, 76) = 3.7*
No. of Obs.	94	94	94	94

1. White/Hetro. corrected covariance matrix used.
2. Standard errors are given in parentheses below the coefficient estimates.
3. (*), (**), (***) means the coefficient is significantly different from zero at a 1 percent, 5 percent and 10 percent level of significance, respectively.

Table 2.12 Empirical Results for Group II Data

Dep.Variable	ISPR	ISPR	NIM	NIM
	(*i*)	(*ii*)	(*iii*)	(*iv*)
MCA	0,1520*	0,1464*	-0,0139	-0,0101
	(0,0419)	(0,0414)	(0,0224)	(0,0133)
MADTD	-0,0678*	-0,0691*	0,0311*	0,0084
	(0,0208)	(0,0205)	(0,0111)	(0,0151)
TASTD	-0,0456*	-0,0438*	-0,0122***	0,0132
	(0,0135)	(0,0134)	(0,0072)	(0,0151)
NNIITI	0,0029	0,0060	-0,0164**	-0,0110***
	(0,0124)	(0,0124)	(0,0066)	(0,0060)
OPEAS	0,0263	0,0279	0,0167	0,0051
	(0,0952)	(0,0938)	(0,0509)	(0,0520)
IRR	-0,0156	-0,0515	-0,7673**	-0,8557*
	(0,5989)	(0,5908)	(0,3203)	(0,2653)
CCAS	0,0258**	0,0211***	0,0020	-0,0024
	(0,0109)	(0,0111)	(0,0058)	(0,0041)
NPA	-0,0260***	-0,0588**	-0,0595*	-0,0946*
	(0,0141)	(0,0238)	(0,0076)	(0,0122)
LASDP	-0,0356*	-0,0956*	0,0147**	-0,0792*
	(0,0128)	(0,0375)	(0,0069)	(0,0149)
(LASDP)(NPA)		0,1008***		0,1499*
		(0,0593)		(0,0231)
AVBOU	-0,0186	0,0202	-0,0285	0,0356
	(0,1101)	(0,1109)	(0,0589)	(0,0360)
AVINF	0,1441**	0,1250**	0,0435	0,0094
	(0,0603)	(0,0605)	(0,0323)	(0,0231)
ERDP	0,0128	0,0299	-0,0924**	-0,0532***
	(0,0808)	(0,0803)	(0,0432)	(0,0299)
Constant	0,1505*	0,1649*	0,0666*	
	(0,0334)	(0,0340)	(0,0179)	
Adj.R-squared	.6310	.6415	.6262	.7433
Model Test	F (12, 65) = 11.97*	F (13, 64) = 11.60*	F (12, 65) = 11.75*	F (16,61) = 14.94*
Fixed Effects	Chi-sq. (3) = 5.89	Chi-sq. (3) = 5.56	Chi-sq. (3) = 5.84	Chi-sq. (3) = 14.98*
	F (3, 62) = 1.62	F (3, 61) = 1.50	F (3, 62) = 1.61	F (3, 61) = 4.31*
No. of Obs.	78	78	78	78

1.Equations *i* to *iii* are estimated using Least Squares without bank dummies. Equation *iv* is estimated using Least Squares, with bank dummies included.
2. White/Hetro. corrected covariance matrix used in Equation *iv*.
3. Standard errors are given in parentheses below the coefficient estimates.
4. (*), (**), (***) means the coefficient is significantly different from zero at a 1 percent, 5 percent and 10 percent level of significance, respectively.

Table 2.13 Empirical Results for Group III Data

Dep.Variable	ISPR	ISPR	NIM	NIM
	(*i*)	(*ii*)	(*iii*)	(*iv*)
MCA	-0,0948**	-0,0947**	-0,0498*	-0,0509*
	(0,0443)	(0,0451)	(0,0183)	(0,0182)
MADTD	0,0365	0,0367	-0,1600	-0,1696***
	(0,2141)	(0,2155)	(0,0980)	(0,0980)
TASTD	-0,1329*	-0,1328*	-0,0230*	-0,0234*
	(0,0171)	(0,0173)	(0,0078)	(0,0078)
NNIITI	-0,0351***	-0,0351***	-0,0244*	-0,0244*
	(0,0198)	(0,0198)	(0,0071)	(0,0070)
OPEAS	0,0185	0,0187	0,1188*	0,1117**
	(0,0902)	(0,0932)	(0,0448)	(0,0461)
IRR	1,1907*	1,1906*	-0,5429**	-0,5395**
	(0,4180)	(0,4189)	(0,2454)	(0,2433)
CCAS	-0,0359*	-0,0360*	0,0252*	0,0282*
	(0,0127)	(0,0142)	(0,0086)	(0,0097)
NPA	-0,0119	-0,0119	-0,0214*	-0,0175***
	(0,0153)	(0,0164)	(0,0078)	(0,0101)
LASDP	0,0138***	0,0138***	-0,0021	-0,0009
	(0,0071)	(0,0081)	(0,0027)	(0,0031)
(LASDP)(NPA)		0,0002		-0,0091
		(0,0221)		(0,0120)
AVBOU	0,1139	0,1139	0,0006	0,0003
	(0,1418)	(0,1420)	(0,0378)	(0,0378)
AVINF	0,0900***	0,0900***	0,0272	0,0286
	(0,0528)	(0,0535)	(0,0199)	(0,0200)
ERDP	0,0064	0,0064	0,0174	0,0187
	(0,0757)	(0,0758)	(0,0315)	(0,0306)
Adj.R-squared	.7262	.7239	.7610	.7600
Model Test	F (19, 120) = 20.41*	F (20, 119) = 19.23*	F (19, 120) = 24.29*	F (20, 119) = 23.01*
Fixed Effects	Chi-sq. (7) = 144.38*	Chi-sq. (7) = 132.80*	Chi-sq. (7) = 147.05*	Chi-sq. (7) = 138.26*
	F (7, 120) = 30.94*	F (7,119) = 26.89*	F (7, 120) = 31.86*	F (7, 119) = 28.64*
No. of Obs.	140	140	140	140

1. White/Hetro. corrected covariance matrix used.
2. Standard errors are given in parentheses below the coefficient estimates.
3. (*), (**), (***) means the coefficient is significantly different from zero at a 1 percent, 5 percent and 10 percent level of significance, respectively.

2.5 A DISCUSSION OF THE EMPIRICAL FINDINGS AND POLICY RECOMMENDATIONS

2.5.1 A Discussion of the Empirical Findings

As the above findings indicate, although the banking system is far less repressed than it was in the 1980s and has recovered notably since the early 1990s, it is still characterised by imperfections that are imposing large intermediation costs onto banks. The banks are then imposing significant risk premiums onto their customers in order to cover the costs of insolvency, illiquidity and interest rate volatility, inflation and other macroeconomic risks. The market is also still segmented and highly concentrated, which allows some banks to raise intermediation spreads above costs.

The fact that operating expenses did not significantly raise spreads while they raised the Net Interest Margins of some bank groups, could be a reflection that banks are not investing enough in technology and hence, cannot gain from economies of scale, or it may be that they are not providing adequate incentives to their staff. Group II banks, which had the largest share of the market for instance, had the worst performance indicators, while Group I banks, which improved technology and appear to have provided higher incentives to staff,[43] maintained their share of the market despite competition from new banks, and on average performed better than other banks.

It is also worthwhile noting that though high intermediation spreads tend to adversely affect the real sector of the economy, they constitute a key mechanism through which banks generate profits and increase capital. This can protect banks against macro and other risks, so that stability of the banking system can be maintained. The motive for banks in setting high spreads thus becomes crucial - whether they are simply covering intermediation costs due to operative inefficiency (as seems to be the case), extracting extra rent for shareholders or whether they are generating profits that can strengthen and solidify the banking system.

[43] Group I had a higher ratio of staff costs to total operating costs than other groups, (Appendix A2.4).

It has been shown that although some bank groups performed better than others, the profitability of banks in the Ugandan financial system, on the whole remained very weak, showing an average Net Interest Margin of 2 percent and an average Return on Assets of 0.2 percent (Table 2.2). Further, though the risks of default and exchange rate volatility were found to significantly reduce the profitability (Net Interest Margins) of some banks, they were not important factors in bank decisions regarding setting spreads. Therefore, while high intermediation spreads may signal lack of competition in the Ugandan banking system, they can partly be explained by X^m-inefficiences due to weaknesses in management. To illustrate this point further, assume that the expected income of a bank is a function of the ex-ante spread. Assume also, for simplicity, that the only risk facing the bank is default risk. The expected return for a bank per shilling loaned, ignoring compensating balances,[44] may be represented by equation 5 below.

$$E(R_L, R_D) = (1-p)(1+r+m+f) \qquad 5$$

where, R_L and R_D are lending and deposits rates, respectively, p is the probability of default attached to the income flow of a bank, r is the base lending rate which could reflect the marginal cost of funds of a bank, m is the risk premium set by the bank managers to compensate the bank for the default risk involved and f is the fee charged to the borrower for the service provided. Note that the bank may earn zero interest on a loan and may lose all or part of the principal lent, since default risk ranges from partial to complete default on interest payments and principal lent, depending on its ability to assess some of the borrower's assets through bankruptcy and insolvency proceedings. Given the wide range of risk attached to the return on lending, an efficient bank would be expected to accurately estimate the expected default risk on loans held as assets, and to demand risk premiums on those loans commensurate with that risk exposure.

[44] A compensating balance is the proportion of the loan the borrower is required to hold on deposit at the lending institution (Saunders, 2000).

The situation depicted by the empirical results is that even if the probability of default (p) was high (i.e. the level of non-performing loans, for instance, averaged 56 percent for Group II banks), risk premiums demanded on loans were not commensurate with that risk exposure (that is, m was set very low). Otherwise, default risk (as proxied by the level of non-performing loans to total loans) would have turned out having a positive and significant effect on the ex-ante spread. This did not hold true for any of the bank group data regressions or full sample bank data regressions. Indeed, these findings imply that under the prevailing credit risk environment, the spreads could well have been higher than observed if the managers had been more efficient in assessing risk. This would not be surprising, since in countries such as Columbia, spreads averaged about 25 percent in the post-liberalisation period (Barajas, Steiner and Salazar, 1999).

A further observation is that while a falling trend was observed in ex-ante spreads throughout the period under review, it was not necessarily due to improvements in operational efficiency. For instance, though overhead costs were reduced by the closing of bank branches and reduction of the number of employees, they were not important in explaining movements in the spreads. Based on this finding, it could be argued that because banks in need of liquidity had to raise extra funds, which could be used to cover up operating losses, they bid up R_D in equation 5. This partly explains the fall in spreads, as well as the low profitability. It is indeed shown by the fact that an increase in the ratio of time and savings deposits to total deposits (TASDP) was an important factor in explaining the fall in the spreads of all bank groups.

An implication is that closing bank branches and reducing the number of bank employees is not sufficient to improve the efficiency of banks if they remain poorly managed. It is also worthwhile noting that Group I banks, which appear to have better performance indicators, mainly concentrate their operations in large towns and have very few branches. Since more than 80 percent of the population live in rural areas, the closing of bank branches may conflict with the objective of enhancing financial development.

2.5.2 Policy Recommendations

To improve efficiency in the financial system, a number of policy actions are called for at both the micro and macro levels. Not only do banks need to develop the capacity to assess risk and monitor risky assets, they also need to be able to optimally control labour, capital and other input sources and costs. However, for efficient management, and in order to reduce the unit costs of producing services (using the inputs of labour and capital), banks need to re-allocate expenditure towards efficiency-enhancing areas such as technology. Well-chosen technological investments have the potential to increase the profitability of banks. For instance, increases in interest income can be achieved if the financial institution can use technological developments to sell a broader range of financial services. Interest expenses can also be reduced if access to markets for liabilities is directly dependent on the technological capability of the financial institutions. Interlocking computer network systems can, for instance, make it possible to link the domestic and international inter-bank lending markets.

A major identified factor that reduces the profitability of banks, but which doesn't appear to be well managed, is default risk. Traditional mechanisms used to control credit risks include: (1) requiring higher interest rates and fees on loans to the more risky borrowers, (2) restricting or rationing credit to the more risky borrowers, (3) requiring enhanced collateral for the bank over the assets of risky borrowers, (4) diversifying across different types of risky borrowers and (5) placing more restrictive covenants[45] on the actions of risky borrowers, such as restrictions on the use of proceeds from asset sales, new debt issues and dividend payments.

In some countries, workout units have been established by banks to recover problem loans. These have been said to be useful in restructuring loan portfolios, especially if accompanied by privatisation programs for the enterprises to which the loans were made. However, as argued by Borish, Long and Noël (1995), portfolio problems often exceed the capacity of banks to restructure loans. They may be further undermined by weak legal and regulatory frameworks for loan recovery (courts, collateral legislation,

[45] Covenants are restrictions written into bond and loan contracts either limiting or encouraging the borrowers' actions that can affect the probability of repayment.

property registries), by insufficiently developed market mechanisms for effecting loan repayment from secured credits (valuation, repossession, liquidation, sale) and by local pressures on banks to roll over loans or forgo repayment.

Other techniques available to assist financial institutions in controlling credit risk include the use of loan sales[46] (removing existing loans from the balance sheet) by using, for instance, the "good bank-bad bank mechanism."[47] The Ugandan government used this method to recover non-performing loans held by UCB until September 1994, through the establishment of the Non-Performing Assets Recovery Trust (NPART). This could be a feasible option for the Group I banks which, too, have a history of bad loans on their balance sheets.

Debt-equity swaps can also be used by banks to write down loan values. Banks end up owning shares in enterprises and gaining direct control or supervisory authority over enterprise management. The use of loan sales and asset swaps may, however, be constrained by the absence of well-functioning inter-bank and secondary markets, including non-bank financial institutions that specialize in discounted loan transactions. There may also be little demand for such instruments because banks are more concerned with ensuring liquidity and recovering non-performing loans than with the uncertain future value of largely discounted, but low-quality, assets (Borish, Long and Noël, 1995).

However, the ability of a bank to measure its risk exposure largely depends on the amount of information the bank has about the borrower. There is, therefore, a need for banks to monitor and collect information about firms whose assets are in their portfolios. The availability of more information, along with lower average costs of collecting the information, makes it possible for banks to use more sophisticated, and usually more quantitative methods in assessing default probabilities for borrowers.

[46] A bank loan sale occurs when a bank originates a loan and sells it, either with or without recourse, to an outside buyer. When a loan is sold without recourse, it is not only removed from the bank balance sheet, but the bank has no explicit liability if the loan eventually goes bad (Saunders, 2000).
[47] "Bad banks" are special purpose agencies organised to recover the non-performing loans of banks therefore allowing them to become "good banks."

There is a need for improvements in interest rate management by, for instance, matching asset and liability maturities.[48] In regards to liquidity management, our results have indicated that a high level of liquid assets significantly reduced the earnings of Group I banks, while they were reflected as premiums in the spreads of Group III banks which seem to have attached more importance to the opportunity cost of reserves. One aspect of liquidity risk control is for banks to build a prudential level of liquid assets. Another aspect is for banks to manage their financial liability structure such that they reduce the need for a large amount of liquid assets to meet liability withdrawals. However, it is important to note that since excess reserves are a drag on bank earnings, banks need to consider other ways of holding assets which although not as liquid as cash, can yield some return at the least possible cost. Of course this will very much depend on the development of securities, equity and inter-bank markets.

A number of policies can further help to enhance the efficiency of the financial system at a macro level:

- As our results indicate, additional costs of borrowing funds from BoU or the inter-bank market were reflected in the spreads of Group I banks. This underscores the need to further reduce intermediation costs through the development of bond, equity as well as inter-bank money markets.

- Competition among financial institutions needs to be encouraged to a larger degree by, for instance, easing entry requirements. This can reduce rent seeking, increase incentives for cost reduction, and stimulate other efficiency improvements including technology. Non-bank financial institutions can also help enhance competition and improve resource allocation since they are said to generally exhibit lower transaction costs than banks.

[48] However, if interest rate changes occur, the financial institution can still be exposed to interest rate risk, even if maturities of assets and liabilities are matched, if the timing of the cash flows on the liabilities and assets are not perfectly matched.

- Economic stability needs to be maintained, while at the same time strict supervision of the banks must be strengthened further to ensure the viability and health of the banking industry. The instability of the Ugandan banking market during the late 1990s that led to the closure of several banks was indeed partly attributed to the failure of supervisors to exercise proper control over the banking system, which magnified the impact of the risks on banks.

  However, Claessens and Klingebiel (1999) note that, although most developing countries have moved to engage in prudential supervision, not much attention has been paid to providing supervisors with the incentives both to monitor better and to take corrective action based on this effort. Without giving incentives to monitor, and thus making no consequences for banks that violate the regulatory framework, the supervision will be completely ineffective.

  Notwithstanding the need for the continued monitoring and surveillance function of BoU, it is important to note that regulation is not without costs for banks. For example, the requirement of BoU that banks produce accounting statements and reports on a timely basis is costly for banks because it involves the time of managers, lawyers and accountants. And the higher the net regulatory burden of financial institutions, the more inefficiently they are likely to provide any given level of financial services from a private bank owner's perspective.

- In the context of dealing with weak banks, Claessens and Klingebiel (1999) note that it has become increasingly common to recommend that countries adopt the idea of "prompt, corrective action and structured early intervention." Structured early intervention calls for: (1) higher capital, (2) structured, pre-specified, publicly announced responses by regulators triggered by a deterioration in bank performance (for example capital ratios) below established limits, (3) mandatory resolution of a capital depleted bank at a pre-specified point when capital is still positive and (4) market value accounting and reporting of capital.

However, Claessens and Klingebiel (1999) point out that while this approach appears to have yielded promising results in the U.S. so far, it is by no means certain that this model works at all times or in all countries. Even if enacted, governments may be tempted to re-write the rules in tough times. And opponents of this approach argue that authorities could be hampered by a loss of discretion.

- Lastly, there is need for enhanced public awareness through improvements and the timely availability of information on key economic indicators. In this regard, it is noted that steps have already been taken by BoU to disseminate information through the monthly Economic and Financial Indicators and/or the newspapers.

2.6 SUMMARY AND CONCLUSIONS

In this chapter we use quarterly panel data covering the period 1994-1998 to examine the determinants of commercial bank interest rate spreads in the Ugandan financial system using two measures of the spread, the ex-ante spread (ISPR), and the Net Interest Margin (NIM). The empirical findings are consistent with the hypothesis that ex-ante spreads reflect interest rate, liquidity and insolvency risk premiums. However, risk factors reduce the earnings (Net Interest Margins) of banks. In addition, lack of competition, costs of excess reserves and short-term borrowing at BoU or in the inter-bank market, get translated into high ex-ante spreads of banks, although they are not necessarily associated with high Net Interest Margins. Large banks seem to have lower ex-ante spreads. However, there is no evidence of scale economies. Dependence on non-interest income lowers ex-ante spreads and Net Interest Margins of banks. Although default and exchange rate risks are major factors in reducing the Net Interest Margins of banks, they are not important reasons for banks deciding to set high ex-ante spreads. This may reflect deficiencies in assessing risk. In contrast to other countries, overhead costs are not associated with high ex-ante spreads, though they are associated with high Net Interest Margins of banks. Inflation also appears to be an important factor in raising spreads.

However, the evidence shows that there are significant disparities in the effects on spreads across market segments. For Group I banks, whose earnings are less likely to be affected by interest rate and exchange rate fluctuations, uncertainty in the macroeconomic environment, and the costs of borrowing at BoU or in the inter-bank market, are the main determinants of the ex-ante spreads. Group II banks, which experienced liquidity and solvency problems before they were restructured, attach more importance to insolvency and liquidity risks in setting spreads. Higher capital is, however, positively related to the ex-ante-spreads of Group II banks, which could reflect managers' incentives to reduce the risk of insolvency below the level required by stockholders. The ex-ante spreads of Group III banks are more sensitive to interest rate and insolvency risks and to foregone earnings by keeping excess reserves. Unlike the case of Group II banks, higher capital is negatively related to the spreads of Group III banks, which could reflect managers' incentives to extend more risky loans at lower costs as capital increases.

A further finding is that while a falling trend was observed in spreads throughout the review period, it was not necessarily due to improvements in operational efficiency, but rather due to an increase in the deposit rates set by banks in need of liquidity to cover operating losses.

These findings call for a number of policy measures. Since high spreads reflect lack of competitiveness and inefficiency in the financial system, policies should be directed at improving risk management and technology, at strengthening supportive information and bank supervision, at developing inter-bank, securities and equity markets and at maintaining macroeconomic stability. However, it is important to note that while improvements in the monitoring and legal systems are essential for the efficient functioning of financial institutions, regulation is not without costs to financial institutions. The higher the net regulatory burden of banks, the more inefficient they are therefore likely to be at providing any given level of financial services.

APPENDICES

Table A2.1 Key Structure and Performance Indicators: A List of Variables

Variable	Description	Variable	Description
ISPR	Interest Spread	NPA	Non-performing loans / Total loans
WALR	Weighted average lending rate	PADV	Total provisions/ Total loans
WADR	Weighted average deposit rate	LASDP	Liquid assets / Total deposits
NIM	Net interest margin	BTDP	Balances at BoU / Total deposits (Reserves)
MADTD	Bank's share of loans	TASTD	Time and savings deposits / Total deposits
EAA	Earning assets/Total assets	MSDD	Bank's share of deposits
NIITI	Non-interest income / Total income	MADTD	Bank's share of loans
OPEAS	Non-interest expenses / Earning assets	MSAS	Bank's share of assets
CCAS	Core capital / Net assets		
CRWS	Core capital / Risk weighted assets		

Note: Net assets are defined as: Total assets – Provisions

Continued…

Table A2.1 Key Structure and Performance Indicators: Group I Banks

	ISPR	WALR	WADR	NIM	EAA	NIITI	OPEAS	CCAS	CRWS	NPA	PADV	LASDP	BTDP	TASTD	MSDD	MADTD	MSAS	No. of branches & Sub-branches	No. of Agencies
Barclays																			
1994	22.0	26.8	4.8	1.2	77.0	39.6	3.5	2.3	3.8	39.3	13.0	49.6	21.5	47.3	11.2	8.7	11.2	5	0
1996	14.0	18.2	4.2	2.1	86.2	44.3	1.7	6.6	10.0	32.8	10.1	36.9	13.1	41.1	7.3	10.5	10.4	2	0
1998	14.6	19.3	4.7	2.4	86.6	17.9	1.1	10.0	26.2	38.2	12.0	99.7	9.8	41.4	6.6	4.6	9.5	2	0
Baroda																			
1994	-	-	-	1.5	82.7	22.0	0.9	2.3	5.7	18.9	4.5	38.7	11.6	47.3	8.8	6.9	7.3	6	0
1996	12.7	21.0	8.3	0.4	87.1	36.5	1.7	3.7	5.2	9.6	6.1	31.6	6.0	74.5	8.6	8.7	7.5	7	0
1998	12.9	22.5	9.6	0.9	83.3	12.8	1.1	3.8	5.6	14.0	7.4	37.1	9.2	79.6	7.3	9.3	6.1	7	0
Stanbic																			
1994	-	-	-	1.8	76.2	30.0	2.0	3.2	4.0	15.3	0.5	40.0	15.1	38.4	6.7	4.9	8.3	1	0
1996	15.5	17.9	2.4	2.3	84.7	31.0	2.1	5.5	6.4	7.8	2.7	23.0	6.0	44.6	7.2	9.5	8.3	1	0
1998	7.0	12.4	5.4	1.8	88.4	21.3	0.9	7.3	9.9	4.3	0.6	46.2	11.8	57.7	9.3	13.5	11.3	1	0
Standard																			
1994	23.2	28.3	5.1	2.2	70.6	43.2	1.7	2.7	7.2	10.2	3.2	55.6	26.7	29.2	7.9	3.6	9.5	1	0
1996	19.3	21.5	2.2	2.3	77.4	37.1	1.9	6.4	9.7	9.7	4.5	51.7	13.5	25.8	8.0	6.5	8.9	1	0
1998	16.0	21.7	5.7	2.4	83.2	30.1	1.7	7.9	10.4	6.1	2.4	51.4	10.2	26.0	8.1	11.2	10.7	1	0
Tropical																			
1994	34.2	39.4	5.2	1.6	80.0	24.8	6.1	-16.8	-4.8	54.9	2.5	22.7	6.8	32.5	1.3	1.1	1.0	3	0
1996	27.9	30.3	2.3	3.5	50.7	20.4	12.1	-13.7	-13.4	42.7	21.8	8.6	0.0	23.8	1.0	1.0	0.9	3	0
1998	23.0	27.8	4.8	3.5	74.7	29.2	3.2	17.6	26.7	20.1	18.0	62.9	11.5	62.5	1.5	2.0	1.4	3	0

Continued…

Table A2.1 Key Structure and Performance Indicators: Group II Banks

	ISPR	WALR	WADR	NIM	EAA	NIITI	OPEAS	CCAS	CRWS	NPA	PADV	LASDP	BTDP	TASTD	MSDD	MADTD	MSAS	No. of branches & Sub-branches	No. of Agenc
UCB 1/																			
1994	16.3	20.0	3.7	1.9	49.1	32.9	3.3	-32.1	-32.6	84.6	65.1	28.3	19.0	33.8	43.5	56.2	44.1	84	53
1996	15.6	16.5	0.9	1.2	61.3	54.3	3.4	-49.7	-48.2	78.9	55.7	33.5	12.5	32.3	31.1	34.3	31.6	85	42
1998	16.8	18.0	1.2	2.0	60.3	43.7	3.6	7.1	20.6	55.6	34.1	96.0	29.3	27.2	26.0	12.7	22.8	66	0
COOP																			
1994	18.6	25.8	7.3	3.2	56.7	38.2	5.8	-42.4	-44.1	77.0	33.6	27.7	20.9	39.6	6.3	9.5	6.5	23	1
1996	19.2	22.9	3.8	2.6	67.4	45.1	3.3	-6.4	-8.4	40.7	20.8	50.0	12.6	55.5	7.7	7.6	6.8	23	1
1998	17.8	22.8	5.0	2.9	65.6	52.9	6.9	6.5	8.9	26.2	17.5	33.0	14.3	53.3	7.4	9.1	5.5	24	2
Nile																			
1994	24.8	30.0	5.2	1.5	65.5	14.7	2.4	-4.4	-8.9	55.8	1.5	21.3	15.0	43.6	5.0	2.9	4.3	4	0
1996	20.9	25.0	4.1	1.5	65.4	75.9	3.7	-33.3	-33.6	70.7	51.9	22.2	13.4	25.5	3.3	2.9	3.2	4	0
1998	16.1	23.7	7.6	0.9	67.6	36.7	2.5	3.9	8.2	58.3	54.9	61.0	37.6	25.0	2.9	2.7	3.7	3	0
Allied																			
1994	25.3	29.3	4.0	2.7	70.5	38.0	4.9	-4.6	-9.0	35.7	11.4	9.8	10.6	49.8	2.4	1.9	1.6	4	0
1996	16.5	21.7	5.3	0.4	78.4	43.2	7.3	-96.5	-44.7	73.0	47.2	-1.0	1.7	70.5	2.1	2.3	1.4	4	1
1998	18.3	25.0	6.7	0.8	66.9	50.7	5.5	1.7	2.5	63.9	23.9	61.2	11.0	68.0	1.8	1.5	1.7	3	0

1/ UCB had 169 branches in December 1993.

Continued…

Table A2.1 Key Structure and Performance Indicators: Group III Banks 2/

	ISPR	WALR	WADR	NIM	EAA	NIITI	OPEAS	CCAS	CRWS	NPA	PADV	LASDP	BTDP	TASTD	MSDD	MADTD	MSAS	No. of branches & Sub-branches	No. of Agenc
Goldtrust																			
1994	24.4	28.6	4.1	2.8	83.0	18.1	2.4	2.5	2.1	4.1	2.8	38.8	25.0	43.8	1.0	0.8	1.2	3	0
1996	15.7	21.0	5.4	1.4	78.4	41.6	1.6	2.9	4.2	2.4	1.4	35.0	13.9	61.6	1.6	1.6	1.9	3	0
1998	14.9	23.8	8.9	1.7	80.9	18.6	2.0	5.3	8.1	8.7	3.7	43.3	17.7	66.9	2.7	3.9	2.6	4	0
Greenland																			
1994	-	-	-	0.8	49.6	30.9	4.6	8.3	6.5	8.6	4.4	4.6	6.6	24.2	2.5	1.6	1.9	3	0
1996	18.4	21.7	3.2	2.0	65.0	30.8	1.7	8.9	11.5	11.6	3.3	19.9	9.8	46.5	6.9	5.9	5.9	3	0
1998	20.8	25.0	4.2	0.8	65.1	48.5	2.6	4.9	5.9	12.9	8.2	-4.9	10.9	48.4	6.4	9.2	6.1	5	0
ICB 3/																			
1994	20.7	27.8	7.2	0.8	46.0	72.6	6.9	5.3	8.5	20.7	19.9	85.7	47.9	40.8	0.5	0.3	1.0	1	0
1996	19.3	25.3	6.0	4.8	57.7	40.1	4.3	8.6	11.5	5.7	6.3	68.8	18.8	54.8	1.5	1.0	1.7	1	0
1998	22.7	27.3	4.6	0.8	62.4	48.7	3.6	6.8	7.4	2.9	3.0	10.2	0.0	34.6	2.3	2.8	2.1	3	0
Orient																			
1994	14.6	19.0	4.4	1.7	49.2	75.3	8.1	20.2	92.8	0.0	0.0	117.6	46.5	41.9	1.1	0.1	0.8	1	0
1996	14.6	24.3	9.8	1.1	74.6	32.7	0.9	7.3	22.6	1.3	2.2	86.4	24.0	69.8	4.5	1.6	3.4	1	0
1998	12.1	23.8	11.7	0.8	82.7	22.3	0.4	10.4	26.6	5.4	6.2	85.1	18.9	87.6	4.7	3.1	4.3	2	0

2/ Excluded banks from Group III are: Diamond, Trans Africa and Trust.
3/ ICB bank was closed during the last quarter of 1998.

Continued...

Table A2.1 Key Structure and Performance Indicators: Group III Banks

	ISPR	WALR	WADR	NIM	EAA	NIITI	OPEAS	CCAS	CRWS	NPA	PADV	LASDP	BTDP	TASTD	MSDD	MADTD	MSAS	No. of branches & Sub-branches	No. of Agencies
Cerudeb																			
1994	25.9	31.0	5.1	2.6	61.1	51.4	6.6	-12.2	-16.8	37.3	27.7	30.9	10.1	78.8	1.8	1.5	1.2	7	1
1996	22.1	24.0	1.9	5.0	57.7	45.9	8.0	-3.3	-4.0	14.5	7.2	30.3	8.3	66.2	2.2	1.5	1.5	7	1
1998	26.9	29.0	2.1	6.1	69.8	33.9	7.4	6.7	8.9	12.0	6.9	40.2	6.4	69.2	2.3	2.4	1.7	9	0
NCB																			
1994	21.6	25.1	3.5	6.4	47.9	15.2	8.9	37.5	44.7	0.0	0.8	33.5	8.8	28.5	0.1	0.0	0.1	1	0
1996	21.7	22.8	1.2	0.6	36.9	50.1	13.2	-75.0	-45.2	67.7	46.5	-9.2	5.4	41.3	0.1	0.0	0.1	1	0
1998	17.8	24.8	7.0	2.6	47.3	11.7	16.4	2.5	4.4	14.5	13.2	-26.8	13.0	66.0	0.1	0.2	0.2	2	0
Crane																			
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1996	17.7	25.9	8.2	2.3	76.9	20.9	1.9	7.8	14.6	3.1	0.1	49.5	20.4	34.4	4.9	3.5	4.3	2	0
1998	15.9	26.5	10.5	1.8	86.0	10.8	1.2	7.2	12.1	4.8	4.0	38.5	9.0	50.0	5.5	6.5	5.6	2	0
Cairo																			
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1996	17.8	18.9	1.0	2.3	60.0	27.2	14.5	13.1	77.8	0.0	0.0	100.4	33.5	26.9	0.1	0.1	0.3	1	0
1998	17.2	19.3	2.1	3.4	75.8	15.3	2.8	13.0	37.8	0.2	2.3	35.0	28.2	20.6	0.3	0.5	0.6	1	0

Source: Quarterly income statements and monthly balance sheets of commercial banks, found at Bank of Uganda

Table A2.2 Balance Sheets: Ugandan Commercial Banks (1994 -1998) 1/

	1994			1995			1996			1997			1998		
Bank Group	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
ASSETS															
Total assets (billion Shs)		588			706			806			966			1280	
o/w share of Groups (%)	37	57	6	37	53	10	36	43	21	37	38	25	39	34	2
Balances at BoU	9.1	9.2	13.7	9.1	9.5	8.7	3.7	6.1	9.0	7.4	7.0	6.2	5.1	12.6	6.
Due from banks in Uganda	1.5	0.7	6.9	2.4	0.6	6.7	1.4	2.5	7.0	8.2	8.2	7.5	5.6	7.6	8.
Due from banks abroad	29.8	11.8	18.5	25.4	11.8	12.1	21.7	8.0	15.9	22.0	8.7	20.0	26.5	12.3	17.
Government securities	6.6	1.8	2.8	7.0	3.8	6.7	9.0	4.8	7.6	10.2	10.8	3.0	13.2	9.2	4.
Advances and Discounts	36.8	45.5	27.2	38.2	44.6	34.3	44.1	52.2	31.7	39.7	38.9	40.0	37.5	31.9	40.
o/w Loans (%)	10.2	46.0	43.0	16.0	48.1	35.0	19.3	54.1	33.0	22.3	61.0	32.9	16.6	58.7	38.
Advances (%)	88.5	36.0	48.3	80.0	40.3	54.2	76.1	38.5	56.3	72.1	32.1	60.8	78.0	36.2	53.
Fixed Assets	7.8	14.4	13.3	7.0	13.1	13.6	6.4	13.1	11.3	5.7	11.0	9.4	6.5	8.8	9.
Other assets 2/	8.3	16.6	17.6	11.0	16.5	17.9	13.6	13.2	17.3	6.8	15.5	14.0	5.5	17.7	14.
LIABILITIES															
Deposits	54.9	58.8	55.2	52.1	57.8	63.5	51.4	65.6	59.1	48.8	53.0	50.1	49.0	58.1	53.
o/w Time and savings (%)	36.3	41.7	46.8	35.9	41.1	49.3	42.0	46.0	50.2	45.3	41.0	52.6	53.4	43.4	55.
Demand (%)	63.7	58.3	53.2	64.1	58.9	50.7	58.0	54.0	49.8	54.7	59.0	47.4	46.6	56.6	44.
Due to banks in Uganda	0.0	0.8	0.0	1.1	1.8	0.0	0.2	1.1	2.7	0.6	0.3	0.9	1.5	0.0	3.
Due to banks abroad	29.1	11.5	16.0	25.8	8.9	12.5	23.1	8.5	14.4	21.1	8.1	17.3	23.3	7.5	17.
Borrowing at BoU	0.3	2.7	0.6	0.7	2.6	0.6	0.3	0.0	0.0	0.0	4.0	1.3	0.0	2.7	3.
Provisions	3.1	13.8	4.7	5.2	12.5	5.1	4.8	25.5	7.7	6.3	13.3	5.5	3.6	10.8	5.
Capital and profit	4.2	-10.8	13.9	4.8	-4.7	8.2	5.7	-23.8	6.1	12.3	1.8	12.4	14.1	2.4	9.
Other liabilities 3/	8.4	23.2	9.7	10.4	21.2	10.1	14.5	23.1	9.9	11.0	19.6	12.5	8.3	18.4	7.

1/ All figures are end of June averages of percentages over total assets per each bank group.
2/ Other assets include cash, BoU schemes, items in transit and investments.
3/ Other liabilities include administered funds, bills payable in shillings and net due to own offices.
- O/w refers to "of which."
Source: Monthly balance sheets of commercial banks, found at Bank of Uganda

Table A2.3 Performance Indicators by Bank Group (1994-1998)

	1994	1995	1996	1997	1998
Interest Rate Spreads (%)					
All banks	21.3	19.1	18.1	18.2	16.3
Group I	22.9	19.0	17.7	16.5	13.8
Group II	21.0	20.1	18.1	18.2	16.8
Group III	20.5	18.6	18.5	19.3	17.6
Lending Rates (% weighted averages)					
All banks	25.6	22.0	22.3	23.2	22.7
Group I	26.9	21.5	21.6	21.5	20.3
Group II	25.2	22.7	21.5	22.3	22.1
Group III	24.9	22.0	23.1	24.7	24.6
Deposit Rates (% weighted averages)					
All banks	4.3	2.9	4.1	5.0	6.5
Group I	4.0	2.5	3.9	5.0	6.5
Group II	4.3	2.6	3.5	4.1	5.4
Group III	4.4	3.4	4.6	5.4	7.0
Time & Savings Deposits (% of total deposits)					
All banks	43.6	43.7	47.5	50.0	53.6
Group I	38.2	37.3	41.0	46.3	53.8
Group II	42.8	42.3	44.7	42.3	44.6
Group III	47.8	50.0	53.0	56.2	58.2
Earning Assets (% of total assets)					
All banks	65.4	65.7	68.4	73.1	73.0
Group I	75.1	75.0	76.5	80.6	80.9
Group II	60.1	62.9	68.2	69.8	67.8
Group III	62.4	59.8	63.5	70.0	70.6
Advances and Loans (% of total deposits)					
All banks	60.1	63.8	70.8	77.8	70.9
Group I	66.0	72.0	79.9	80.7	73.0
Group II	67.4	70.3	76.4	68.6	54.5
Group III	51.4	52.7	62.4	80.5	78.0

Note: All figures are end of June.
Source: Quarterly income statements of commercial banks, found at Bank of Uganda

Table A2.4 Operating Costs by Type of Expenditure, 1994 -1998
(% of total operating costs)

	1994	1995	1996	1997	1998
All banks					
Staff costs	44.9	48.6	45.0	42.3	42.9
Premises and fixed assets	10.0	8.2	10.8	10.4	11.6
Depreciation	5.8	5.5	6.8	8.1	9.9
Motor Vehicle	4.0	3.7	3.2	3.5	3.0
Other	35.3	34.0	34.2	35.7	32.6
Group I					
Staff costs	58.0	60.7	55.6	50.8	53.7
Premises and fixed assets	11.9	8.7	9.4	9.6	9.1
Depreciation	4.7	5.0	6.0	7.3	7.5
Motor Vehicle	1.2	2.4	2.2	1.4	1.3
Other	24.2	23.2	26.9	30.9	28.4
Group II					
Staff costs	49.3	45.9	45.5	42.5	42.0
Premises and fixed assets	9.1	9.7	12.9	13.1	10.8
Depreciation	6.1	7.3	6.4	10.6	10.1
Motor Vehicle	4.8	3.9	3.3	3.6	2.7
Other	30.7	33.2	31.9	30.2	34.4
Group III					
Staff costs	33.3	40.3	38.2	36.8	36.4
Premises and fixed assets	9.3	6.8	10.6	9.6	13.7
Depreciation	6.3	4.8	7.5	7.2	11.3
Motor Vehicle	5.2	4.6	3.7	4.8	4.3
Other	45.9	43.5	40.0	41.5	34.4

Note: All figures are end of June.
Source: Quarterly income statements of commercial banks, found at Bank of Uganda

CHAPTER 3

THE RELATIONSHIP BETWEEN MARKET STRUCTURE AND PROFITABILITY IN UGANDAN COMMERCIAL BANKING: *MARKET POWER VERSUS EFFICIENCY*

Abstract

In this chapter we analyse the relationship between market structure and profitability in Ugandan commercial banking by testing two hypotheses, both of which predict a positive structure-profitability correlation but have contrasting policy implications: the Market Power and the Efficient-Structure hypotheses. While the Market Power hypothesis relates high profitability to the ability of firms to exercise market power in pricing, the Efficient-Structure hypothesis links high profitability to efficiency of firms in producing and marketing products. Using two samples of panel-data covering the period 1993-1999, a measure of profitability (Return on Assets) is regressed on efficiency and market structure variables. The efficiency measures are derived from a Stochastic-Frontier Production Function model in which firm-effects vary exponentially with time. The full sample data supports neither of the two explanations for the structure-profitability relationship. However, some evidence is found to partially support the Efficient-Structure hypothesis using selected bank data. Given that Market Power does not seem to explain the structure-profitability relationship, no beneficial efficiency effects are predicted from an anti-merger or de-concentration public policy.

Key words: Profitability; Market Structure; Market Power; Efficiency

3.0 INTRODUCTION

In this chapter we analyse the relationship between market structure[49] and profitability in Ugandan commercial banking during the period 1993-1999. A number of studies of financial institutions and other firms report a positive statistical relationship between market structure variables and measures of profitability. Two competing hypotheses may explain this result. According to market power explanations, this finding reflects the ability of some firms in concentrated markets to exercise market power in pricing and hence earning extra rents. The alternative Efficient-Structure paradigm links high profitability to concentration through the ability of efficient firms to lower costs of production and gain higher market shares (Demstez, 1973).

This study is particularly relevant for the Ugandan economy given the high degree of concentration in its banking market and in view of the policy change which permitted selected banks to acquire the branches of closed banks, following the financial crisis in the financial system during the late 1990s.[50] It is important to determine which of the behavioural hypotheses describes the structure-performance relationship in the banking industry because the two different explanations have directly opposing implications for policy regarding acquisitions, mergers and entry. For instance, if the current trends in market structure and profitability reflect collusive or other forms of non-competitive behaviour of Ugandan banks, the policy that has permitted some banks which are perceived as being more efficient to acquire the branches of closed banks is likely to lead to a reduction in market competition, raise costs and may lead to welfare losses due to unfavourable interest rates being charged to bank customers.

[49] Market structure consists of two sets of quantities: (1) intrinsic structural variables that are more or less completely determined by the nature of the product and the available technologies for production and marketing and (2) Variables derived to reflect factors such as government policy, business strategies and relevant intrinsic variables. Derived structural variables usually include seller concentration, conditions of entry, buyer concentration and product differentiation (Schmalensee, 1989).

[50] See for instance The Republic of Uganda (2000).

Another frequent argument is that mergers enhance the performance of surviving banks through improvements in cost efficiency. If this study finds that the positive relationship between profits and market structure is due to efficiency and not to market power explanations, policies that encourage mergers should be implemented on efficiency grounds. On the other hand, if the positive relationship between profits and market structure is due to competitive imperfections, the policies encouraging mergers in the financial system will be welfare reducing given that high profitability results from motivations to set unfavourable interest rates for bank customers. This study presents the results from tests of the two hypotheses, in the context of Ugandan commercial banking, based on the following specific objectives:

- To examine the trends in market structure and their impact on bank competition.
- To examine the trends in efficiency of banks and their possible impact on the market structure.
- To empirically ascertain the relative strength of market power and efficiency in explaining the performance of banks.

We test for the two hypotheses using the Berger (1995) methodology that incorporates efficiency measures directly into the profit function, in order to distinguish between the effects of efficiency from the effects of market power on the structure-profitability relationship. However, unlike Berger (1995) who uses the distribution free method and a cost function model to derive the efficiency estimates, we use a stochastic frontier production function model in which the technical efficiency of banks is allowed to vary over time, and which distinguishes shifts in the efficiency frontier that are due to technical change, from changes in the average efficiency of banks.

In addition, we control for the effects of asset quality and risk on the level of bank efficiency by deducting non-performing loans from earning assets (which are defined as output of banks). In so doing, we avoid overstating the level of efficiency of banks. For instance, banks scrimping on credit evaluations or producing excessively risky loans might be labelled as efficient when compared to banks spending resources to ensure that their loans are of higher quality. To our knowledge, this is the first study to test the

structure-performance relationship using such a methodology and the first to test this relationship in the context of African banking.

The remainder of the chapter is organised as follows: In Section 3.1 we provide a brief overview of the institutional structure of banking in Uganda as a background to the empirical work. Section 3.2 provides theoretical arguments of the hypotheses to be tested and the empirical evidence. The methodology and data are discussed in section 3.3. Sections 3.4 and 3.5 present and discuss the descriptive and the empirical results, respectively. Section 3.6 provides the conclusions and recommendations from the study.

3.1 BACKGROUND

The Ugandan financial sector went through a period of deregulation and restructuring during the 1990s. Supervision and regulation of banks were also strengthened during the same period with the amendment of the Bank of Uganda Statute and the introduction of a new Financial Institutions' Statute in 1993. In addition, relaxation of entry restrictions attracted a number of new banks into the financial system (both foreign and domestic). This was not only meant to increase the level competition and hence efficiency of the financial system, but along with other reforms to contribute to financial deepening and development of equity and capital markets. The main structural features of the Ugandan financial industry are outlined in Table 3.1.

Table 3.1 Structure and Composition of the Financial Industry 1/

Year	1993	1994	1995	1996	1997	1998	1999
Number of Bank FIs	14	15	15	20	20	20	17
No. of branches of Banks 2/	229	146	144	152	147	142	111
o/w Uganda Commercial Bank (UCB)	169	84	84	85	76	66	66
Co-operative Bank (COOP)	23	23	23	23	24	24	-
Number of Non-Bank FIs 3/	31	31	36	35	35	38	-
Market Share of the largest 3 banks (%)							
Deposits	66	64	58	48	47	43	61
o/w UCB	45	44	39	31	30	26	26
Loans and advances	71	74	63	54	38	37	54
o/w UCB	53	56	39	34	16	13	11
Assets	64	65	62	51	48	45	61
o/w UCB	44	44	41	32	28	23	27
Total assets (billion Shs) 4/	473	588	706	806	966	1280	1457

1/ Teefe Bank is excluded from the analysis as it was under liquidation in 1994.
2/ The figure reported for the number of branches for 1993 is that at the end of December 1993.
3/ "Non-Bank Financial Institutions" include credit institutions, development banks, insurance companies and building societies.
4/ The total assets in 1999 exclude assets of Greenland and COOP banks.
Source: Various issues of Bank of Uganda Quarterly and Annual Reports

Following the relaxation of entry restrictions, the number of banks in the financial system increased from 10 in 1990/91 to 20 in 1997/98. The initial effect of entries of new banks into the financial system was an increase in competition, and a reduction in the degree of concentration in the banking sector from a three-bank asset ratio of 64 percent in 1993 to about 45 percent in 1998. However, due to differences in the age, ownership and performance of banks, the market was segmented during the review period. We have divided the 20 banks which existed in 1998 into three distinct groups: Group I consists of four foreign owned banks, and a half state owned bank: Barclays, Standard Chartered, Stanbic, Baroda and Tropical, respectively. This group has been operating for a longer time and had more time to acquire experience in banking, which should be reflected in high efficiency, relative to other banks.[51]

[51] Stanbic (formerly called Grindlays) started operations in the early 1900s, Standard Chartered in 1912, Barclays in 1927; Baroda began in 1953, while Tropical bank (formerly Libyan bank) started operations in the early 1970s.

Group II includes the largest bank UCB, which was during the review period state owned, and COOP,[52] Nile and Allied banks. The four banks experienced liquidity and solvency problems in the early 1990s, which resulted mainly from management deficiencies. They were, hence, restructured and re-capitalised during the financial sector reform process. It is worthwhile noting that the market share of assets of this group dropped from 54 percent in 1993 to about 34 percent in June 1998, which was mainly explained by stiff competition from other banks.

Group III includes about 10 banks, most of which were established in the 1990s, with both foreign and domestic ownership. Most of these banks not only had the advantage of tax-exemption, they had the opportunity to start fresh without bad loans in their portfolios, and with the possibility of adopting recent banking technologies at the time of their inception. Due to the increase in the number of banks in this group and aggressive competition for deposits with the larger banks, their market share of assets increased from 4 percent in 1993 to 27 percent at the end of June 1998.[53] Unlike Group I banks, however, this group has not acquired much experience in banking and is likely to face management deficiencies. Indeed, it is noted that three of Group III banks suffered acute financial distress in the financial year 1998/99 and were closed down between September 1998 and December 1999, along with COOP bank. Two other banks in this group voluntarily suspended operations due to liquidity problems.

Following the financial sector turbulence of the year 1998/99 (in which several banks suffered financial distress), the banking market became characterised by panics. This led to shifts of deposits by the public, to banks that were perceived as operating efficiently. However, it was mainly Group I banks that increased their market share, following the turbulence in the financial sector. For example, between 1997/98 and 1998/99 the market share of assets of Stanbic and Standard Chartered banks increased from 11 percent (each) to 15 percent and 19 percent, respectively. Their market share of advances and discounts increased from 14 percent and 11 percent to 20 percent and 22 percent, respectively. The three-bank asset concentration ratio also showed a dramatic

[52] UCB was privatised in the year 2001and COOP bank was closed in May 1999.
[53] The number of banks in Group III also rose from 4 in 1993 to 10 in 1998.

rise from 45 percent in June 1998 to 61 percent in June 1999. Recently, several banks including Stanbic and Standard Chartered, which were perceived as operating efficiently, were permitted by policy makers to acquire the branches of the closed COOP bank.[54] This led to a further increase in the level of concentration of the market.

Regarding performance, Group I banks have on average had better indicators than other banks. For instance, Standard Chartered bank had the highest average Return on Assets (RoA) at 2 percent during the review period (Appendix Table A3.2). Although Group II banks showed a marked improvement in profitability after the start of restructuring them in the financial year 1994/95, they continued making losses throughout the review period. With the exception of a few banks, Group III made losses during the review period and the losses worsened beginning in 1997.

This review of developments in the banking system suggests that growth of some banks and hence concentration is due to relative efficiency. However, observations and perceptions by themselves are not sufficient to establish a causal link between market structure and performance. In order to draw policy conclusions, it is necessary to empirically analyse the structure-performance relationship.

3.2 LITERATURE SURVEY

According to the literature on industrial organisation, there are two main explanations for the likely impact of market structure on the conduct and performance of firms: market power and efficiency. The market power explanation has two hypotheses: the Structure-Conduct-Performance (SCP) hypothesis and the Relative-Market-Power (RMP) hypothesis. The traditional Structure-Conduct-Performance (SCP) hypothesis which was pioneered by Bain (1951) and others is based on the proposition that the persistence of economic profits is indicative of allocative distortions, and is due to some features of market structure that foster collusion and retard competition among firms in the industry. Since concentration facilitates collusive or monopolistic practices, firms in concentrated markets will earn higher profits than firms operating in less concentrated

[54] See The Republic of Uganda (2000): pp.30.

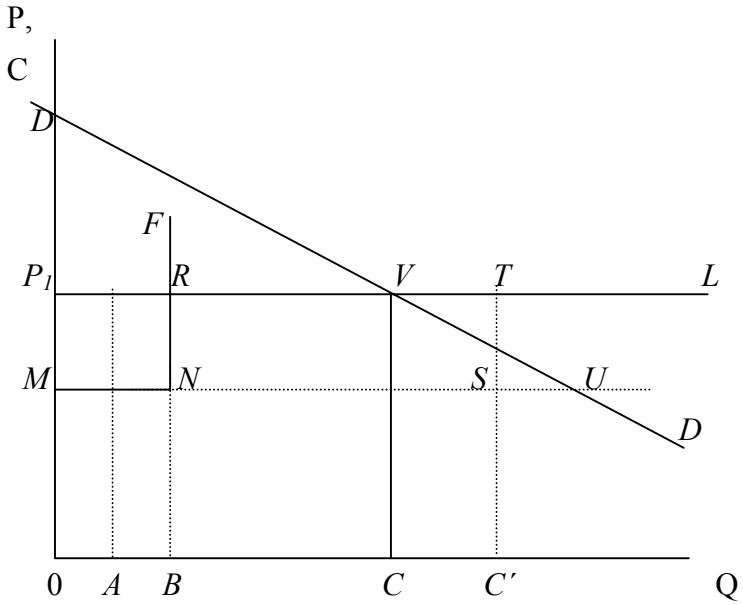
markets irrespective of their efficiency.[55] This hypothesis suggests that banks in concentrated markets would be able to extract monopolistic rents by their ability to offer low deposit rates and high loan rates. A related theory is the Relative-Market-Power (RMP) hypothesis, which states that only firms with large market shares and well-differentiated products are able to exercise market power in pricing these products and earning supernormal profits (Shepard, 1982). However, the RMP hypothesis need not apply in concentrated markets.

An implication of the two market power hypotheses is that an anti-merger or de-concentration public policy would be justified on the grounds that it might lead to more efficient resource allocation. However, this would not be correct if the deconcentration or anti-merger policy caused firms to adopt socially less efficient methods of colluding than would be adopted in the absence of such a policy.

In contrast, the Efficient-Structure (ES) hypothesis posited by Demsetz (1973), Peltzman (1977) and others asserts that efficient firms increase in size and market share because of their superiority in producing and marketing products. It is due to such expansion that the degree of concentration of a market increases, while at the same time the firms increase their profits. The efficiency advantage that leads to an increase in the degree of concentration may be reflected in optimal scales of production, in lower per unit costs at each scale of production or in higher quality products which satisfy demand at a lower cost. This argument, which can also be found in Demsetz (1973) and Peltzman (1977) is illustrated in Figure 3.1.

[55] Further illustration of the relationship between concentration and industry profitability is shown in Appendix Section A3.1.

Figure 3.1 The Efficient-Structure Hypothesis



Source: Peltzman (1977)

Assume perfect competition in the industry. Let the industry demand be represented by DD. Assume further that the long-run supply curve of a competitive industry is P_1L, while the long run *firm* supply curve is P_1RF. Suppose that an average firm produces output OA. The industry is in equilibrium with a price of OP_1, zero profits and a three firm concentration ratio of say 3 x (OA/OC). Assume now that one clever firm discovers a way to lower marginal costs to MNRF, lowers price trivially and grows from OA to OB. The firm can now earn positive profits equal to the resource cost saving P_1MNR, while the concentration has increased by (AB/OC). The increase in the profits of the firm is, in this case, due to new efficiencies that lower the firm's marginal costs, and not through concentration initiated collusive agreements, even if part of the resource cost saving (AB x NR) is realised through the increased concentration. Consumers can also share the gains in efficiency if enough firms adopt the cost-reducing technology.[56] For example, if (MS/MN) firms lower their marginal costs, industry supply becomes MSTL. The price would fall but the firms would still earn

[56] Under this hypothesis, some of the profits arising from the new efficiencies might be eroded by competitive imitation, but only after a long time, due to costs of acquiring information and difficulty of duplicating technology by other firms. The firm might have also have established a reputation of goodwill that is difficult to separate from the firm itself and which should be carried at higher value on its books.

positive profits and concentration would increase (provided that the demand is sufficiently inelastic to keep (CC`/OC) < (AB/OA).

The proponents of the ES hypothesis have, hence, argued that a de-concentration or an anti-merger public policy (while it may reduce some monopoly caused inefficiencies) faces the danger of producing more inefficiency in resource allocation by reducing some of the gains associated with concentration. Moreover, superior ability may be interpreted as a competitive basis for acquiring a measure of monopoly power. For instance, if a firm with superior entrepreneurship seeks better ways to satisfy buyers or to produce a product and it is successful, then the reward for its entrepreneurial efforts is likely to be some (short-term) monopoly power. This may be associated with increased industrial concentration. Destroying such power when it arises may very well remove the incentive for progress (Demsetz, 1973).

3.2.1 Empirical Evidence

The literature on the bank market structure-performance relationship began in the 1960s when the US Federal bank regulatory authorities began responding to new legal requirements that the regulatory authorities consider the effects of bank mergers on competition. The early studies were conducted in order to provide the regulatory authorities with an empirical basis for evaluating the influence of bank mergers on competition and on the cost structure of the banking industry. The studies applied the framework available from the field of industrial organisation: the market structure-performance framework. Regression analysis was used to estimate the relationship between measures of performance including profit rates, loan and deposit rates, and variables such as local market concentration, that were hypothesised to have influence on the performance of banks.

Estimates of the influence of market structure on the measures of bank performance are highly variable among these studies. However, as noted by Gilbert (1984), a majority of the early studies of the market structure-performance relationship in the banking industry report a significant influence of market concentration on the measures of performance, thus supporting the SCP hypothesis (for example Heggestad and Mingo,

1977; Shepherd, 1982; and Rhoades, 1985). On the other hand, other studies on the US banking industry found support for the ES hypothesis (for example Brozen, 1982; Smirlock et al, 1984; Smirlock, 1985; and Evanoff and Fortier, 1988).

This pattern of mixed findings from the bank market structure studies has mainly been attributed to weaknesses in the specifications of equations that are estimated. For instance, Gilbert (1984) has criticised the methodology of market structure studies for neglecting the possible effect of regulation on firm/bank performance and on the structure-performance relationship.[57] However, Heggestad (1984) has challenged this argument by saying that even if there may be interactive effects between regulation and other variables of interest, which could have a significant impact on the structure-performance relationship, regulation still permits market forces to work but may change the intensity of their effects. For example, interest rate ceilings and high entry barriers may foster market collusion with the result that even markets with low concentration may exhibit collusive behaviour. On the other hand, competition may be enhanced by regulatory oversight.

It can also be argued that the rates of return of banks are in general not regulated directly and that regulation is treated by firms as just one of the many operational constraints they face while attempting to maximise some objective function. Thus, according to Heggestad (1984), it is highly likely that the performance of banks will be affected by market structure. But it is also likely that changes in regulation may lead to different relationships between market structure and performance.

[57] Lloyd-Williams, Molyneux and Thornton (1994) cite regulation as a possible explanation for the marked contrast between their results which favour the traditional SCP hypothesis and those of studies of the US banking industry, that support the Efficiency-Structure hypothesis.

Another problem of the early empirical studies concerns the interpretation of the positive relationship between profitability and concentration (when it can be found), and whether it supports the SCP or the ES hypothesis. Several studies have proposed to resolve this problem by including both market share and concentration variables in the profit equation (see for instance, Evanoff and Fortier, 1988; and Smirlock, 1985). Finding a positive relationship between market share and profitability and no relationship between concentration and profitability has yielded support for the ES hypothesis. However, Shepherd (1986) has criticised these studies for implicitly assuming that efficiency is the sole source of market share. Even if the market share variable is included in the profit regressions, as a proxy for firm-specific efficiencies, it may also proxy the effects of monopoly power of larger firms.

Berger and Hannan (1989) test the two hypotheses by using price data instead of profit data as the dependent variable. Since the SCP hypothesis predicts that prices in concentrated markets will be less favourable to consumers due to non-competitive behaviour exhibited in such markets, Berger and Hannan test for the presence of a negative relationship between deposit rates and concentration. They find that banks in more concentrated markets pay lower deposit rates, which is consistent with the implications of the SCP hypothesis. Berger and Hannan (1989) further question exogeneity of the market share variable in a price equation. Their argument is that market share may be highly endogenous to prices, since the firms offering more favourable prices to consumers may attract customers and gain higher market shares. The market share variable is found to have a positive and significant relationship when included in their model. Berger and Hannan (1989) attribute this finding to differentials in the quality of products, or to higher deposit rates leading to higher market shares. Nevertheless, the inclusion of the market share variable in their equation does not change the finding of a significant negative relationship between concentration and deposit rates.

However, when Jackson (1989) uses selected sub-samples of the data which Berger and Hannan (1989) used, he finds that the negative price-concentration relationship is not consistent across different levels of observed market concentration. Jackson (1989) finds that the negative price-concentration relationship holds, only in the low concentration group. He finds a non-significant relationship in the middle concentration group and a significant positive price-concentration relationship in the high concentration group. Jackson, hence, predicts a non-linear relationship between concentration and price. He interprets it as not supportive of the structure-performance relationship, but rather the ES theory, by arguing that the different levels of concentration across markets may be indicative of the optimal structure of those markets. For instance, high levels of market concentration may signal the gaining of market share by the most efficient firms. On the other hand, low levels of market concentration may signal the entry of new firms.

Berger and Hannan (1992), in a reply find that although some of their findings are similar to the findings of Jackson (1989), the general lack of statistical significance for the coefficients on sub-sample results makes it difficult to draw conclusions about the effects of concentration within the concentration groups. However, Berger and Hannan (1992) contend that at least on average and for some ranges of concentration, the price-concentration relationship supports the SCP hypothesis, but varies across time periods.

Other refinements to the tests of the two hypotheses are done by Berger (1995), who uses direct measures of both X-efficiency and scale efficiency in the empirical analysis in order to explain whether the structure-profit relationship reflects superior management, or greater market power of firms with large market shares. Berger (1995) also conducts additional tests to check whether efficiency has the predicted efficient-structure effects on the market structure, by regressing market share and concentration variables against efficiency measures. Nevertheless, Berger's results do not provide conclusive evidence to support fully any of the two hypotheses. They provide only partial support for the X-efficiency version of the ES hypothesis. While X-efficiency is consistently associated with higher profits, the other necessary condition that X-efficiency be positively related to concentration or market share is much weaker. Some

support is also found for the RMP hypothesis, since market share is positively related to profitability in most cases after controlling for the effects of concentration and efficiency. However, no evidence is found to support the scale-efficiency version of the ES hypothesis and the traditional SCP relationship.

Studies on European banking also provide mixed results with the majority supporting the SCP hypothesis. Using data across eighteen European countries for the period 1986-1989, Molyneux and Thornton (1992) examine the determinants of bank performance and find a positive statistically significant correlation between concentration and Return on Assets (RoA), thus, supporting the traditional SCP paradigm. Molyneux and Teppet (1993) also find support for the SCP hypothesis for countries (Sweden, Norway, Finland, Austria and Switzerland). Using survey data for the period 1984-88, Ruthenburg (1994) finds that concentration increases profitability especially if barriers to entry are high. Lloyd-Williams et al (1994) also find no evidence to support the ES hypothesis for Spanish banks for the period 1986-88. Although, Goldberg and Rai (1996) incorporate measures of efficiency directly in the model, they find contrasting results to those of other studies done on the structure-performance relationship in European banking. While their data supports the X-efficiency version of the ES hypothesis for the banks located in low concentration countries, the results are not very robust and are sensitive to the measure of performance used.

Overall, the evidence on the structure-performance relationship in banking is mixed and there remain weaknesses in specifications of the equations used in analysing the relationship. Berger (1995) and Goldberg and Rai (1996) make a significant contribution to the methodology of testing the two hypotheses by including measures of efficiency directly into the profit function. However, one may wonder whether the derived efficiency measures by Berger (1995) and Goldberg and Rai (1996) may not be biased since these authors do not isolate shifts in the efficiency frontier due to technical change, from changes in the average efficiency of banks. Rapid technical progress which leads to the production of more output with the given level of inputs, could, for instance, result in lower average bank efficiency even if banks became increasingly productive over time. Lastly, the empirical literature on the bank structure-performance

relationship has, to date, been dominated by studies on the US and European economies and there is hardly any work done to analyse this relationship in the context of African banking.

3.3 ESTIMATION METHODS AND DATA

3.3.1 The Theoretical Model and Tests of the Two Hypotheses

The theoretical model that tests the Efficient-Structure (ES) and Market-Power (MP) hypotheses was developed by Berger (1995). However, although this model was developed for estimation using cross section data, we incorporate variation in the efficiency of banks over time, by including a time subscript *t*. The structural model underlying the ES hypothesis can be written as follows:

$$\pi_{it} = f_1(EFF_{it}, Z^1_{it}) + \varepsilon^1_{it} \quad (1)$$

$$MS_{it} = f_2(EFF_{it}, \mathbf{Z}^2_{it}) + \varepsilon^2_{it} \quad (2)$$

$$CONC = f_3(MS_{it} \text{ for all } i \text{ in the market and } t) \quad (3)^*$$

where π measures a bank's profitability per unit of output, EFF represents either X-efficiency (X-EFF) or scale efficiency (S-EFF), MS and CONC represent market share and concentration, respectively and the Z vectors represent control variables. The εs are random errors, *i* represents a bank and *t* is a time subscript. Equation 1 represents the ES hypothesis. Under this setting, higher profitability reflects either X-efficiency (X-EFF) or scale efficiency (S-EFF), depending on which of the two versions of the ES hypothesis is to be tested.

Equation 2 implies that under the ES hypothesis, more efficient banks gain dominant market shares. This could occur in a number of different ways: (1) If the products of banks within a local market are homogeneous, each market may be in a competitive equilibrium with a common price equal to every bank's marginal cost. More efficient firms are larger and have greater shares if they have lower marginal cost at every scale. (2) If the products of banks are differentiated by location under spatial competition, more efficient banks could set more favorable prices to consumers and attract customers from further distances and (3) More efficient banks could have larger market shares in

equilibrium, because of past out-of-equilibrium behaviour in which more efficient banks gained shares through price competition or through acquisition of less efficient banks (see Berger, 1995).

Equation (3) implies that on average banks with higher market shares have higher concentration (CONC). The concentration variable in this function applies to all banks and could be the Herfindahl index or the n-firm concentration ratio. Under the ES hypothesis, profit (π) is only spuriously related to market-structure because more efficient firms are more profitable and have higher market shares, while market share (MS) is related to concentration (CONC).

The two versions of the Market-Power (MP) hypothesis (SCP and RMP) can be represented by following structural model.

$$\pi_{it} = f_4(P_{it}, Z^4_{it}) + \varepsilon^4_{it} \quad (4)$$

$$P_{it} = f_5(STRUC_{it}, \mathbf{Z}^5_{it}) + \varepsilon^5_{it} \quad (5)$$

$$CONC = f_3(MS_{it} \text{ for all } i \text{ in the market and } t) \quad (3)^*$$

where P is a vector of output prices and STRUC is a measure of market structure (either concentration [CONC] or market share [MS]), depending on whether the SCP or RMP hypothesis is being tested. Equation 4 implies that higher profitability is due to banks' charging unfavorable prices to consumers. For instance, a bank may offer low deposit rates or charge high lending rates to its customers. However, this does not rule out efficiency as affecting profits under the MP hypotheses; the effects of efficiency are just viewed as less important than the exogenous effects of market power acting through prices.

In equation (5) prices are primarily determined by the market structure. Under the SCP relationship, CONC is the key exogenous variable represented by STRUC, implying that all firms in concentrated markets set prices that are relatively unfavorable to consumers. On the other hand, if the RMP hypothesis applies, MS is the key exogenous variable in (5), implying that firms with large market shares have well differentiated products because of advantages such as advertising and location. Firms are therefore

able to exercise market power in pricing these products. Again, this does rule out the possible effects of the EFF variable on P; these effects are just viewed as relatively unimportant. The CONC definition in equation 3* is the same as that in the ES model above. Under the SCP hypothesis, the positive profit-concentration relationship comes about because CONC affects P in (5) and P affects π in (4). Similarly under the RMP hypothesis, profit is positively related to market share because MS affects P in (5) and P affects π in (4). Under either of these hypotheses, profitability and the 'other' market structure variable are spuriously positively correlated because CONC and MS are positively correlated in (3)*.

The model which is used for estimation is a reduced form for π of all the four hypotheses (SCP, RMP, X-EFF and S-EFF), and includes direct measures of efficiency:

$$\pi_{it} = f_7(CONC, MS_{it}, X-EFF_{it}, S-EFF_{it}, Z^6_{it}) + \varepsilon^6_{it} \qquad (6)$$

Under the ES hypothesis, the coefficient of the appropriate EFF variable is positive and the coefficient of all the other key variables are either relatively small or zero.[58] Similarly, under the MP hypothesis the appropriate market structure variable (CONC or MS) has a positive coefficient and the remaining one is simply irrelevant.

The disturbance term ε is assumed to follow a one-way error component model:

$$\varepsilon_{it} = \mu_i + \upsilon_{it} \qquad (7)$$

where μ_i represents any unobservable bank specific effects that are not included in the regression, for example unobservable managerial skills of the managers of banks. The μ_is are fixed parameters and are estimated by introducing a dummy variable for each bank that is included in the regression. The remaining disturbance υ_{it}, varies by bank and by time and represents all other market imperfections and regulatory restrictions

[58] The CONC and MS variables may be included in the testing of the ES hypothesis only as irrelevant variables since their correlation with π reflects the effects of EFF and Z, which are controlled for in Equation 6. However, the disturbance terms in the ES model must be uncorrelated.

that affect the Return on Assets (RoA) of banks, randomly. The fixed effects (μ_i) and the coefficients on the observed explanatory variables (βs), are estimated using Ordinary Least Squares (OLS). A necessary assumption for the estimated coefficients to be unbiased is that all the explanatory variables in Equation 6 be independent of the υ_{it} for all *i* and *t*.

A second necessary condition for the ES hypothesis is that the market structure variables (MS and CONC) be positively related to efficiency. In order to test for this additional condition, the reduced forms for MS and CONC from the ES model are estimated using feasible Generalized Least Squares (GLS) and equations (8) and (9) below, respectively. The effects of the EFF variables on MS and CONC are expected to be positive.

$$MS_{it} = f_7(X-EFF_{it}, S-EFF_{it}, Z_{it}^7) + \varepsilon_{it}^7 \quad (8)$$

$$CONC = f_8(X-EFF_{it}, S-EFF_{it}, Z_{it}^8 + \varepsilon_{it}^8 \quad (9)$$

3.3.2 Estimation of Efficiency Measures

The two measures of efficiency which are derived are X-efficiency (X-EFF) and scale efficiency (S-EFF). X-efficiency provides a measure of the effectiveness of a bank in producing output with a given level of inputs. In order to derive a measure of X-efficiency, we use a stochastic frontier production function model. The model is originally based on the ideas of Aigner et al (1977) and Meeusen and van den Broeck (1977), and assumes that the output of a firm will vary from its frontier due to two economically distinguishable random disturbances (u_i and v_i). The disturbance u_i reflects the fact that the output of each firm must lie on or below its frontier. Any such deviation is the result of factors under the control of the firm, for example technical and economic inefficiency and the will and effort of the producer and his employees.

However, the frontier itself is stochastic due to unpredictable factors which are beyond the control of the firm, with a random disturbance v_i (less than, equal to or greater than 0) accounting for factors that are beyond the control of the firm such as luck, labor

market conflicts, machine performance, measurement errors in the dependent variable and left out explanatory variables. Although this model was initially developed to estimate technical inefficiency of firms over a single time period, it has been extended through research to account for several time periods and other factors. The specification which is used to obtain the X-efficiency estimates in this study, is a stochastic frontier time-varying model for unbalanced panel data. It was proposed by Battese and Coelli (1992).

Battese and Coelli (1992) have defined a stochastic frontier production function with a simple exponential specification of time varying firm effects of a sample of N firms observed over T time periods as follows:

$$y_{it} = f(x_{it};\beta)\exp(v_{it} - u_{it}) \qquad (10)$$

where y_{it} denotes the output for the *i*-th firm at the *t*-th time period, $f(x_{it};\beta)$ is a suitable production function with x_{it} denoting a (1xK) vector of production inputs and other firm specific factors. β is a (Kx1) vector of unknown scalar parameters to be estimated, the v_{it}s are the random errors, which represent those effects that cannot be controlled by the firm. The v_{it}s are assumed to be independent and identically distributed as N $(0,\sigma_v^2)$ random errors. The u_{it}s are the technical inefficiency effects in the model. They are assumed to be distributed independently of the v_{it}s, to have a truncated-N (μ, σ^2) distribution and to satisfy $u_i \geq 0$. The u_{it}s are subtracted because the observed output of a firm cannot be larger than the maximum output obtainable from the vector of inputs x_{it} due to the presence of technical inefficiency in production. The technical inefficiency effects are defined by:

$$u_{it} = \{\exp[-\eta(t-T)]\}u_i, \quad i = 1,2,\ldots,N; \ \ t = 1,2,\ldots,T \qquad (11)$$

where η is an unknown parameter to be estimated, while u_i can be considered as the technical inefficiency effect for the *i*-th firm in the last period of the panel.

Battese and Coelli (1992) have shown that an appropriate predictor for the technical efficiency of the *i*-th firm at the *t*-th time period involves the conditional expectation of exp (-u_{it}) given the vector of random variables $E_{it} = v_{it} - u_{it}$. That is, the technical efficiency predictor may be defined using:

$$TE_{it} = E\left[\exp(-u_{it})\middle|E_{it}\right], \tag{12}$$

Battese and Coelli (1992) also show that the conditional expectation of exp (-u_{it}) given the vector of random variables E_{it} is:

$$E\left[\exp(-U_{it}\middle|E_{it}\right] = \left\{\exp\left[-\eta_{it}\mu_i^* + \frac{1}{2}\eta_{it}^2\sigma_i^{*2}\right]\right\}.\left\{\frac{1-\Phi\left[\eta_{it}\sigma_i^* - (\mu_i^*/\sigma_i^*)\right]}{1-\Phi\left(-\mu_i^*/\sigma_i^*\right)}\right\} \tag{13}$$

where

$$\mu_i^* = \frac{\mu\sigma_V^2 - \eta_i' E_i \sigma^2}{\sigma_V^2 + \eta_i'\eta_i\sigma^2} \tag{14}$$

$$\sigma_i^{*2} = \frac{\sigma_V^2\sigma^2}{\sigma_V^2 + \eta_i'\eta_i\sigma^2} \tag{15}$$

and η_i denotes a (T_i x 1) vector of η_{it}s associated with the time periods observed for the *i*-th firm while $\Phi(.)$ denotes the distribution function of the standard normal random variable.[59]

To obtain an operational predictor for the technical efficiency of the *i*-th firm in the *t*-th time period, the unknown parameters in equation (13) are replaced with the maximum likelihood estimates. The estimates are calculated using the computer program (Frontier) written by Coelli, T. (1996). This program uses the reparameterisation

$$\sigma_s^2 \equiv \sigma_v^2 + \sigma^2 \text{ and } \gamma \equiv \sigma^2/\sigma_s^2,$$

where parameter γ has a value between zero and one.

[59] The expressions for the logarithm of the likelihood function for the stochastic frontier model (equation 10) with the time varying inefficiency effects (equation 11) and first partial derivatives of the log likelihood function are presented in Battese and Coelli (1992).

In order to estimate the production frontier, we utilise a translog functional form:

$$\ln y_{it} = \beta_0 + \sum_{j=1}^{6} \beta_j \ln x_{jit} + \frac{1}{2}\left\{\sum_{j=1}^{6}\sum_{k=1}^{6} \beta_{jk} \ln x_{jit} \ln x_{kit}\right\} + v_{it} - u_{it} \qquad (16)$$

where y_{it} denotes the output for the i-th firm at the t-th time period, x_{it} denotes a (1xK) vector of inputs and other appropriate variables associated with the translog function, v_{it} is a random error term and u_i is a firm specific non-negative random variable which represents the technical inefficiency in production. A requirement of this function is that production be homogeneous in inputs, hence, we impose the usual restrictions:[60]

$$\begin{aligned} &\sum_{j=1}^{6} \beta_j = 1 \\ &\beta_{jk} = \beta_{kj} \qquad (17) \\ &\sum_{j=1}^{6} \beta_{jk} = 0 \end{aligned}$$

Scale Efficiency

Scale efficiency indicates whether banks operating under the same production and management technology are operating at the most productive scale sizes. There is currently no agreed method for computing scale efficiency from parametric models that use the more flexible functional forms and most studies use a proxy.[61] We obtain an estimate of scale efficiency from scale elasticity, as has been done in many efficiency studies as follows:

[60] A translog functional form is preferred because it has a more flexible parametric form to represent technological tradeoffs than for instance the Cobb-Douglas function (see Varian, 1992).

[61] The method which Ray (1999) suggested, for obtaining scale efficiency from an empirically estimated translog production function holds only under the assumption that the matrix of cross coefficients B = βit is symmetric and negative definite.

Scale elasticity (ε_s) is estimated for each bank at its respective input levels, x1---- x6 as:

$$\varepsilon_s = \sum_{j=1}^{6} \frac{\partial \ln y}{\partial \ln x_j}$$
$$= \sum_{j=1}^{6} \left(\beta_j + \sum_{k=1}^{6} \beta_{jk} \ln x_k \right) \quad (18)$$

If $\varepsilon_s > 1$, a bank is operating at below optimal scale level and has the ability increase output at the observed input bundle. If $\varepsilon_s < 1$ then a bank is required to downsize in order to achieve the most productive input scale. Since $\varepsilon_s > 1$ and $\varepsilon_s < 1$ both imply inefficiencies, a proxy for scale efficiency (S-EFF) is obtained as follows: $S\text{-}EFF = \varepsilon_s$, if $\varepsilon_s < 1$ and $S\text{-}EFF = (2 - \varepsilon)$ if $\varepsilon_s > 1$.

Definition of Inputs and Outputs

Following the intermediation bank model as developed by Sealey and Lindley (1977), the role of production, cost and behavior of a firm is analysed within the context of a profit-maximizing producer. A financial firm is assumed to make its price and output decisions depending on the market value of its costs and revenues. Only those services that are associated with the acquisition of earning assets are regarded as economic outputs of the firm. The firm acquires earning assets from several stages of the production process involving intermediate outputs. In particular, labor, capital and material inputs are used by the financial firm to service deposits and other loanable funds in order to produce earning assets. Hence, the quantity of output (y_{it}) is measured as the shilling value of earning assets (i.e. total loans and advances – non-performing loans + government securities + other earning assets).[62] Non-performing loans are deducted from earning assets because they are negatively related to measured efficiency; bad management will be poor at controlling both costs and risks.[63] For example, a large proportion of non-performing loans may signal that a bank used fewer

[62] Other earning assets include Bank of Uganda schemes, the amounts that are due from other banks and other investments.

[63] In the case where banks accumulate problem loans due to exogenous factors such as recession, measured production efficiency may be artificially low because of lower levels of earning assets combined with higher expenses associated with dealing with the loans, such as extra monitoring and negotiating workout arrangements.

resources than usual in the initial credit evaluation and monitoring of its loans. Inputs are defined as loanable funds plus implicit resource costs involved in producing services to depositors, plus explicit interest payments, if any, to the depositors. Hence,

x1 = total deposits

x2 = other liabilities including financial capital. Other liabilities are included since they provide an alternative to deposits as a source of funding the earning assets of a bank.[64]

x3 = interest expenses

x4 = labor costs

x5 = other expenses including those on physical capital and depreciation

x6 = time trend which accounts for the fact that output is not only influenced by inputs but also by technical progress.

3.3.3 The Data

The data used is a quarterly unbalanced panel on Ugandan commercial banks and covers the period 1993-1999. The review period is selected to start in 1993 because most of the financial sector reforms were not implemented until then. The data is an unbalanced panel in the sense that over the review period there was an entry of new banks into the financial system, while some banks exit the market. The total number of banks increased from 14 in 1993 to 20 by September 1998, but dropped to 16 in December 1999. Of the 20 banks on which data was collected, 17 were included in the analysis. Together they accounted for about 96 percent of the total assets of the banking system.

Estimates of bank variables were obtained from the quarterly income statements and monthly commercial bank balance sheets, which were found at Bank of Uganda. The profitability indicator of banks is the pre-tax Return on Assets (RoA). It is defined as net income before tax (including provisions), expressed as a ratio of total assets.

[64] For example, in addition to providing a cushion against losses, financial capital can be used to fund loans as a substitute for deposits or other borrowed funds (see Mester, 1996; Berger and Humphrey, 1997).

Two other bank performance indicators were included as control variables in the profit equation: The ratio of non-performing loans to total loans (NPA) and the ratio of core capital to net assets (CAS). Other bank variables include deposits and earning assets, which were used to obtain the efficiency measures. It was assumed that the data was reliable, mainly because the data reporting of the financial system was improved during the review period, by the revision of the format of commercial banks' report forms and the strengthening of bank supervision. However, the method used in computing bank performance indicators by BoU changed over time. To obtain consistency in the indicators, they were all recomputed using the same method.

The remainder of the data is that on money supply (M2) and Gross Domestic Product (GDP). It was obtained from quarterly and annual reports published by Bank of Uganda. Data on the GDP series is published semi-annually. It was interpolated to obtain a quarterly series. The rate of growth of GDP between quarters was assumed constant.

3.4 DESCRIPTIVE ANALYSIS

In this section we briefly explain the trends in the variables used in the empirical analysis. Table 3.2 shows the averages of all variables used in the analysis for all the banks in the sample. The average indicators per bank are presented in Appendix Table A3.2.

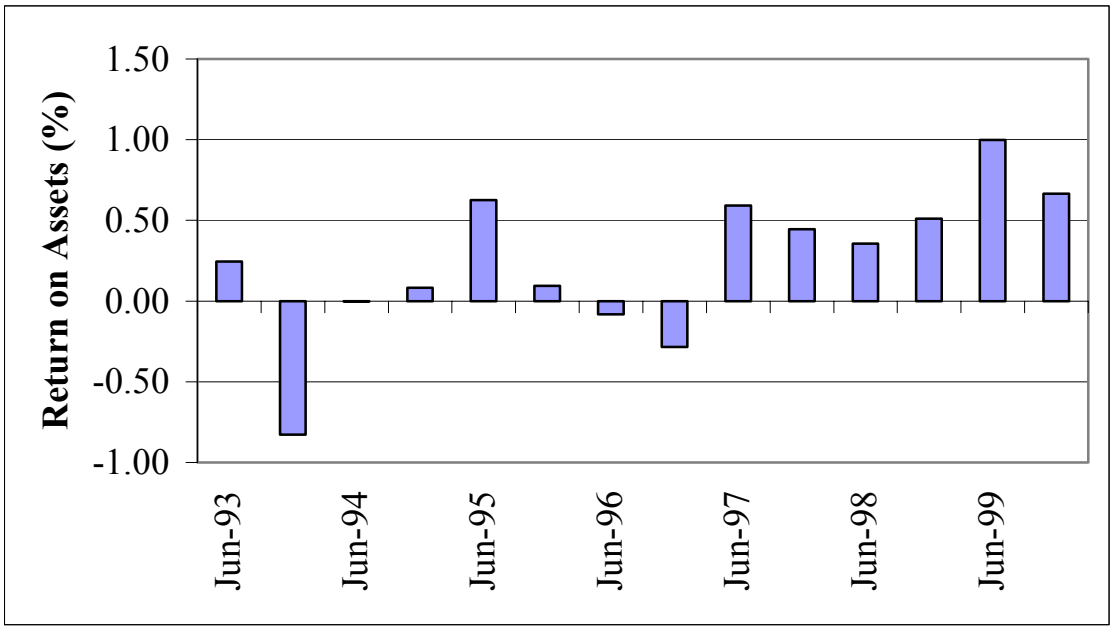
Table 3.2 Descriptive Statistics

Variable	Definition	Mean	Std.Dev.	Minimum	Maximum
RoA	Pretax Return on Assets	0.003	0.020	-0.128	0.052
X-EFF	X-efficiency	0.588	0.185	0.161	0.988
S-ELAS	Scale elasticity	1.142	0.087	0.846	1.409
S-EFF	Scale efficiency = S-ELAS if S-ELAS is < 1; = (2 – S-ELAS) if S-ELAS is > 1	0.853	0.079	0.591	1.000
MCA	Three-bank asset concentration ratio	0.551	0.085	0.437	0.734
MS	Bank's share of total assets of the market	0.062	0.080	0.001	0.445
HERF	Herfindahl index of concentration of the market	0.159	0.048	0.101	0.241
NPA	Ratio of non-performing loans to total loans	0.251	0.235	0.000	0.878
CAS	Ratio of core capital to net assets	0.008	0.196	-1.134	0.451
M2/GDP	Ratio of money supply (M2) to GDP	0.108	0.011	0.083	0.125

3.4.1 Return on Assets (RoA)

The average Return on Assets (inclusive of provisions) for all banks in the sample was about 0.3 percent (Table 3.2) and it was negative during some quarters (Figure 3.2). The low profitability is attributed to high intermediation costs of the banking system during the review period, due to factors such as a high level of non-performing loans, holding of excess reserves by banks at Bank of Uganda and financial inefficiency. It has, however, been observed that the performance of banks varied by bank group (Groups II and III made more losses than Group I [see Chapter 2]).

Figure 3.2 Mean Return on Assets (1993-99)



Note: Data used is based on all banks in the sample.

3.4.2 Technical Progress, X-efficiency and Scale Efficiency

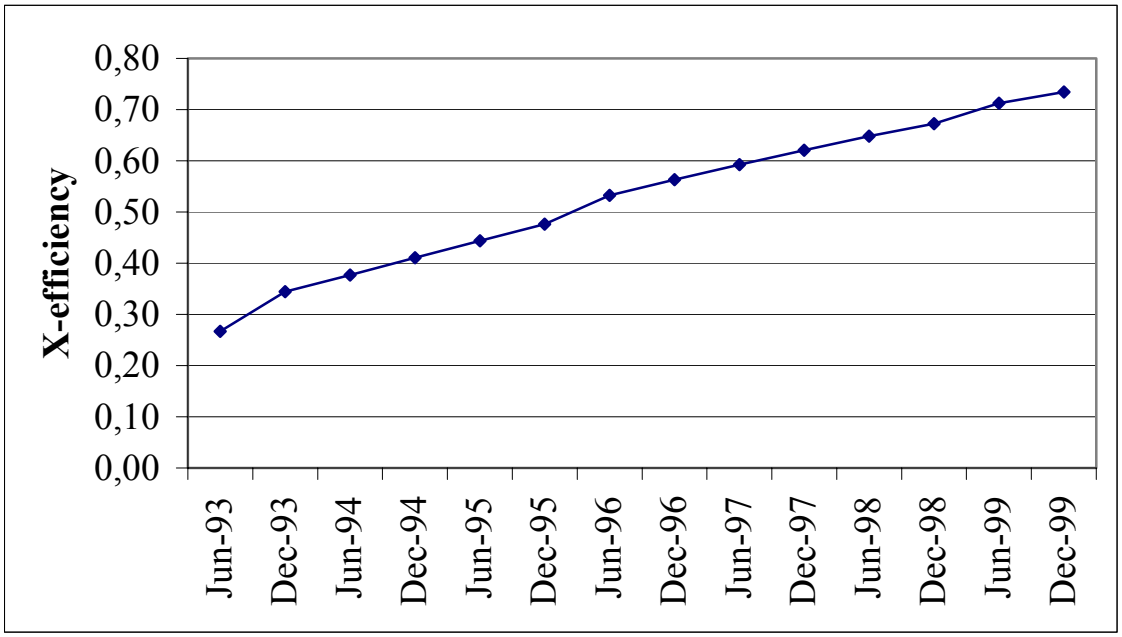
During the review period, the average X-efficiency of banks was 59 percent (Table 3.2).[65] Figure 3.3, further, indicates that the average X-efficiency of the banking system improved throughout the period. This is mainly attributed to the financial sector reforms that included changes in the management of some banks and improvement in bank supervision. On average group III banks had higher efficiency scores, perhaps because they had a lower level of non-performing loans than other banks. A negative coefficient on the time trend in the efficiency model, however, indicates that there was a deterioration of computer or communication technology in the banking system during the review period (Appendix Table A3.4). This should have led to banks producing less output per given level of inputs.

Scale elasticity averaged 1.142, implying that on average banks were operating below optimal scales of production and have the ability to increase output at the observed input

[65] Period averages of the variables used in the translog stochastic frontier production function, by bank, are shown in appendix Table A3.3. Maximum-likelihood estimates for parameters of the translog stochastic frontier production function are shown in Appendix Table A3.4.

mixes. Scale economies could not have increased substantially during the review period given the deterioration in banking technology.

Figure 3.3 Mean X-Efficiency of Production (1993-1999)



3.4.3 Market Concentration

Two measures of concentration were computed: the three bank asset concentration index[66] and the Herfindahl index[67] (Figure 3.4 and Figure 3.5). The two measures showed similar trends. As measured by the three-bank asset concentration index, market concentration declined from 64 percent in 1993 to 45 percent in 1998, but had risen to 61 percent by end of 1999. The fall in concentration observed prior to the financial year 1997//98 could be explained by the entry of new banks in the market and a subsequent increase in competition. The rise in concentration beginning 1998 is explained by a faster increase in the market share of assets of two banks (Stanbic and Standard Chartered), especially following the financial market crisis of the period 1998-1999, which led to the closure of several banks.

[66] The three-bank asset concentration ratio is defined as the sum of the three highest asset shares in the banking industry.
[67] The Herfindahl concentration index is defined as the sum of the squares of market shares of all the banks.

Figure 3.4 Three-Bank Asset Concentration (1993-1999)

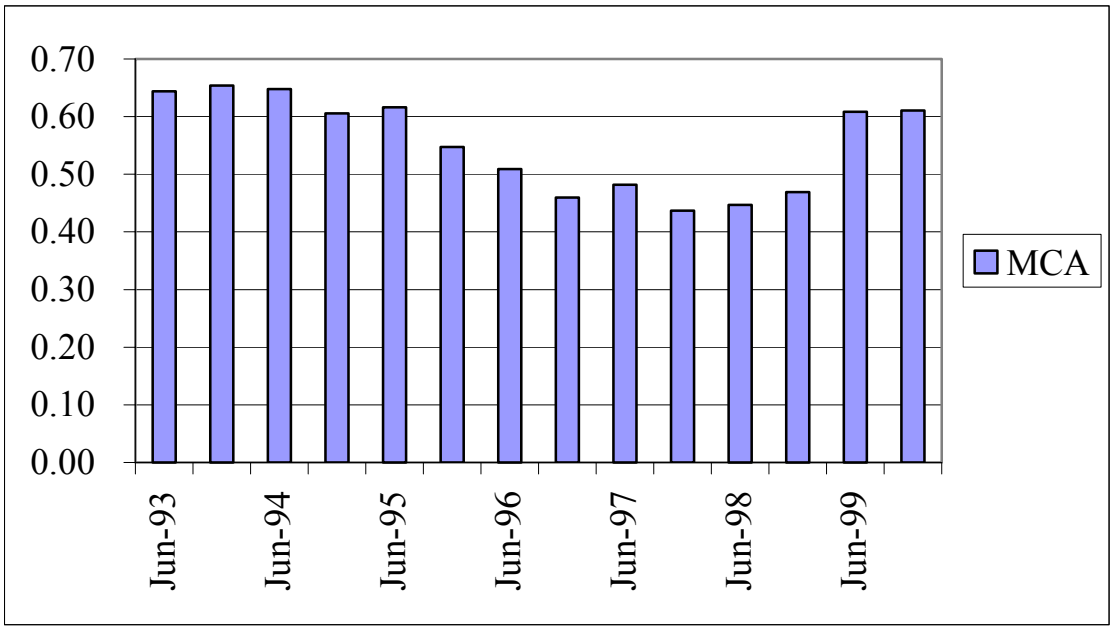
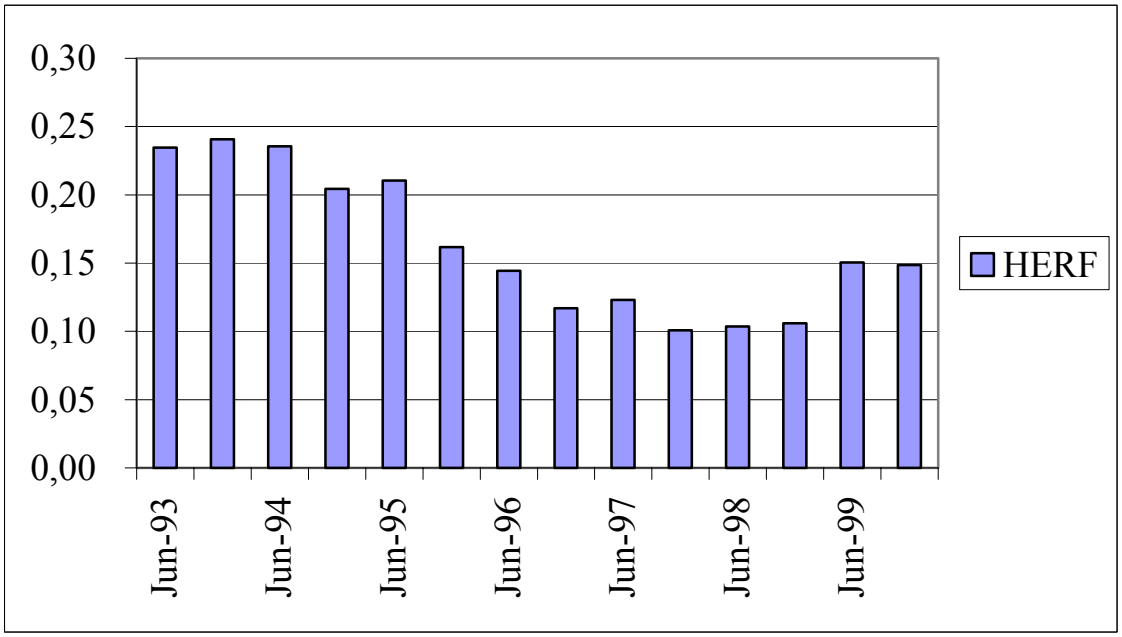


Figure3.5 The Herfindhal Index of Market Concentration (1993-1999)



Finally, three control variables were included in the profit equation. The ratio of non-performing loans to total loans (NPA) was included to control for differences in costs due default risk. The costs include foregone principal and interest payments and expenses on monitoring and administering the portion of a bank's existing loan portfolio that is currently performing. The average level of non-performing loans was 25 percent, while the maximum level was 88 percent - indicating a high degree of default risk faced by the banking system. A high level of defaults is expected to have a negative effect on the profitability of banks.

The ratio of core capital to net assets (CAS) was included, first, to control for differences in costs due insolvency risk.[68] Insolvency risk affects the costs and profits of a bank via the interest rates the bank has to pay for uninsured debt and through the intensity of risk management activities the bank undertakes. Second, the capital level of a bank directly affects costs since it may provide an alternative source of funding earning assets. Because raising equity typically involves higher costs than raising deposit capital, differences in profits of banks may to some extent reflect differences in the sources of funding.

The ratio of money supply (M2) to total GDP (MGDP) was included as a measure of the overall size of the banking system. This affects numerous factors related to the supply and demand for loans and deposits. The hypothesised coefficient is negative since higher levels of financial development result into more competitive interest and profit margins.

3.5 ECONOMETRIC ANALYSIS

Several regressions were done using data from the full sample of banks and from selected banks. Although our discussion of findings will relate mainly to the reduced form Equation 6 which includes direct measures of efficiency into the profit function, we first discuss the results obtained by regressing the profit variable (RoA) on the

[68] Insolvency risk is the risk that a bank may not have enough capital to absorb portfolio losses, due to risks such as default and liquidity.

concentration, market share and control variables, in order to compare our findings with those of earlier studies. The results obtained by using either the Herfindhal (HERF) or the three-bank asset (MCA) concentration index were similar, so we reported only those obtained by using the MCA index in the estimation.

Column (*i*) of Table 3.3 indicates the results obtained by regressing RoA on MCA, MS and the control variables. The LM test for the significance of the bank dummy variables supports the fixed effects model relative to a pooled regression. Contrary to the findings of earlier studies, which supported either the SCP or the ES hypotheses, the data does not support either of the two hypotheses, as the coefficients on the MS and MCA variables are both not significantly different from zero.

Table 3.3 Regression results of Return on Assets (ROA) on Efficiency, Concentration (MCA), Market Share (MS) and Control Variables

	A Full sample Data Dependent Variable = RoA		**B** Selected bank Data Dependent Variable = RoA	
Variable	Coefficient	Coefficient	Coefficient	Coefficient
	(*i*)	(*ii*)	(*iii*)	(*iv*)
X-EFF		-0.013		0.038**
		(0.019)		(0.019)
S-EFF		-0.033		0.022
		(0.029)		(0.022)
MCA	0.006	0.002	-0.012	-0.011
	(0.011)	(0.011)	(0.009)	(0.012)
MS	-0.015	-0.008	0.007	-0.019
	(0.027)	(0.027)	(0.031)	(0.032)
NPA	-0.012**	-0.012**	-0.020*	-0.018*
	(0.006)	(0.006)	(0.007)	(0.007)
CAS	0.022*	0.024*	0.026	0.017
	(0.007)	(0.008)	(0.024)	(0.025)
MGDP	0.294*	0.426***	0.081	-0.266
	(0.091)	(0.225)	(0.106)	(0.233)
FE LR (χ^2)	194.173*	107.473*	27.587*	17.110*
Adj-R^2	0.480	0.482	0.257	0.273
No. of Obs.	424	424	185	185

1. White/Hetro. corrected covariance matrix used in the estimations using full-sample data.
2. Standard errors are given in parentheses below the coefficient estimates.
3. (*), (**), (***) implies that the coefficient is significantly different from zero at 1 percent, 5 percent and 10 percent level of significance, respectively.

Column (*ii*) of Table 3.3 shows the results obtained by including the efficiency variables (X-EFF and S-EFF) in the regression, hence, incorporating all the four hypotheses in the profit equation. Each coefficient gives the marginal effect of one hypothesis on profitability. The coefficient on the MCA variable is positive but not significantly different from zero after controlling for other factors affecting profitability. This finding does not support the SCP hypothesis.

The coefficient on the MS variable is negative and not significantly different from zero after controlling for efficiency. This could imply that relative market power does not explain part of the structure-profit relationship. That is, market share does not appear to represent market power of larger banks in the market, gained through techniques such as advertising, local networks or business connections.

The coefficient on the S-EFF variable is negative and not significantly different from zero, which implies that the scale-efficiency version of the ES hypothesis is not supported by the full sample data. This is not surprising since with the exception of UCB, all banks were operating below optimal scales for the observed input mixes. The coefficient on the X-EFF variable is also negative and not significantly different from zero, thus, the full sample data does not support the X-efficiency version of the ES hypothesis either.

Finding no significant efficiency-profitability relationship may be explained by several reasons: (1) It is possible that the banks did not have systematic differences in costs or that these differences were offset by or overwhelmed by variations in revenue. (2) It appears that intermediation costs of the banking system were still high despite improvements in management efficiency. This is clearly indicated by the negative and significant effect of non-performing loans (NPA) on the profits of banks in both sets of equations, and a low average RoA of the whole banking system and (3) The output expansion by the more efficient banks might have imposed losses on other banks; in which case the efficiency gains by some banks need not lead to higher profits by the whole banking industry.

To illustrate this point further, during the review period, all the banks reduced their lending rates. Group I to which Stanbic and Standard Chartered banks belong, however, made higher reductions in the rates. Stanbic and Standard Chartered banks also increased their market share of assets from 12 percent and 10 percent in 1993 to 15 percent and 19 percent in 1999, respectively. We assume here that, the higher share of assets was achieved through lowering lending rates. Group I banks also recorded higher reductions in operating costs than other banks. This would imply that while Stanbic and Standard Chartered banks obtained extra profits from both cost reductions and higher market shares, any of the other banks which lost part of its share of loans, for instance, but did not reduce its operating costs in proportion to the fall in its lending rates, registered a fall in its RoA. The total assets of UCB, for example, fell from 44 percent in 1993 to 27 percent in 1999. UCB also reduced its lending rates in line with the reductions made by other banks. Assuming that unit costs of UCB were not reduced proportionately to the reduction in its lending rates, UCB would incur losses from the fall in its market share. On average UCB made losses with a RoA of −0.2 percent (Appendix Table A3.2). Since there were other banks, which faced similar consequences to those of UCB, the RoA of the whole banking system need not increase, especially given that the efficient growing banks like Stanbic and Standard Chartered were initially relatively small compared to UCB. They therefore had few inputs on which to earn the efficiency rents that might outweigh every other bank's loss. Finally, it is important to note that about 46 percent of the variations in bank output were explained by factors beyond the control of the banks (Appendix Table A3.4).

In the next step, the above regressions were repeated using data from selected banks. The very small banks (i.e. having less than 1 percent of the market assets) were deleted irrespective of their level of efficiency. This is justified on the grounds that even if such banks might be efficient, they have too few resources/inputs on which they can earn the efficiency rents. The very small Ugandan banks are also young and are likely to have high start up costs. Banks with low efficiency scores and which were losing their share of the market were also deleted irrespective of their size. This would be justified since validity of the ES relationship requires that efficiency be accompanied by growth in size. Columns (*iii*) and (*iv*) of Table 3.3 indicate the results obtained by regressing RoA

on MS, MCA and control variables, without controlling and controlling for efficiency, respectively, using the data from selected banks.

As column (*iii*) indicates, the MS and MCA variables do not have a significant relationship with RoA. This finding is similar to that obtained using the data from the full sample of banks. Turning to the main results in column (*iv*), the X-EFF variable and RoA have a positive and significant relationship, which supports the X-efficiency version of the ES hypothesis. The coefficient on the S-EFF variable is positive but not significantly different from zero. This provides no support for the scale-efficiency version of the ES hypothesis. Further, the results do not support the notion that high profits are explained by market power since the coefficients on the MCA and MS variables are negative and not significantly different from zero.

Regarding the use of control variables in the profit equation, the coefficient on the NPA variable is negative and significant in both equations - indicating that default risk was a key factor in lowering overall profitability of banks. The coefficient on the CAS variable is positive in the two sample results (columns *ii* and *iv*), and is significant in the results obtained using the full-sample data. A positive rather than negative coefficient indicates that well capitalised banks were more profitable than banks with capital shortages. Since well-capitalised banks face lower expected bankruptcy costs for themselves and for their customers, their costs of funding are reduced. On the other hand, banks with capital shortages will incur extra costs in the process of adjusting their capital levels to the legal requirement. A capital shortage may also cause costs by doing damage to the reputation of a bank and thus worsening the terms at which it can get funds from the public.

The coefficient on the MGDP variable is positive and significant in the full sample data results, but negative and not significant in the results obtained using data from selected banks. The hypothesised coefficient is negative since higher levels of financial development result into more competitive interest and profit margins. But, it could be the case that because financial reform creates increased banking activity, small banks come into the market to take advantage of this activity. They remain in the market only

when it is profitable to do so. This could explain the positive coefficient on the MGDP variable, in the results obtained using the data from the full sample of banks.

In the next step, we conduct two additional tests to check whether efficiency has the predicted efficient-structure effects on market structure, by regressing market share and concentration variables against efficiency measures and control variables. The results of the regressions are shown in Table 3.4. The coefficient on the X-EFF variable in the MS equation is negative and significant in the results from both samples of data, thus no additional support is provided for the X-efficiency version of the ES hypothesis (columns *i* and *iii*). The relationship between S-EFF and MS is positive and significant in the results from both samples of data, which is not surprising given that most banks have the ability to increase output at the observed input scales.

Lastly, in the MCA equations the two efficiency variables (X-EFF and S-EFF) have a negative relationship with market concentration (columns *ii* and *iv*). The last condition necessary to support the two versions of the ES hypothesis is, hence, not met. However, this is not surprising given that during most of the review period, concentration was falling, while the average efficiency of the banking system was rising. In particular, the three-bank asset concentration ratio was declining prior to 1998, since two of the currently largest three banks (Stanbic and Standard Chartered) were still small relative to UCB, although the average efficiency of the banking system was rising. An implication of this trend is that unless Stanbic and Standard Chartered banks get to be sufficiently large, the relationship between efficiency and concentration is unlikely to be positive and significant.

Table 3.4 Regression results of MS/MCA on X-EFF, S-EFF and Control Variables

	Full sample data Dependent Variable		Selected bank data Dependent Variable	
Variable	MS Coefficient	MCA Coefficient	MS Coefficient	MCA Coefficient
	(*i*)	(*ii*)	(*iii*)	(*iv*)
X-EFF*	-0.099*	-0.090**	-0.056*	-0.115
	(0.008)	(0.047)	(0.022)	(0.083)
S-EFF*	0.041*	-0.137*	0.092*	-0.151*
	(0.010)	(0.034)	(0.020)	(0.053)
NPA*	0.001	-0.010	0.006	0.020
	(0.003)	(0.013)	(0.014)	(0.038)
CAS*	0.000	0.003	-0.106*	0.004
	(0.002)	(0.011)	(0.018)	(0.061)
MGDP*	0.400*	-1.844*	0.332***	-2.025*
	(0.085)	(0.345)	(0.197)	(0.588)
Constant*	0.033*	0.926*	-0-013	0.964*
	(0.012)	(0.043)	(0.020)	(0.063)
Test Ho: $\sigma^2_g =$	σ^2 for all *g*			
Wald (χ^2)	221.16*	74.83*	102.290*	49.330*
No. of Obs.	424	424	185	185

1. Estimates are based on Generalised Least Squares (GLS) that allows for group heteroskedasticity and errors that follow and AR (1) process.
2. *G* refers to Group.
3. Standard errors are given in parentheses below the coefficient estimates.
4. (*), (**), (***) implies that the coefficient is significantly different from zero at 1 percent, 5 percent and 10 percent level of significance, respectively.

We now turn to the economic significance of the findings in explaining bank profitability, using the results shown by the data from selected banks (Table 3.3, Column *iv*). The significance of the relationship between Return on Assets and X-efficiency implies that higher profitability of some banks may be explained by their superiority performance in producing and marketing banking services. A coefficient of 0.04 on the X-EFF variable predicts a 4 percent increase in the Return on Assets of banks from a one percent improvement in management efficiency, ceteris paribus. The positive but insignificant relationship between S-EFF and Return on Assets could, however, imply that Ugandan banks were still too small to benefit from economies of scale during the review period. Lastly, it appears that market power did not have a significant influence on the profitability of banks during the review period.

3.6 SUMMARY AND CONCLUSIONS

In this chapter we analyse the relationship between market structure and profitability in Ugandan commercial banking by testing two hypotheses: the Market Power hypothesis and the Efficient-Structure hypothesis. Using two samples of panel data covering the period 1993-99, a profitability measure (RoA) is regressed on efficiency and market structure variables. The efficiency measures are derived using a stochastic-frontier production function model in which firm efficiency is allowed to vary over time. The data from the full sample of banks supports neither of the two versions of the Market Power or Efficient-Structure hypotheses. The coefficients on the market structure variables (MCA and MS) are negative and insignificant, contrary to what would be expected if banks obtained extra profits through market power. The relationship between scale efficiency and Return on Assets is insignificant, which suggests that differences in profitability of Ugandan commercial banks are not explained by economies of scale. X-efficiency and profitability are also found to have a negative and insignificant relationship. However this is not interpreted as implying that efficiency has no effect on profitability. Rather, it is possible that the banks did not have systematic differences in costs, or that these differences were offset by or overwhelmed by variations in revenue. A further possibility is that the efficiency gains by some banks led to losses by other banks such that the overall profitability of the banking system did not rise. Moreover, intermediation costs of the banking system remained high during the review period.

Nevertheless, the results shown by the data from selected banks indicate that the higher profitability of growing banks may partly be explained by their superior performance. This follows from finding a positive and significant relationship between Return on Assets and X-efficiency and between scale-efficiency and market share. However, X-efficiency is not found to have the predicted positive effects on market structure, hence, only partial support is provided for the Efficient-Structure hypothesis.

The Market Power hypothesis is not supported at all by the data from the selected banks, since both the market share and concentration variables are not positively related to the Return on Assets of banks. No beneficial efficiency effects are, hence, predicted from a de-concentration or an anti-merger public policy. Indeed, such a policy might as well introduce inefficiencies by placing penalties on the innovative success of some banks and/or shifting of output to smaller higher-cost banks that it may bring about.

However, finding no support for the Market Power hypothesis should not necessarily imply that the prices of some banks were not subject to collusion. For example, as observed in Chapter 2, market power was a key factor in explaining the high interest rate spreads of some banks during the review period. But, it may be the case that high spreads did not affect profits enough to yield a significant structure-profitability relationship. To the extent that any such pricing relationships lead to net welfare losses, they should be of concern to policy makers.

A major limitation to the analysis is that during most of the review period, concentration of the market was declining, mainly because the growing banks were small initially, as compared to UCB that had a low X-efficiency score. This trend would seem to be inconsistent with the assertion that market concentration is a signal of superior efficiency of leading firms. And indeed, the relationship between efficiency and market concentration was found to be negative. It would appear that in order for the data to fully support the Efficient-Structure hypothesis, the growing efficient banks would have to get sufficiently large to increase market concentration and to have enough resources from which to earn efficiency gains. Further research is called for to provide additional evidence regarding the market structure-profitability relationship, particularly on the interaction between efficiency and concentration.

APPENDICES

A3.1 The Link between Concentration and Industry Profitability

Concentration indices reflect a useful economic variable for measurement or policy evaluation. One possibility is that they are related to the profitability of the industry. As Bain (1951 and 1956) hypothesised that concentration facilitates collusion between firms and increases industry wide profits. The link between concentration and profitability can be illustrated using the static Cournot model as follows:

Assume that firms have asymmetric market shares, for example, because of cost differences. It can be shown that industry profitability is related to a simple index of concentration (see for instance Tirole, 1997). Suppose for example, that firms have constant marginal costs $C_i\ (q_i) = c_i q_i$ and that they compete in quantities.[69] Industry-wide profits are:

$$\Pi = \sum_{i=1}^{n} \Pi^i = \sum_{i=1}^{n} (p - c_i) q_i = \sum_{i=1}^{n} \frac{p \alpha_i q_i}{\varepsilon} = \frac{pQ}{\varepsilon} \left(\sum_{i=1}^{n} \alpha_i^2 \right)$$

where use is made of the expression for the Lerner Index or price cost margin for firm *i*:

$L_i = \alpha_i / \varepsilon$ and

$L_i \equiv \frac{P - C_i'}{P}$, $\alpha_i \equiv \frac{q_i}{Q}$ is the firm *i*'s market share, $Q \equiv (q_i + q_j)$, $i = 1 \ldots n$, $\sum_{i=1}^{n} \alpha_i = 1$ and $\varepsilon \equiv -\frac{P'}{P} Q$ is the elasticity of demand. Suppose further that consumers spend a fixed amount of income on the good i.e. the elasticity of their demand ε is fixed and equal to 1: Q = *k*/p, where *k* is a positive constant. It follows that

$$\Pi = k \left(\sum_{i=1}^{n} \alpha_i^2 \right) = kH$$

The Herfindahl Index is hence shown to be proportional to industry profitability.

[69] See for instance, Cowling and Waterson (1976).

A3.2 Period Averages of Performance Indicators by Bank (1993-1999)

BANK	RoA	X-EFF	S-ELAS	S-EFF	MS	NPA	CAS
Barclays*	0.010	0.523	1.051	0.946	0.105	0.315	0.054
Baroda*	0.010	0.560	1.159	0.841	0.070	0.153	0.037
Stanbic*	0.014	0.551	1.090	0.910	0.101	0.094	0.056
Standard Chartered*	0.017	0.545	1.077	0.923	0.111	0.087	0.050
Tropical	-0.010	0.533	1.192	0.808	0.012	0.412	0.017
UCB	-0.002	0.376	0.968	0.961	0.322	0.670	-0.248
COOP	0.001	0.341	1.065	0.935	0.064	0.438	-0.130
Nile	0.005	0.513	1.115	0.885	0.038	0.415	0.001
Allied	-0.013	0.537	1.184	0.816	0.017	0.472	-0.122
Goldtrust	0.005	0.707	1.182	0.818	0.018	0.119	0.033
Greenland*	0.004	0.512	1.161	0.839	0.046	0.147	0.058
ICB 1/	0.010	0.620	1.162	0.838	0.015	0.151	0.062
Orient*	0.015	0.639	1.233	0.767	0.026	0.025	0.159
CERUDEB* 2/	0.011	0.574	1.172	0.828	0.016	0.201	-0.012
NCB 3/	-0.030	0.977	1.308	0.692	0.001	0.295	-0.026
Crane	0.012	0.740	1.149	0.851	0.048	0.080	0.098
Cairo	-0.018	0.931	1.163	0.837	0.005	0.017	0.138

1/ ICB = International Credit Bank
2/ CERUDEB = Centenary Rural Development Bank
3/ NBC = National Bank of Commerce
* Implies that the bank is included in the reduced sample.

Definition of Variables

RoA	Pretax Return on Assets	MS	Bank market share of assets
X-EFF	X-efficiency	NPA	Ratio of non-performing loans to total loans
S-ELAS	Scale elasticity	CAS	Ratio of core capital to net assets
S-EFF	Scale efficiency		

A3.3 Period Averages of the Variables Used in the Translog Stochastic Frontier Production Function, by Bank, 1993-1999 (*figures are in billion Shs*)

BANK	Earning Assets	Total Deposits	Other Liabilities	Interest Expenses	Staff Costs	Other Costs
Barclays	68.57	44.94	45.40	0.34	0.77	0.75
Baroda	47.47	40.28	19.92	1.00	0.44	0.42
Stanbic	78.77	49.42	44.55	0.84	0.53	0.53
Standard Chartered	87.72	58.28	47.66	0.52	0.68	0.61
Tropical	7.04	6.53	4.74	0.08	0.28	0.16
UCB	135.07	151.96	111.10	0.77	3.30	2.89
COOP	25.82	33.51	19.04	0.22	0.68	1.03
Nile	21.36	16.26	15.78	0.23	0.24	0.48
Allied	8.69	9.51	5.59	0.19	0.22	0.33
Goldtrust	13.00	8.75	8.18	0.22	0.15	0.20
Greenland	29.16	24.65	16.69	0.52	0.23	0.44
ICB	9.76	6.23	6.96	0.13	0.10	0.20
Orient	20.31	16.05	9.64	0.47	0.05	0.18
CERUDEB	10.98	11.98	3.77	0.06	0.36	0.41
NCB	0.70	0.62	0.60	0.01	0.02	0.04
Crane	41.95	32.64	19.41	1.04	0.17	0.63
Cairo	4.82	1.98	3.93	0.03	0.13	0.08

A3.4 Maximum Likelihood Estimates for Parameters of the Translog Stochastic Frontier Production Function

Variables: Lnx_j and (Lnx_{jk} .x_{kj})	Coefficient β_j, β_{jk}	Std-error	*t*-ratio
Intercept	-8.501	1.256	-6.769
Ln(deposits)	0.500	0.268	1.864
Ln(other liabilities)	1.545	0.210	7.359
Ln(interest costs)	-0.411	0.147	-2.801
Ln(staff costs)	0.624	0.253	2.472
Ln(other costs)	-0.136	0.187	-0.730
Time trend, *t*	-0.108	0.016	-6.672
½(Ln(deposits))^2	0.164	0.053	3.124
½(Ln(other liabilities))^2	0.191	0.042	4.533
½(Ln(interest costs))^2	-0.017	0.013	-1.261
½(Ln(staff costs))^2	0.050	0.032	1.560
½(Ln(other costs))^2	-0.175	0.033	-5.244
½t^2	0.003	0.001	4.940
Ln(deposits) x Ln(other liabilities)	-0.272	0.044	-6.202
Ln(deposits) x Ln(interest costs)	0.005	0.019	0.268
Ln(deposits) x Ln(staff costs)	-0.045	0.034	-1.296
Ln(deposits) x Ln(other costs)	0.191	0.041	4.640
Ln(other liabilities) x Ln(interest costs)	0.056	0.018	3.057
Ln(other liabilities) x Ln(staff costs)	-0.047	0.026	-1.776
Ln(other liabilities) x Ln(other costs)	0.012	0.028	0.419
Ln(interest costs) x Ln(staff costs)	0.047	0.018	2.659
Ln(interest costs) x Ln(other costs)	-0.071	0.019	-3.675
Ln(staff costs) x Ln(other costs)	-0.021	0.021	-0.987
t x Ln(deposits)	-0.002	0.003	-0.769
t x Ln(other liabilities)	0.010	0.002	4.149
t x Ln(interest costs)	-0.006	0.001	-4.403
t x Ln(staff costs)	-0.004	0.002	-2.202
t x Ln(other costs)	0.004	0.002	1.708
Variance Parameters			
σ^2	0.036	0.005	7.039
γ	0.541	0.081	6.695
μ	0.277	0.072	3.865
η	0.046	0.003	15.760
Log likelihood Function	226.234		
Test for the null hypothesis H_0: $\beta_{jk} = 0$	LR =	194.747*	Rejected at $\chi_{21}^2 = 32.67$

CHAPTER 4

MONETARY POLICY AND CREDIT MARKET IMPERFECTIONS: EVIDENCE FROM UGANDA (1994-2000)

Abstract

In this chapter we analyse the effects of credit market imperfections on monetary policy in the Ugandan economy during the period 1994-2000. In order to identify a credit channel of monetary transmission, we study the responses of two credit variables (total bank loans and lending rates) to base money (an indicator of monetary policy). Among all the tests conducted, we do not find evidence of a significant role of either variable in the transmission of monetary policy shocks to output. This could be explained by a history of unusually high default rates in the Ugandan credit market, strengthening of prudential regulations during the reform period, exogenous factors affecting the demand for credit and interest rate driven portfolio adjustment by banks towards investment in safe assets. These results indicate that the presence of credit market imperfections is more likely to limit, rather than amplify the impact of an expansionary monetary policy on the economy as predicted by the "credit view." Finding no evidence to support an independent monetary channel via loans and lending rates suggests that neither variable performs well as a leading indicator or an information variable for monetary policy in Uganda. Possible disruptive effects of credit market imperfections on monetary policy further highlight the need for financial sector policies to address informational problems.

Key words: Monetary Policy; Credit Market Imperfections; Banks

4.0 INTRODUCTION

The purpose of this chapter is to analyse the role of credit market imperfections in the transmission of monetary policy in the Ugandan economy during the period 1994-2000. According to the IS-LM model, supply of and demand for money determines the short-term interest rate, which in turn affects investment and output. Under this theory, monetary policy affects spending and aggregate demand only through the money/interest channel, and financial factors will not matter since, by assumption, financial markets are perfect and all funds are perfect substitutes. Therefore, explicitly introducing financial intermediaries into this model is unnecessary. However, according to the "credit view," financial intermediaries play an important role in the transmission of monetary policy due to informational imperfections that prevent firms from easily substituting among alternative sources of credit.

The key idea of the "credit view" is that due to information and incentive problems in financial markets, a large class of borrowers (particularly households and small firms) cannot readily obtain non-bank forms of credit, hence they must rely primarily on banks for external finance. An important implication is that any kind of disruption in the flow of bank credit potentially has important real effects.[70] First, tight policy which causes a drain of reserves from the banking system, may lead banks to contract their loan supply, which reduces investment activities by bank dependent borrowers (the lending channel). Second, tight policy weakens firm balance sheets, thereby increasing adverse selection and moral hazard problems. This leads to decreased lending and hence investment spending (the balance sheet channel).

It is anticipated that a credit channel would be relevant in the Ugandan economy, given that all borrowers were primarily dependent on bank lending due to the underdeveloped nature of capital markets. Further, though the banking system underwent restructuring during the review period, bad debts remained a major problem in bank portfolios. For example, non-performing loans as a ratio of total loans averaged 27 percent per bank, while some banks recorded ratios of over 80 percent.

[70] See for instance Blinder and Stiglitz (1983).

Uganda's monetary policy aims at promoting sustainable growth and low inflation. Indeed, in recent years the central bank has pursued a strategy of tight monetary policy proactively in order to prevent inflationary pressures arising from exchange rate depreciation and excess liquidity in the banking system.[71] In order to be successful in such an undertaking, the monetary authorities must have an accurate assessment of the timing and effect of their policies on the economy, which thus requires an understanding of the monetary transmission mechanisms beyond traditional channels.

Understanding these channels is important not only in their own right, but also because they have important implications for monetary policy. For instance, since the finding of significant credit effects implies that monetary policy can affect investment and aggregate activity without substantially affecting interest rates, it can make it possible for bank variables to be used as indicators to help gauge the stance of monetary policy. The existence of a credit channel can also influence the distributional consequences of monetary policy. For example, since the credit view suggests that the costs of tight policy might fall disproportionately on smaller firms who are unable to access public capital markets, it may be important to bear in mind such distributional consequences when formulating monetary policy.

This chapter builds on the work done in the preceding chapters of this dissertation, analysing the post financial-reform performance of the Ugandan economy and has the following objective: While guided by the assumptions of the "credit view," we empirically test for the effects of credit market imperfections on the transmission of monetary policy in the Ugandan economy. The credit view predicts that a change in monetary policy will be amplified and distributed among borrowers through either the lending or balance sheet channels. Before doing this, however, we must identify an indicator of monetary policy. First, if a variable is a measure of monetary policy and if policy affects the real economy, the variable should be a good reduced form predictor of major macroeconomic variables. We therefore begin by studying the information

[71] See for instance Bank of Uganda, Quarterly Economic Report (1999, Vol.2; 1999, Vol.3; 1999, Vol.4; 2000, Vol.1; 2000, Vol.2; 2000, Vol.3).

content of two macroeconomic variables (the 91-day Treasury Bill [TB] rate and base money) in order to identify an indicator of monetary policy. Second, a measure of monetary policy must be exogenous in the sense that its growth rate can be determined independently of current-period information. We therefore conduct additional tests of exogeneity on the two variables.

Like most previous studies, we test for the effects of credit market imperfections using Vector Autoregression (VAR) to analyse co-movements in monetary policy, bank variables and output. However, this study differs from most previous work found in the literature in that it uses both quantities (loans) and prices (lending rates) as bank variables to test for credit effects. The key assumption is that since the bank loan market can clear by both quantity and price, there are possible credit effects of monetary policy via lending rates. Previous empirical work has been silent on this possibility.

The rest of the chapter is organized as follows: Section 4.1 presents some background on Uganda's financial system, and monetary policy and its correspondence with aggregate output movements. It explains how extensive defaults and other distortions could have reduced the efficiency of the financial sector in performing its intermediary role. Section 4.2 reviews the relevant literature and empirical evidence. The estimation methods and data are discussed in Section 4.3. Section 4.4 provides a descriptive analysis of the effects of credit market imperfections on monetary policy. The empirical findings are discussed in Section 4.5, and Section 4.6 concludes the chapter.

4.1 BACKGROUND

During the 1990s, a number of developments exerted a strong influence on the implementation of monetary policy in the Ugandan economy. First, Uganda's domestic financial markets were deregulated through liberalising interest rates, allowing more forms of financial instruments and abolishing or reducing restrictions on financial transactions. Second, direct monetary control was replaced with indirect and market-oriented forms. The objective of the implementation of these reforms was to promote market stability and efficiency through enhancement of the role of price signals in the economy. Specifically, it was expected that indirect instruments could provide more effective monetary control by providing the monetary authority with greater flexibility in the implementation and conduct of monetary policy.

The formulation and conduct of monetary policy has, since the financial year 1992/93, been guided by the Reserve Money Program (RMP). Reserve money (monetary base or high-powered money) is defined as the sum of the Currency in Circulation (CC) and the Commercial Bank Reserves with the central bank (TR), plus Investments in BOU Instruments by Commercial banks (IBI). It is based on the flow of consolidated assets and liabilities of the central bank as shown in Table 4.1. Since the RMP is highly influential in terms of monetary policy, it is worthwhile setting out its logic in some detail.

Table 4.1 The Central Bank Balance Sheet

Assets	**Liabilities**
Net Foreign Assets (NFA)	Currency in Circulation (CC)
Net Domestic Assets (NDA)	Total Commercial Bank Reserves (TR)
- Net Domestic Credit (NDC)	. Required Reserves (RR)
. Net Claims on Government (NCG)	. Excess Reserves (ER)
. Claims on the Private Sector	
- Commercial Bank Borrowing (BOR)	Investments in BoU Instruments by
- Other Items Net (OIN)	Commercial Banks (IBI)
Total Assets	**Total Liabilities**

Source: Bank of Uganda

In order to relate the above balance sheet to the banking system as a whole, it is first necessary to define the balance sheet equality between domestic liabilities of the central bank (reserve money) and its net domestic and foreign assets. Hence, the monetary base can be written as:

$$BM = TR + CC + IBI = NFA + NDA \quad (1)$$

where NFA represents the central bank's Net Foreign Assets, and NDA represents its Net Domestic Assets. Two key assumptions of the RMP are that the demand for money is either stable or predictable, and that the supply of money is exogenous. If money supply (*MS*) is exogenous, it is linked to the monetary base (*BM*) via the money multiplier:

$$MS = \left(\frac{1+c}{c+r+x} \right) BM \quad (2)$$

where c is the currency-deposit ratio, r is the reserve ratio and x is the excess reserve ratio. The expression in brackets is the money multiplier (*mm*) where c, r and x determine the leakages from the process of money creation.[72]

If the money multiplier is stable, or if it changes in a predictable way, the balance sheet relationship of the banking system can be represented as:

$$MS = mm\ (NFA + NDA) \quad (3)$$

where (*NFA* + *NDA*) represents the sources of any change in the monetary base. The RMP involves the mapping of the intermediate targets, the forecasting of factors affecting the supply and demand for base money and the design of monetary policy to ensure consistency with policy targets.

[72] For instance, an exogenous increase in the budget deficit, which creates an increase in currency in circulation will lead to a rise in money supply which is greater than the initial increase in the monetary base by the multiplier (*mm*).

When determining the demand for base money, three steps are followed:

- Overall macroeconomic objectives on desired real Gross Domestic Product (GDP) growth, inflation and Balance of Payments (BoP) are defined.
- Monetary growth is projected as consistent with the macroeconomic objectives, given assumptions for velocity.
- The growth of base money is then projected to be in line with the broader monetary aggregate (M2) and inflation. The annual growth target for base money is converted into monthly targets that reflect seasonality in the demand for money.

The demand for base money is best described in terms of the demand for its components – Required Reserves (RR) and Excess Reserves (ER) of commercial banks, Currency in Circulation (CC) and Investments in BOU Instruments by commercial banks (IBI). The framework assumes that any increase in deposits in the current period must result in an increase in required reserves. The demand for excess reserves on the other hand, depends on the opportunity cost of holding them, and the general climate of confidence. The Currency in Circulation (CC) can be specified in a variety of ways. These range from an equation reflecting an invariant relationship between currency and the money stock, to a general function reflecting currency demand to variables such as the interest rate on competing assets, the rate of inflation and some proxy for transactions activity.

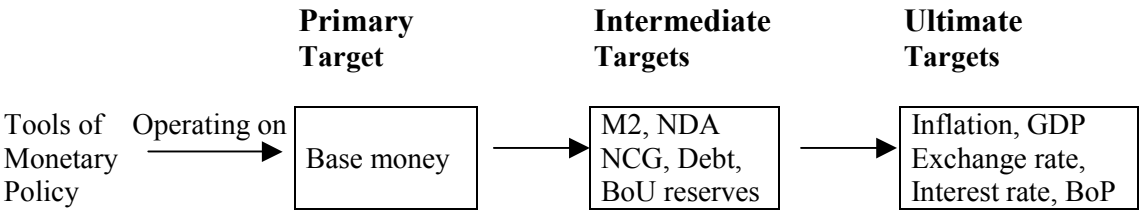
On the supply side, factors affecting the base money are made up of changes in the BoU Net Foreign Assets (NFA), Net Domestic Credit (NDC), Commercial Bank Borrowing (BOR) and Other Items Net (OIN). These are divided into two categories: autonomous, which are not directly under the control of BoU, such as Net Foreign Assets and Net Credit to Government (NCG); and non-autonomous factors which are driven by policy considerations (for instance, Commercial Bank Borrowing [BOR]).

A target is then defined as a limit on the growth of base money. Implementation of the RMP, however, requires monthly projections of items on the BoU balance sheet, which are not under its control in the short-run. These include, foreign exchange transactions, changes in the demand for currency and excess reserves and the government's ways and

means position with BoU. Implementation of the RMP further involves the charting out of options of discretionary factors in order to achieve the policy objectives. The discretionary factors include the level of foreign exchange market intervention, central bank rediscounts, and sales of Treasury Bills (TBs) and BoU bills.

For a particular month, the gap between the actual out-turn of base money and the desired target path of base money, forms the basis for the monetary policy intervention stance (looser, tighter or unchanged). However, the mix of monetary policy would be guided by the desired outcome of the final targets (inflation, exchange rates and growth), as well as the development in the prospective supply of base money.

The supply of base money impacts broad monetary aggregates (e.g. Money Supply [M2]) via the money multiplier. However, since there is a relationship between broader monetary aggregates and final prices (exchange rates, inflation, interest rates) and growth, the supply of base money will also impact ultimate targets in the same direction as broader monetary aggregates do. The link between monetary policy and the economy is summarised in the schematic below:



4.1.1 Instruments of Monetary Policy

Three main instruments have been used for monetary and credit control: open market operations, reserve ratios and interest rate interventions, and we discuss each below:

Open Market Operations: Government securities (Treasury Bills [TBs]) are either sold to or bought from the public by the central bank to influence deposits with commercial banks (and thus credit creation), and have been the most important policy tool in liquidity management since 1992.[73] The stock of TBs as a share of base money for instance increased from about 18 percent in 1992 to 65 percent in June 2000, indicating an increased deepening of the market (Table 4.2).

However, the effectiveness of the Treasury bill market has been limited due to a number of factors. Until late 1999, only Treasury Bills of 91 days to maturity or less were eligible for rediscounting, which made papers of more than 91 days to maturity illiquid. The market has also remained thin and dominated by commercial banks, which account for over 70 percent of transactions (Table 4.2). This has caused considerable fluctuations in interest rates, which may outweigh gains from the control aspects of the policy. In addition, there was a lack of secondary trading in TBs during the review period, resulting in the majority of the purchasers holding the bills until maturity, although BoU did of course regulate its liquidity stance via its rediscount rate.[74]

The Reserve Ratio: This too has proved itself ineffective and has not been changed frequently. The major problem has been excess reserves held by banks; legal reserve ratios have not been a binding constraint (so x in the equation 2 is both positive and relatively high). Thus, although high reserves must be held due to a rise in r, the new legally required figure may well be below the actual reserves banks held prior to the policy change. Excess reserves have been significant due to inefficiently functioning inter-bank and money markets.

[73] The BoU bill was introduced in November 1996 as an additional tool for liquidity management.
[74] The rediscount rate is the rate at which government securities can be rediscounted.

Table 4.2 Participation of Different Agents in the Treasury Bill Market, 1992-2000 (*all figures are end of June*)

Period	1992	1993	1994	1995	1996	1997	1998	1999	2000
Stock of TBs (billion Shs)	22.0	20.1	45.8	62.8	93.8	95.0	143.2	205.7	361.8
Share of Agent (%)									
Commercial Banks	41.0	53.2	71.4	68.4	75.0	77.1	76.2	70.3	75.7
Bank of Uganda	0.1	14.7	0.1	1.2	2.6	1.2	8.6	18.8	13.4
Insurance Companies	6.1	6.1	7.3	7.3	5.0	0.9	1.0	0.5	4.3
Others	52.9	26.0	21.1	23.1	17.4	20.8	14.2	10.4	6.6
Stock of TBs (% of base money)	18.1	13.8	22.1	22.4	33.5	28.6	37.8	44.7	65.0

Source: Various issues of Bank of Uganda Quarterly and Annual Reports

Interest Rate Interventions: These have operated through various mechanisms such as open market operations, the discount rate[75] and rediscount rate. The 91-day Treasury bill is the key market rate and has not been effective as a channel of monetary policy for a number of reasons. First, since the securities market is dominated by commercial banks, developments in the securities market have, on several occasions, not reflected monetary policy signals, but rather conditions in the financial sector. For example, the decline in the TB rates experienced in 1994/95 was attributed to high liquidity in the commercial banks during the 1994/95 coffee boom, which resulted in an increased demand for Treasury Bills (Table 4.3).[76]

Second, the TB rate did not lead to significant changes in commercial bank rates, which weakened the link between interest rates and output. It has been argued that lending rates were sticky due to high intermediation costs faced by banks during the review period. An implication is that we are unlikely to find significant credit effects via lending rates. The link between monetary policy and lending rates is empirically analysed in Section 4.5.

[75] The discount rate is the interest rate on central bank loans to banks.
[76] See Atingi-Ego and Rwebeyanga (1998).

Table 4.3 Monetary Policy and Performance Indicators, 1993-2000 (*all figures are end of June*)

Indicator	1993	1994	1995	1996	1997	1998	1999	2000
Growth in Base Money, (%)	19.8	42.7	35.1	0.1	18.3	14.1	21.6	20.9
Growth in Money Supply, M2 (%)	41.5	33.8	25.3	20.7	15.8	23.7	9.1	8.5
91-day Treasury Bill Rate, (%)	23.7	10.8	7.4	11.8	9.8	6.9	8.1	18.4
Reserve Ratio (%)								
Demand Deposits	8.0	8.0	8.0	9.0	9.0	9.0	9.0	9.0
Time and Savings Deposits	7.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0
Inflation, (%)	-2.4	16.1	3.4	5.4	10.4	-1.4	5.3	2.1
Official Exchange Rate (Shs/USD)	1,199.1	962.6	964.8	1,041.4	1,067.6	1,231.0	1,447.2	1,565.6
Real GDP growth (%)	8.4	5.4	10.6	7.8	4.5	5.4	7.4	5.1

Source: Various issues of Bank of Uganda Quarterly and Annual Reports

The discount rate has also been used to regulate commercial bank borrowing from BoU, and the rediscount rate has been used to regulate liquidity. In April 1995, the determination of the discount rate was changed to reflect interest rate developments in the inter-bank market. However, lending by BoU to commercial banks was very discretionary and infrequent during the review period, with no significant impact on base money. Movements in the discount rate also appear not to have any relationship with bank lending rates partly due to the high costs of intermediation faced by banks. In light of this and the need to develop the inter-bank shilling market, the discount rate has played a limited role in the transmission of monetary policy.

The determination of the rediscount rate was also changed in April 1995 to reflect developments in the 91-day TB rate.[77] However, BoU has not actively used the re-discount rate in liquidity management primarily for two reasons: the perception that TB interest rates have limited influence on other rates, and the limited rediscounting of TBs by agents, at BoU, preferring secondary markets. The major indicators of monetary policy and performance are indicated in Table 4.3.

[77] The re-discount rate is set at a margin above the four week-average of the 91-day Treasury bill rates.

4.1.2 Commercial Bank Activities

Commercial banks in Uganda play an important role in the transmission of monetary policy in several ways. First, they account for more than 90 percent of the credit extended to the private sector.[78] Second, and even more important is the fact that since the Ugandan financial system is characterized by several imperfections, the effectiveness of monetary policy is to a large extent likely to be affected by banks' perceptions about the degree of adverse selection and moral hazard problems in the market. A major problem faced by banks during the review period was a high default rate that led to accumulation of bad loans in bank balance sheets, thus imposing significant losses on them.[79] As Table 4.4 indicates, non-performing loans per bank averaged about 27 percent and reached a peak of 59 percent in 1994.

Coupled with the strengthening of prudential regulations by BoU during the reform period, which saw the closure of several malfunctioning banks during 1998-1999, banks became more risk averse towards lending to the private sector. As Table 4.4 indicates, loan growth as a percentage of total assets of banks declined particularly after 1996 (with the exception of 1998). There also appears to be selective allocation of credit in favour of some sectors. For example, because of the risk associated with production in the agricultural sector, less and less credit was allocated to the sector throughout the review period, unlike the trade and other services sector to which less risk was attached (Table 4.4). On account of this, interest rates have not played a significant role in the allocation of credit. In general, as banks strive to overcome the persistent problem of bad debt through improvements in loan screening and monitoring, they have become increasingly prudent in their lending.

Due to a lack of confidence in the market and a shortage of good investment opportunities to which to extend credit, commercial banks preferred to purchase more government securities, whose share of assets in their portfolios rose from 2.5 percent in 1993 to 17 percent in 2000 (Table 4.4). An implication of the reluctance of banks to

[78] This ratio is derived from total credit extended by banks and Non-Bank Financial Institutions (NBFIs) as at the end of June 2000.
[79] Default losses were mainly attributed to diversion of funds that makes administration of loans very expensive, and to poor performance of projects.

lend to the private sector is that part of the transmission mechanism between the BoU open market operations and output is put out of action. Further, there may not be any significant positive supplementary effects from an expansionary monetary policy as proposed by the "credit view." This issue is further investigated in Section 4.5.

Table 4.4 Commercial Bank Activities, 1993-2000 (*all figures are end of June*)

Indicator	1993	1994	1995	1996	1997	1998	1999	2000
Assets (billion Shs.)	472.8	587.8	706.4	805.9	965.9	1,279.8	1,456.6	1,801.5
Credit (% of assets)	32.7	33.3	34.0	41.9	34.9	36.1	41.2	27.8
Securities (% of assets) 1/	2.5	5.6	6.1	8.7	7.6	9.0	11.0	17.0
Excess Reserves (% of assets)	4.6	6.5	10.1	3.1	5.1	4.7	4.3	2.6
Lending Rate, (%)	26.8	21.3	19.5	20.8	21.7	21.5	23.0	21.9
Growth in Deposits (%)	57.5	32.3	25.3	19.1	21.6	30.7	5.4	9.2
Growth in Total Credit (%)	47.6	25.8	23.0	37.4	4.9	24.0	16.3	0.6
Growth in Credit to Agriculture (%)	43.7	29.0	15.0	12.9	10.0	2.1	-7.7	-27.9
Growth in Credit to Trade & Other Services (%)	64.7	15.8	25.7	24.1	28.1	32.1	2.5	5.9
Non-Performing Loans (% of total loans) 2/	16.1	58.7	46.3	41.7	29.2	20.1	16.3	NA

1/ Securities include Treasury Bills and BoU bills.
2/ The figures for non-performing loans are average ratios per bank.
- NA means not available.
Source: Various issues of Bank of Uganda Quarterly and Annual Reports

Yet, there were other distortions to the allocation of credit during the review period. For example, there were episodes of reduced demand for domestic credit due to increased use of foreign credit to finance production. Unfavourable weather conditions during 1996/97 also resulted in a decline in demand for credit due to reduced activity in the economy. Such factors make it difficult to identify the real effects of monetary policy, since they may have acted as exogenous driving forces in the data generating process of output.

Reduced demand for credit coupled with banks' lack of confidence in the market, led to an increase in bank excess reserves and, hence, excess demand for Treasury bills, thus exerting an influence on the TB rates. An implication is that developments in the TB rates may not reflect monetary policy signals, but rather conditions in the financial sector such as excess liquidity. Inefficiency in the financial sector which led to high

intermediation costs,[80] also led to high and sticky bank lending rates, weakening the link between policy rates and economic activity further. This issue is taken up again in Sections 4.4 and 4.5.

Other distortions to credit allocation were created by the restructuring of some banks. For example, the removal of bad loans from the Uganda Commercial Bank balance sheet in 1997 led to a 14 percent fall in the banking system stock of credit. The upward revision of minimum capital requirements for all financial institutions effective January 2000, may further lead to an additional monetary channel, since banks suffering from large negative capital shocks may not be able to offset a drain in reservable deposits following tight money by issuing large time deposits. Consequently, their loan supply will be more responsive to tight monetary policy than the loan supply of well-capitalised banks. Although we do not empirically examine this issue through cross-bank characteristic differences in this study, it supports the existence of loan supply shifts emanating from the lending channel.

In conclusion, imperfections in the financial sector have, to a great extent, undermined the effectiveness of monetary policy. The Treasury bill market is narrow with a modest stock of TBs, and is concentrated among banks. Secondary trading of securities is limited, while the inter-bank market is not functioning efficiently. These weaknesses have often led to large movements in market interest rates without any significant impact on credit supply. High intermediation costs (of which default risk seems to be a major cause) also led to distortions of credit allocation, further weakening the link between interest rates and economic activity. In Section 4.5, we empirically analyse these links by studying the relationship between monetary policy, bank variables and real activity.

[80] For instance, bad loans due to poor lending policies led to losses from the writing off of and provisioning for loans.

4.2 LITERATURE SURVEY

According to the traditional Keynesian IS-LM model of aggregate demand, monetary policy affects the real economy through changes in the interest rate. An expansionary monetary policy leads to a fall in real interest rates, which in turn lowers the cost of capital. This causes a rise in investment spending, and thereby leads to an increase in aggregate demand. Since spending, output and aggregate income are equal in a closed economy, output and spending increase in response to a monetary expansion, and fall following a monetary contraction.

The response of the short-term rate to a change in money supply, however, diminishes as offsetting movements of money substitutes help re-equilibrate money supply and demand. This view, which is referred to as the "money view," therefore rests on the idea that there are no perfect substitutes for money. Given that a large part of money supply consists of bank liabilities, the money view tends to emphasise the special nature of the liability side of bank balance sheets. In contrast, bank loans and other forms of customer-market credit such as bonds, are assumed to be perfect substitutes, and there is no place for financial intermediaries since, by assumption, financial markets are perfect.

However, due to informational imperfections that prevent firms from easily substituting among alternative sources of credit, financial intermediaries will matter. Although the "credit view" is not necessarily in conflict with the "money view", it tends to emphasize the special nature of the asset side of bank balance sheets (loans), and admits the role of informational imperfections and hence financial intermediaries (banks) in the transmission of monetary policy.

First, because banks can specialize in acquiring information about default risk, they can easily distinguish between good and bad risks and can devise non-price mechanisms such as credit rationing for screening out untrustworthy borrowers.[81] They can also devise contracts that provide strong incentives not to default. Thus, although the credit market is competitive in the usual sense (free entry, many buyers and sellers), lenders

[81] See for instance Stiglitz and Weiss (1981).

will view different borrowers as highly imperfect substitutes, and borrowers will have the same attitudes about different lenders - at least in the short run (Blinder and Stiglitz, 1983). In particular, there may be some classes of borrowers such as households and small firms for whom non-bank forms of credit are not readily accessible. Hence, they must rely primarily on banks for external finance.

An important implication is that any kind of disruption in the flow of bank credit potentially has real effects. The proponents of this view have, hence, argued that monetary policy will work at least in part by altering the flow of bank credit. For example, a contractionary monetary policy, which decreases bank reserves and bank deposits, is likely to decrease the quantity of bank loans available, since very high-risk borrowers might not have their loan contracts renewed (Bernanke, 1983; Blinder and Stiglitz, 1983; Bernanke and Blinder, 1988; Brunner and Meltzer, 1988). Given that this class of borrowers would be unable to secure alternative forms of credit, the decrease in loans would cause investment and possibly consumer spending to fall.[82] Similarly, the credit channel would make monetary policy more expansionary than in the IS/LM model and would therefore raise the transactions demand for money by more than in the conventional model (Bernanke and Blinder, 1988).

There are two channels through which monetary policy will operate under the "credit view": the lending channel and the balance sheet channel. The lending channel will be operative if (1) changes in policy affect the supply of bank loans and (2) certain borrowers who face informational problems in credit markets will not have access to credit, unless they borrow from banks (Bernanke and Blinder, 1988). An important implication of the lending channel is that monetary policy will have a greater effect on expenditure by smaller firms which are more dependent on bank loans than expenditure by large firms which can have direct access to credit through stock and bond markets without going through banks.

[82] The US Great Depression of the 1930s has, for instance, been explained as a downward shock to credit supply, stemming from the increased riskiness of loans and bank concerns about liquidity in the face of possible runs (Bernanke, 1983).

The balance sheet channel also arises from the presence of asymmetric information problems in credit markets. The lower the net worth of business firms, the more severe the adverse selection and moral hazard problems in lending to these firms, since lenders in effect have less collateral for their loans, and therefore losses from adverse selection and moral hazard problems are higher. A decline in net worth, which raises the adverse selection and moral hazard problems, thus leads to decreased lending and hence investment spending. Monetary policy can affect firm balance sheets in several ways. Expansionary monetary policy, which causes a rise in equity prices, raises the net worth of firms and leads to higher investment and aggregate demand because of the decrease in adverse selection and moral hazard problems. An expansionary monetary policy, which lowers nominal interest rates, also causes an improvement in firm balance sheets because it raises cash flows, thereby reducing adverse selection and moral hazard problems.

The presence of credit effects, however, need not imply that the more traditional interest rate channel of monetary policy is not operative. Clearly, the two channels can co-exist and can complement each other. Indeed, the proponents of the credit channels view them as a set of factors that amplify and propagate conventional interest rate effects (see for instance Bernanke and Gertler, 1995). Similarly, credit rationing in the loan market is not necessary for there to be a meaningful credit channel, though in practice such rationing is likely to be present to some degree. For instance, the bank loan market may clear by price, or the bank loan rate may rise relative to the open market lending rate following tight money (Gertler and Gilchrist, 1993).

4.2.1 Critique of the Credit View

A number of criticisms in the literature have been raised against the credit view. The existence of a distinct lending channel of monetary policy requires two distinct hypotheses. First, loans and other forms of customer market credit are imperfect substitutes, hence some groups of borrowers are unable to offset a decline in the supply of loans by borrowing more directly from public markets; their spending depends on bank loans. Second, by changing the quantity of reserves available to the banking

system, monetary policy affects the supply of intermediated loans relative to other types of credit.

If bank loans were indeed the principal source of external finance for many firms, the first condition would no doubt hold. Banks specialise in acquiring costly information about borrowers so that good substitutes for bank credit will not be available at least in the short run. Monetary policy would hence change both the total volume of credit and who gets it. But there are other sources of credit such as securities markets, finance companies, families and others. The real issue, however, is how easily borrowers can find alternative lenders and whether a significant aggregate effect will result if they fail to do so (Meltzer, 1995).

The second condition for a lending channel is even more arguable. Since banks have several alternatives to reducing their lending when reserves fall, they can mitigate the effects of monetary policy. They can for instance issue large Certificates of Deposits (CDs) and other kinds of managed liabilities to offset any drop in deposits (Romer and Romer, 1990). One might ask why they prefer to reduce loans more than proportionately to their loss of reserves.

Nevertheless, as noted by Gertler and Mark (1993), banks may not be able to elastically issue large CDs at the margin for several reasons. Large CDs raise the risk of the bank's portfolio. Informational asymmetries also introduce a potential incentive problem between a bank and its large depositors such that the supply schedule for large CDs may not be perfectly elastic. This may particularly apply to small banks, since they have relatively less access to the CD market than large banks do.

On the other hand, banks could maintain their lending by selling off some of their liquid assets, such as government securities, to meet the contraction in reserves due to tight policy. In the same way, it can be argued that during an expansionary monetary policy, banks may increase their holdings of such assets instead of increasing their lending, because of the need to build up their stock of liquid assets, or because of the presence of credit risk.

Lastly, by assuming that a rise in net worth lowers the adverse selection and moral hazard problems, thus leading to increased lending and hence investment spending, the credit view ignores factors other than cash flow as a cause of borrower default. For example, Fry (1995) highlights cultural factors, as undoubtedly playing a key role in the persistent problem of bad and doubtful assets in bank portfolios in the financial systems of developing countries.[83]

4.2.2 Evidence on the Credit Channel

There is a considerable body of empirical work that seeks to distinguish between the "money view" and "credit view" of the transmission mechanism. Although much of this work initially focused on the US Great Depression of the 1930s and the so-called credit crunch of the early 1990s, tests for the credit channel have also been done on some European and developing countries. We consider several cases below.

Bernanke (1983) analyses the extent to which monetary channels of transmission can account for the decline in the US output during the Great Depression of 1930-1933. He finds that while monetary channels would predict a large drop in output during this period, a significant amount of the decline cannot be purely attributed to monetary influences. Rather, the effects of a decline in the money stock during this period were supplemented by the disruption of the lending channel, through a reduction in the quality of financial services.

Using dummy variables obtained from a reading of the minutes of the US Federal Open Market Committee to indicate periods of tight money, Romer and Romer (1990) find that the growth rate of narrow money (M1) falls precipitously within several months of a Romer's episode of tight money, while the growth rate of bank credit does not drop until nearly six to nine months after the shock. Output also falls with a lag and seems to move roughly contemporaneously with loans. Romer and Romer interpret these results as consistent with the "money view." Bernanke and Blinder (1992) report a similar finding when they use innovations in the federal funds rate to identify exogenous shifts

[83] In some countries, loan recipients simply lack responsibility and discipline.

in monetary policy.[84] However, they interpret the evidence as consistent with the "credit view."

There is of course an identification problem here, in that the competing theories are capable of observationally equivalent predictions about the movement of money and credit. The identification problem means that although correlations between policy indicators, bank loans and activity are consistent with the view that monetary policy works through loan supply, such evidence cannot provide unambiguous support for the "credit view." The fact that a fall in output coincides with a fall in loans is not sufficient to establish that the fall in output was caused by loans. One way to interpret these results is that the monetary tightening operated through conventional money channels to depress output, and that the fall in the quantity of bank loans simply reflects a decrease in loan demand (due to reduced output), and not monetary policy (see Romer and Romer, 1990). Consequently, there can be an induced correlation between activity and bank lending even if there is no lending channel.

In the same way, the fact that bank loan growth does not decline sharply following tight money is not necessarily evidence against the "credit view." Following tight money, banks may not be able to reduce lending immediately because that may force many borrowers prematurely into bankruptcy.[85] Banks may instead initially meet the decline in deposits in part by selling securities as Bernanke and Blinder (1992) find, or issue money market liabilities such as large Certificates of Deposits (Gertler and Gilchrist, 1993). If bank credit were not in some way special, there would be no reason for the ratio of securities to assets to fall quickly in response to tight money, or for banks to issue money market liabilities.

Bernanke and Blinder (1992) further point to the possible effect of loan commitments on the speed with which loan volume can shrink following tight money. Morgan (1998) indeed finds that much of the slow response of loans to monetary policy is due to loan

[84] Gertler and Gilchrist (1993) also find that bank loans decline after a rise in the funds rate, though the pace is slower than the decline in deposits reported by Bernanke and Blinder (1992).
[85] Kashyap and Stein (1993) argue that since credit demand for a substantial fraction of borrowers may actually be rising because of the need to finance excess inventories, loans may not contract rapidly following tight money.

commitments. Using two indicators of policy, Morgan finds that tight money slows the growth of loans not made under commitment, compared to loans that are made under commitment. To identify credit supply effects from effects due to reduced demand for credit by firms without commitment, Morgan examines the responses of lenders and small firms to survey questions about the availability of credit. Both lenders and small firms report reduced credit availability at times when the share of loans not made under commitment is declining, which Morgan interprets as a reflection of the reduction in credit supply to firms without commitments, rather than reduced demand for loans by these firms.

Kashyap, Stein and Wilcox (1992) propose identification of credit effects by studying the relative fluctuations in bank loans and a leading substitute for bank loans: commercial paper. Their key assumption is that since bank loans and commercial paper both provide short-term business finance, movements in commercial paper should contain information about the demand for bank credit. A rise in the ratio of commercial paper to bank loans might for instance reflect a contraction in the supply of bank credit. On the other hand, if the two aggregates move coincidently, demand factors will likely explain the overall movement. Using both the Federal Funds rate and the Romer's policy dummy variables, Kashyap, Stein and Wilcox find that following tight money, commercial paper issuance surges while loans slowly decline, which they interpret as evidence for the lending channel.

An alternative way to use information regarding substitutes for bank loans to resolve the identification problem is to study movements in relative prices rather than relative quantities. Specifically, changes in loan supply could be identified by checking if the price of loans increases relative to the price of an alternative source of finance, such as commercial paper. Using the spread between the prime rate and the commercial paper rate, Kashyap, Stein and Wilcox find that following tight money the prime rate rises relative to the commercial paper rate. The spread is also found to have forecasting power for investment even after controlling for the cost of capital. However, using simple VAR-type causality tests, Kuttner (1992) shows that the spread between the

prime rate and the commercial paper rate is a poor predictor of output. Thus, the tests with price-based indicators do not seem to be robust using US data.

Gertler and Gilchrist (1991) respond to the identification problem by examining the cyclical behaviour of small versus large US manufacturing firms, and the differential response of the two classes of firms to various indicators of monetary policy. They exploit the assumption that credit market frictions make small firms more sensitive to disturbances compared to large firms. Using two indicators of monetary policy, they find that monetary policy appears to have a larger impact on small firms. The sales growth for small manufacturing firms is found to contract at a much faster pace than that for large firms, following a Romer episode of tight money. Small firms also respond more than large firms to lagged movements in GNP.

Similarly, Gertler and Gilchrist (1993) find a compositional effect on the behaviour of US bank lending, further supporting the idea that monetary policy has a larger impact on small firms. Gertler and Gilchrist begin by showing that bank loans to small firms decline following tight money, while they actually rise for large firms. Relatedly, while short-term bank and non-bank lending rises sharply for large firms after tight money, it stays roughly constant for small firms. Large firms thus appear to have an increased need for credit to smooth the impact of declining sales after tight money, while small firms do not.

Studies using aggregate data on European economies generally provide mixed results with some providing support for the existence of a credit channel (e.g. Meuller, 2000), while others find no support (e.g. Dale and Haldene, 1995; Garretsen and Swank, 1998). Dale and Haldene (1995) indeed conclude, "The role of these bank balance sheet variables appears to be as a vehicle for transmitting monetary impulses, rather than as an independent source of such impulses."

Giovanni and Kang (1999) provide evidence suggesting that credit channels of monetary transmission aggravated the Republic of Korea's financial crisis of 1997-98. Using bank level data they find that following tight money, the spread between marginal

bank lending rates and corporate commercial paper rates widens, which they interpret as evidence for the bank-lending channel. Credit limits on overdrafts – used as a proxy to identify shifts in the loan supply – react negatively to tight money. Further, following a stiffening of bank capital adequacy requirements, banks suffering from larger negative capital shocks experience more of a marked slowdown in lending and deposit taking, and also raise their loan rates disproportionately.

Overall, the existing evidence seems to suggest that monetary transmission operates at least partially through induced shifts in loan supply. However, there are some important limitations that accompany the current empirical analysis. For example, an identification problem still remains in terms of distinguishing independent effects of the lending channel from conventional monetary channels. A further limitation highlighted by Kashyap and Stein (1993) is that in almost all cases using aggregate data, there are relatively few episodes where monetary policy shifts. The shifts occur near recessions, so that many of the correlations discussed in the empirical work to date could be uncovered by contrasting behaviour during booms and busts. The evidence that we present in Section 4.5 is based on monetary transmission in an economy, which is neither in a boom nor a recession.

4.3 ESTIMATION METHODS AND DATA

4.3.1 Estimation Methods

A common approach to deriving monetary policy shocks is the Vector Autoregressive (VAR) analysis which has, for instance, been followed by Haslag and Hein (1992), Christiano and Eichenbaum (1992), Leeper and Gordon (1992), Bernanke and Blinder (1992), Gertler and Gilchrist (1993), Leeper and Gordon (1994), Bernanke and Gertler (1995), Strongin (1995), Spencer and Haldene (1995), Estrella and Mishkin (1997) and Brunner (2000) among others.

With this approach, a direct measure of central bank policy is identified and used to study responses of the economy to observed policy shocks. Suppose a variable could be identified such that its innovations could be interpreted as policy shocks. Assume also

that perhaps because of information lags, these measurable policy shocks could be independent of contemporaneous fluctuations in other macroeconomic variables. Given these assumptions, the reduced form responses of the economy to the observed policy shocks would provide a reasonable measure of the dynamic structural effects of a monetary policy change (see for instance Bernanke and Blinder, 1992). Suppose the Ugandan economy can be represented by the following structural model:

$$M_t = \alpha_{M+}\beta_{MM} M_t + \beta_{MP} P_t + A_M(L)X_t + \upsilon_{Mt}$$
$$P_t = \alpha_P + \beta_{PM} M_t + \beta_{PP} P_t + A_P(L)X_t + \upsilon_{Pt} \qquad (5)$$

where α_M and α_P are vectors of intercept terms; M_t is a vector of macroeconomic variables; P_t is a vector containing central bank's policy instruments; β_{ij} are matrices of impact multipliers;[86] $A_M(L)$ and $A_P(L)$ are kth-order matrices of structural polynomials in the lag operator L (such that $B(L) = B_1L + B_2L^2 + \ldots + B_kL^k$); $X_t = [M_t' \; P_t']'$; and υ_{Mt} and υ_{Pt} are vectors of structural (orthogonal) disturbances. The first equation in (5) describes the behavioural relationships between M_t and all variables in the VAR model, including the monetary policy variables. The second equation in (5) describes the central bank's reaction function; that is, the relationship between its policy instruments (P_t) and all other macroeconomic variables.

In order to estimate the system, it must be transformed into a usable form, or the VAR in standard form:

$$M_t = A_M + B_M(L)X_t + e_{Mt}$$
$$P_t = A_P + B_P(L)X_t + e_{Pt} \qquad (6)$$

where A_M and A_P are vectors of intercept terms; $B_M(L)$ and $B_P(L)$ are kth-order matrix of polynomials in the lag operator L; and e_{Mt} and e_{Pt} are vectors of structural disturbances. It is assumed that e_{Mt} and e_{Pt} are serially uncorrelated with constant variances.

[86] The diagonal elements of β_{MM} and β_{PP} are zero.

Since the right hand side of the equations in (6) contains only predetermined variables and these are by definition not correlated with the error terms (assuming no serial correlation), consistent estimates can be obtained from each equation using Ordinary Least Squares (OLS). However, estimating the VAR requires an appropriate lag length to be determined. This is done by imposing cross-equation restrictions that reduce the number of lags. Though a likelihood ratio test would be applicable to any type of cross-equation restriction, it is based on asymptotic theory, which limits its usefulness in estimations with small samples (see Enders, 1995; 1996). Likelihood ratio tests are hence supplemented by multivariate generalisations of the Akaike Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC).

The equations in 6 are used to test for causality between variables; namely, a standard F-test is used to check if all the coefficients on the lagged values of a variable included in an equation are jointly significantly different from zero. A further test is the block causality test, which determines whether lags of one variable Granger-cause any other variable in the system. Implementing this test involves restricting all lags of the variable in all the equations of the other variables to be equal to zero.

To further study the interrelationships among the variables in the system, we use impulse response functions, which capture the dynamic responses of the variables contained in (X_t) to the set of structural shocks (υ_{Mt} and υ_{Pt}). These are obtained by inverting the VAR, yielding its Vector Moving Average (VMA) representation, such that the variables included in the VAR are expressed in terms of the current and past values of the *n* types of shocks:

$$X_t = \overline{X} + \sum_{i=0}^{\infty} \theta_i \upsilon_{t-i} \qquad (7)$$

where $\overline{X} = \left[\overline{M}_t, \overline{P}_t\right]$ is the unconditional mean of X_t, n is the total number of variables in the system and θ_i is an (nxn) matrix with elements $\theta_{jk}(i)$ representing impulse response functions. υ_t is an n variate white noise innovation process of X_t, such that if $t \neq s$, υ_t and υ_s are uncorrelated.

By plotting the coefficients of $\theta_{jk}(i)$ against i we can, for instance, trace the response of the macroeconomic variables (M_t) to shocks to the policy variables P_t. However, in order to identify the impulse responses, it is necessary to identify the structural form of the model from the estimated standard VAR in equation 6. A convenient Vector Moving Average (VMA) representation is one with orthogonalized innovations since they are uncorrelated both across time and across equations, hence the economic analysis can be done separately on each equation. To accomplish orthogonalization, we use the Choleski decomposition of the covariance matrix of the VAR model, suggested by Sims (1980); that is, all the elements above the principal diagonal of the covariance matrix are restricted to zero. This implies an ordering of the variables in the system such that shocks to each variable contemporaneously affect variables ordered after it but not before it. With this assumption, the parameters of the structural VAR can be obtained using the OLS estimates of the standard VAR.

The ordering of the variables is, in this case, done such that variables that we expect to have more predictive value for other variables are first. However, we take into consideration the fact that, when there is substantial correlation among innovations in variables, the decomposition of one-step variance depends strongly on the order of factorisation.

Interrelationships among the variables in the system are further analysed by studying the properties of the forecast errors. Denoting the variance of the p-step ahead forecast error of a series j in X as $\sigma_j\ (p)^2$, and decomposing the p-step ahead forecast error variance due to each one of the shocks in the VAR, we can obtain the proportion of the movements in sequence j due to its own shocks versus shocks to the other variables:

$$\frac{1}{\sigma_j(p)^2}\left[\sigma_j^2\sum_{i=0}^{p-1}\theta_{jj}(i)^2\right]+\frac{1}{\sigma_j(p)^2}\sum_{k=2}^{n}\left[\sigma_k^2\sum_{i=0}^{p-1}\theta_{jk}(i)^2\right] \qquad (8)$$

where the first expression represents the proportion of the movement in series j due to its own shocks, and the second expression represents effects due to shocks to other

system variables. Use is particularly made of the forecast error variance decomposition in isolating credit supply from demand effects, by comparing for instance the forecast error variance in loans that is explained by shocks to the GDP series, and the proportion of the GDP forecast error variance explained by innovations to the loan series. If the proportion of the forecast error variance of GDP explained by loans is higher than the proportion of forecast error variance of loans explained by GDP, it is likely that supply factors dominate the observed co-movements in the system variables.

4.3.2 The Data

The data used in the empirical analysis is a monthly time series, and covers the period January 1994 - June 2000. This period is selected because most of the financial sector reforms were not completed until 1994. The series on macroeconomic variables, i.e. base money, Consumer Price Index (CPI), Gross Domestic Product (GDP), exchange rates and interest rates, were obtained from quarterly and annual reports published by Bank of Uganda. Data on GDP is published semi-annually, but there is a monthly series on the Index of Industrial Production (IIP), which has been used in the empirical estimation instead of GDP. The exchange rate series used is the official one, and is denoted in Shs/USD. Data on loans (credit), securities, deposits, reserves and commercial bank lending rates is taken from consolidated commercial bank balance sheets and other tables found in the quarterly and annual reports published by Bank of Uganda. The lending rate is calculated as a weighted average of all bank lending rates.

4.4 DESCRIPTIVE ANALYSIS

In this section we provide a descriptive analysis of the effects of credit market imperfections on monetary policy, but first we present the descriptive statistics of the variables used in the empirical analysis in Table 4.5.

Table 4.5 Descriptive Statistics

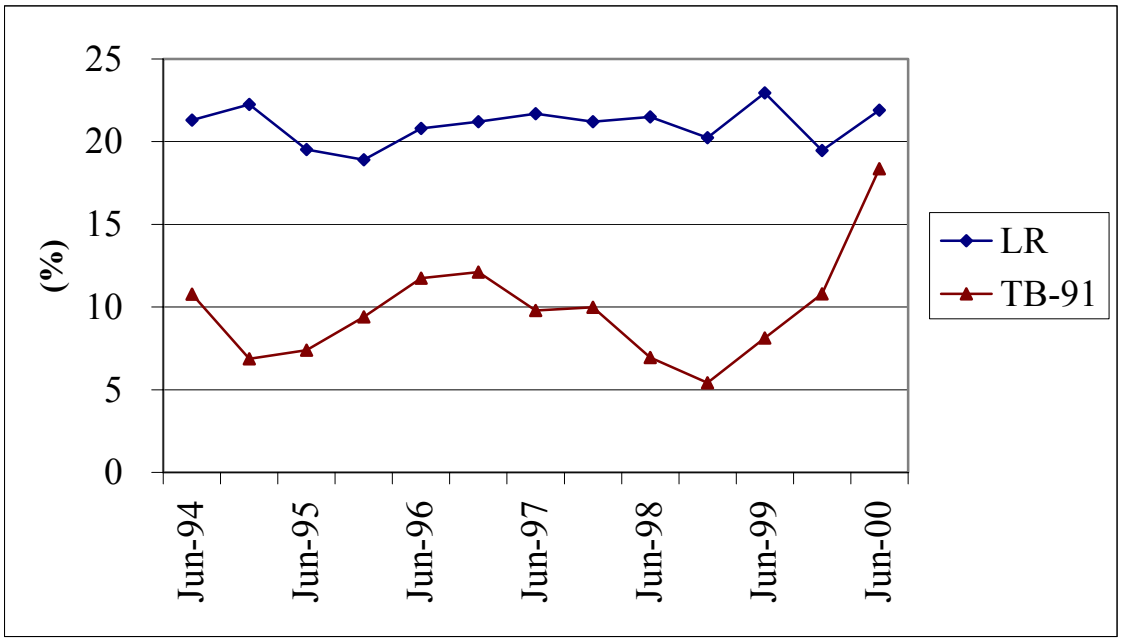
Variable	Mean	Std.Dev.	Minimum	Maximum
91-day Treasury Bill Rate	0.10	0.04	0.04	0.22
Base Money (billion Shs) (BM2)	334.84	100.27	163.96	556.94
Exchange Rate Shs/USD	1,160.22	205.36	919.78	1,579.67
Lending Rate (LR)	0.21	0.01	0.19	0.26
Consumer Price Index (CPI)	329.01	32.44	272.10	383.70
Index of Industrial Production (IIP)	425.80	105.85	235.86	603.70
Loans (billion Shs) (LNS)	348.86	104.80	184.79	502.45
Securities (billion Shs) (UGS)	132.06	94.61	15.50	322.88

4.4.1 Identifying Credit Effects

When trying to identify credit effects, it is best to start with the money view, which assumes that they are irrelevant. Under this theory, we would expect lower short-term market rates to be associated with lower bank lending rates and higher lending. We hence examine the responses of lending rates and loans to the 91-day TB rate in Figures 4.1 and 4.2 respectively, and the relationship between loans and lending rates in Figure 4.3.

As Figure 4.1 indicates, changes in the 91-day TB rate were not fully reflected in bank lending rates, which remained relatively constant during the review period. Indeed it is worthwhile noting that during the financial year 1999/2000, the 91-day TB rate showed a marked increase from 8.0 percent in 1999 to 18 percent in 2000, reflecting tight monetary policy (Table 4.3). However, bank lending rates remained relatively constant. Yet, as Table 4.4 indicates, banks increased their purchases of government securities from a ratio of 11 percent of total assets in 1999 to 17 percent in 2000. While this increase could partly be explained by the rise in the TB rate during this period, it could be indicative of bank rationing of credit by quantity.

Figure 4.1 Response of the Lending Rate to the 91-day Treasury Bill Rate



Figures 4.2 and 4.3 indicate that except for the period 1999/2000 when a rise in the TB rate was associated with a fall in loan growth, movements in loans do not have a systematic relationship with either the 91-day TB rate or lending rates, respectively - an indication that the monetary policy may have a limited impact on the economy via the interest rate channel. The seemingly insignificant relationship between the loans and the lending rate provides further evidence for the existence of credit rationing, signifying the presence of credit market imperfections.

Figure 4.2 Response of Loans to the 91-day Treasury Bill Rate

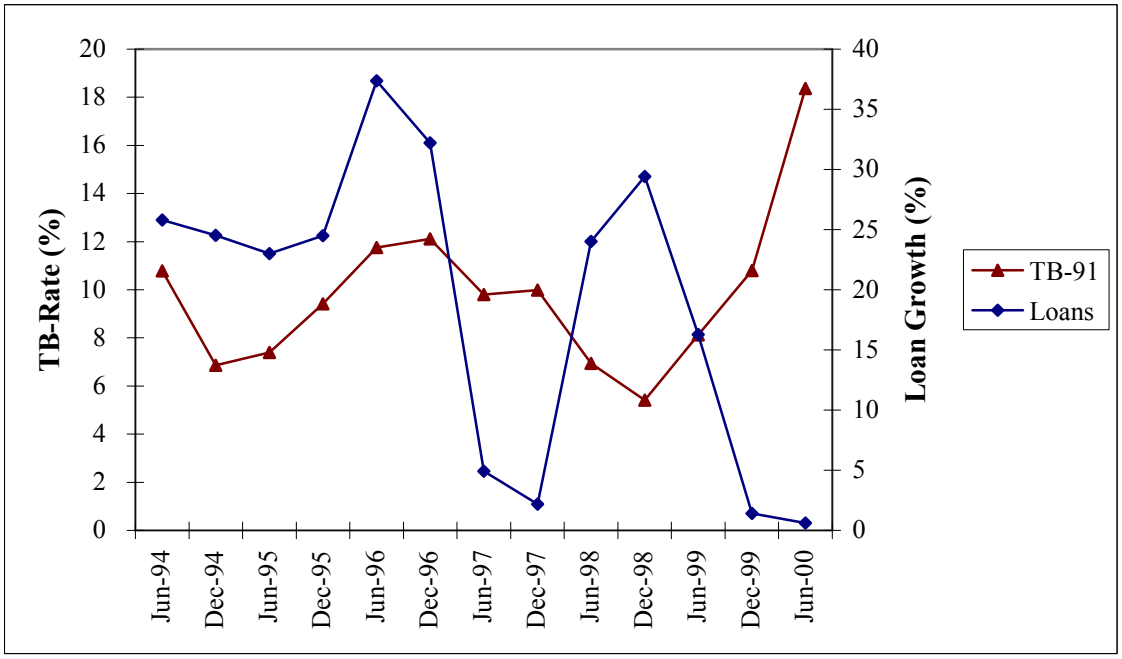
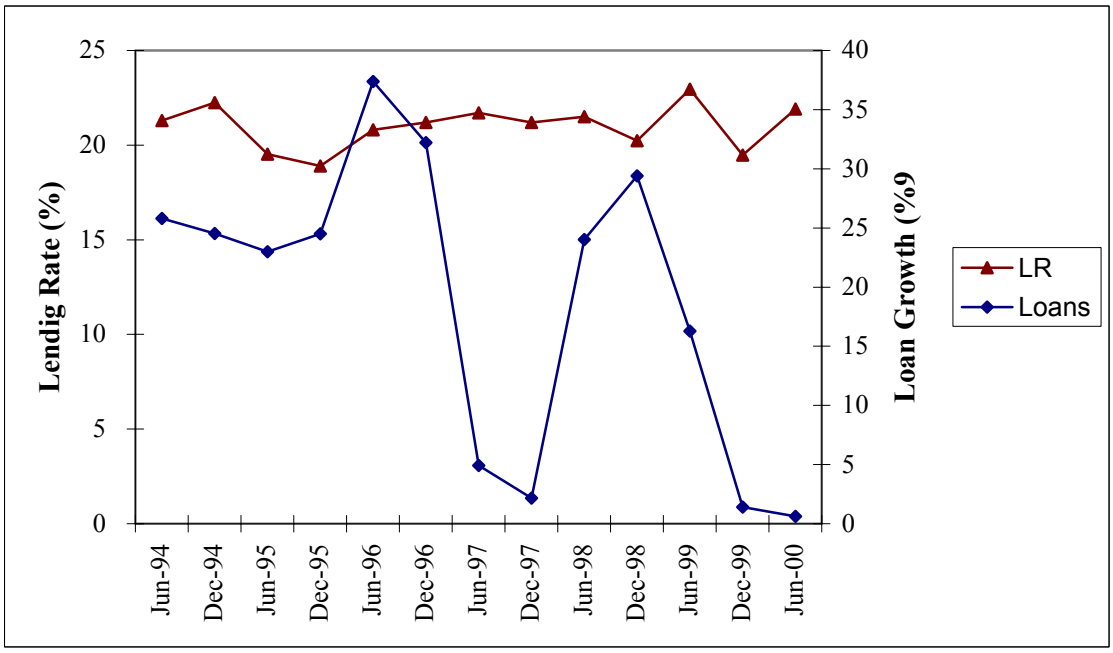


Figure 4.3 Response of Loans to the Lending Rate



One of the problems faced by many banks in the Ugandan financial system during the review period was a high level of default risk. For example, the ratio of non-performing loans to total loans averaged 27 percent, and reached a peak of 88 percent for some

banks.[87] As a consequence, banks could have been reluctant to increase their lending when market rates fell. An implication is that even if an expansionary monetary policy lowers nominal interests and may improve firms' cash flows, it may not necessarily reduce adverse selection and moral hazard problems and lead to increased lending as proposed by the "credit view."

However, as highlighted in Section 4.1, there were other distortions that could have weakened the link between the interest rate and credit. Among others, the removal of bad loans from the balance sheet of Uganda Commercial Bank during 1997 led to a sharp fall in the total stock of loans. We empirically analyse the linkages between credit market distortions and monetary policy in the next section.

4.5 ECONOMETRIC ANALYSIS

4.5.1 Selection of a Monetary Policy Indicator

We begin by empirically studying the information content of two variables in order to identify a measure of monetary policy: the 91-day TB rate and base money. If a variable is a good measure of monetary policy, and if policy affects the real economy, the variable should be a good reduced form predictor of major macroeconomic variables. Further, movements in the policy variable must generally be due to policy changes; not simply endogenous responses of the variable to changes in the economy. Thus, we assume that the policy variable is exogenous in the sense that its growth rate can be determined independently of current period information.

First, we carry out causality tests between the two policy variables and key economic non-policy variables: exchange rate, domestic CPI and Index of Industrial Production (IIP). We estimate two sets of VAR models using equation 6. Each model includes four variables: the policy variable (either the 91-day TB rate or base money), CPI, exchange rate and IIP. It also includes a constant and seasonal dummies. Our objective is to select which of the two policy variables is superior, as a forecaster of developments in the economy. The policy variable is placed first in the ordering based on the idea that if it is

[87] For a discussion of asset quality of banks during the review period, see Chapter 2.

a true indicator of monetary policy, it should not respond instantly to contemporaneous movements in other variables. All variables except interest rates are included in the VAR in log form. CPI is included in the system of equations for comparability with previous literature, and because it is presumably real money and real interest rates that affect real variables. All variables in the VAR are included in levels, for the reason that even if differencing would be appropriate, it would yield no asymptotic efficiency gain in an autoregression. In addition, information would be lost by differencing data since, for instance, co-integrating relationships among variables would not be captured in the VAR (see for instance Sims, 1980 and Doan, 2000).

Since our focus is on the predictive power of the policy variables, only causality tests between the TB rate, base money and other variables in the system are reported. Each entry in Table 6A represents a joint significance test for a policy variable (indicated at the top of the column) in a VAR, including the policy variable, CPI, exchange rate and IIP. The entries in the first column of Table 4.6A suggest an orderly pattern in which the TB rate helps predict the exchange rate (Row 3, Col. 1) and itself at a 1 percent level of significance, but does not help predict CPI and production. The entries in the second column of Table 4.6A show that lags of base money are significant in the CPI, exchange rate and production equations at 5 percent, 10 percent and 5 percent levels of significance, respectively. The lags of base money are also significant at a 1 percent level of significance in the base money equation.

The fifth row of Table 4.6A indicates marginal significance levels for the hypothesis that all lags of the policy variable can be excluded from the model. It is shown that both policy variables are important in predicting at least one of the non-policy variables in the system. However, it is necessary to decide which of the two variables is a better indicator of monetary policy - the TB rate or base money. First, we observe that although the TB rate cannot be excluded from the system of equations, it does not have predictive power for production, which is the ultimate target of monetary policy. Since base money has predictive power for production and is important in the system of equations, it is selected as a measure of the stance of monetary policy.

However, fluctuations in base money might be caused primarily by variations in the demand for, rather than the supply of, bank reserves. For example, unexpected cash withdrawals increase bank demand for reserves. In this case the information content of base money would not imply any effectiveness of the monetary policy. Instead, it would merely reflect the correlation of base money with surprises in bank deposits, which in turn carry information about future developments in the economy.

While the ordering of the variables in the VAR automatically implies the condition that supply side forces dominate short-run movements in the policy variable, it cannot be conclusive unless supplemented with other tests. One way of obtaining more conclusive results is to conduct block exogeneity tests on each of the non-policy variables. Entries in Table 4.6B indicate significance levels for the hypothesis that the coefficient on lag 0 of the non-policy variable is equal to zero in a policy reaction equation. Since base money is already selected as an appropriate indicator of the stance of monetary policy, we discuss only the entries in column 2 of Table 4.6B. It is shown that base money is not affected by pure shocks to any of the non-policy variables in the current period. Hence, we can think of this result as evidence that short-run variations in base money are mostly attributable to central bank policy decisions, and not to fluctuations in the demand for reserves.

Table 4.6 Selection of a Monetary Policy Indicator

A. Joint significance tests for policy variables in VAR including the policy variable, CPI, exchange rate and Index of Industrial Production (IIP).

	Policy Variable	
Target Variable	T-bill rate	Base money
The policy variable itself	0.000	0.000
CPI	0.254	0.044
Exchange Rate	0.001	0.070
IIP	0.365	0.054
Marginal significance levels for the hypothesis that all lags of the policy variable can be excluded from the model.	0.006	0.005
No. of lags	3	5
B. Significance level for the hypothesis that the coefficient on lag 0 of the non-policy variable is equal to zero.	*Dependent/Policy Variable*	
	T-bill rate	Base money
CPI	0.053	0.557
Exchange Rate	0.694	0.735
IIP	0.772	0.970

Note: Entries in B are based on a VAR that includes either of the policy variables, two of the non-policy variables and current and past lags of the remaining non-policy variable. Thus, low probability values in B indicate that pure shocks to the non-policy variable affect the policy variable, even though the non-policy variable may not granger cause the policy variable.

4.5.2 Identifying Credit Effects using Loans

The "credit view" predicts that an increase in base money would lead to an increase in the supply of loans, which might for instance correspond with a decrease in perceived riskiness of loans. However, since the bank loan market can clear by both quantity and price, an increase in base money, which might raise the supply of loans, may also lower the loan rate.[88] An implication is that there are possible additional credit effects via prices, and these have generally been ignored by previous empirical work. Taking into consideration that monetary policy may work through loans as well as lending rates, we test for effects of credit market imperfections using loans and lending rates, each in a different estimation.

[88] See for instance Bernanke and Blinder (1988).

First, we present a preliminary empirical analysis of the relationship between base money, CPI, loans and/or lending rates and production, which needs to hold if the credit channel is to be effective in the transmission of monetary policy. We estimate two VARs, each including base money as an indicator of monetary policy, CPI, either loans or the lending rate, IIP, a constant and seasonal dummies. From each estimated VAR, we analyse the relationship between the variables using Granger causality tests. Specifically, Tables 4.7 and 4.8 report the significance probability (*p*-value) of each of the F-tests that correspond to the joint hypothesis that the coefficients of all lags of a given variable in a given equation are equal to zero.

Table 4.7 presents evidence that base money does not help predict movements in loans as all coefficients of all the lags of base money in the loan equation are jointly not significantly different from zero (Row 1, Col. 3). Base money, however, has predictive power for production at a 5 percent level of significance (Row 1, Col. 4). It is further shown that loans do not help predict production (Row 3, Col. 4). On one hand, these results seem to imply that the presence of credit market imperfections may limit, rather than amplify, the effects of an expansionary monetary policy on the economy. This interpretation is plausible in view of the fact that many banks in the Ugandan financial system were faced with unusually high default risk in the 1990s, on account of a high level of bad loans that had accumulated in their asset portfolio. Given that prudential regulations were also strengthened during the review period, banks may have become reluctant to increase their lending during loose money. This is further reinforced by the fact that since default risk is partly explained by a culture of wilful non-repayment of loans rather than poor cash flows in firms, banks need not change their perception about the riskiness of loans during loose money.

On the other hand, there is the problem of distinguishing between demand versus supply-induced movements in money and credit. The fact that base money does not Granger-cause loans, does not necessarily speak against the credit view, since credit demand could be the force driving the movement of loans. Indeed it is shown that production helps predict loans at a 1 percent level of significance (Row 4, Col. 3). To better identify changes in the supply of credit, we compare the forecast error variance in

loans that is explained by shocks to the IIP series, to the proportion of the IIP forecast error variance explained by innovations to the loan series at a 24-month horizon (Table 4.7B).

Table 4.7 Identifying Credit Effects Using Loans

A. Joint significance tests in VAR including Base Money, CPI, Loans and IIP

	Dependent Variable			
p-values for	Base Money	CPI	Loans	IIP
Base Money	0.000	0.086	0.121	0.054
CPI	0.188	0.000	0.289	0.205
Loans	0.049	0.270	0.000	0.300
IIP	0.056	0.245	0.011	0.183
Marginal significance levels for the hypothesis that all lags of a variable can be excluded from the model.	0.033	0.061	0.068	0.000

B. Variance Decompositions of variables at a 24-month horizon

	Forecasted Variable			
	Base Money	CPI	Loans	IIP
Base Money	81.537	16.215	8.748	22.282
CPI	5.247	37.709	29.248	13.213
Loans	3.292	17.090	24.860	13.626
IIP	9.924	28.986	37.144	50.879

1. Low probability values in A indicate that at conventional significance levels, the row variable Granger causes the column variable.
2. Entries in B are the percentages of the forecast error variance of the forecasted variables accounted for by variation in the row variables at a 24-month horizon.
3. Estimates are based on vector autoregressions with 7 monthly lags of each variable.

It is shown that production (IIP) accounts for a higher percentage of forecasted error variance of loans (i.e. 37.1 percent) as compared to the forecasted error variance of production accounted for by loans (i.e.13.6 percent). This result could indicate that movements in loans are, to a large extent, attributed to changes in credit demand, rather than to changes in monetary policy. This is not surprising since factors such as unfavourable weather led to distortions in the allocation of credit by reducing growth in economic activity and hence growth in the demand for credit. The result is indeed consistent with the finding that the variation in IIP accounts for a higher percentage of the forecasted error variance of loans (37.1 percent) compared to the variation in base money (8.7 percent). The developments that led to distortions in the allocation of credit are likely to have contributed to diminishing the importance of intermediated loans as a

transmission channel of monetary policy, and hence to reduce the information content of credit regarding future developments in the real economy.

4.5.3 Identifying Credit Effects Using the Lending Rate

Turning to Table 4.8 and focusing on identifying credit effects via the lending rate (Row 3, Col. 3), it is shown that with the exception of lending rates, no variable in the system can help predict lending rates (Col. 3). Further, lending rates do not improve the forecasting performance of any of the other variables in the system (Row 3). Indeed, the marginal significance levels of all lags of variables (Row 5) indicate that the lags of the lending rate can be excluded from the system of equations (Row 5, Col. 3). These findings could imply that conventional interest rate effects of an expansionary monetary policy are not amplified and propagated via the lending rate, in contrast to the prediction of the "credit view." The weak link between monetary policy, lending rates and the economy is further shown by the low level of the forecast error variance of lending rates accounted for by base money (4.9 percent) and 4.4 percent of the movements in IIP accounted for by the lending rate.

Since there is a high correlation between innovations in the lending rate and IIP (Appendix Table A4.2), we obtain an additional set of variance decompositions by interchanging the positions of the two variables from one ordering to the other. We find that the lending rate accounts for a higher percentage of the forecast error variance of IIP when placed second to IIP (i.e. 10 percent) rather than first (4.4 percent). An implication is that causation runs from lending rates to IIP, in support of the supply side interpretation of monetary policy transmission.

Table 4.8 Identifying Credit Effects Using the Lending Rate

A. Joint significance tests in a VAR including Base Money, CPI, Lending Rate and IIP

	Dependent Variable			
p-values for	Base Money	CPI	Lending Rate	IIP
Base Money	0.000	0.080	0.902	0.027
CPI	0.724	0.000	0.857	0.188
Lending Rate	0.787	0.352	0.006	0.396
IIP	0.119	0.044	0.693	0.000
Marginal significance levels for the hypothesis that all lags of a variable can be excluded from the model.	0.051	0.733	0.555	0.105

B. Variance Decompositions of variables at a 24-month horizon

	Forecasted Variable			
	Base Money	CPI	Lending Rate	IIP
Base Money	89.387	13.130	4.860	17.919
CPI	1.737	30.122	4.253	7.894
Lending Rate	6.677	8.851	83.279	4.407
IIP	2.199	47.897	7.607	69.780
	Base Money	CPI	IIP	Lending Rate
Base Money	89.387	13.130	17.919	4.860
CPI	1.737	30.122	7.894	4.253
IIP	4.051	44.013	63.845	20.805
Lending Rate	4.825	12.735	10.342	70.081

1. Low probability values in A indicate that at conventional significance levels, the row variable Granger causes the column variable.
2. Entries in B are the percentages of the forecast error variance of the forecasted variables accounted for by variation in the row variable at a 24-month horizon.
3. Estimates are based on vector autoregressions with 5 monthly lags of each variable.
4. The two sets of results in Table 4B differ by interchanging the positions of the lending rate and IIP from one ordering to the other.

In the next step, we use innovations in base money to capture exogenous shifts in the stance of monetary policy using the above estimated VARs. Since all reduced form errors have been orthogonalised, we interpret a shock to the reduced form base money residual as a shock to the structural monetary policy reaction function. The responses of the loans, lending rates and production to an increase in base money, can hence be interpreted as dynamic effects of loose money on the banking system and the economy. Figures 4.4 and 4.5 display the responses of loans and lending rates, respectively, to a shock to base money over a horizon of 16 months. Standard error bands (of ± two standard deviations) are also included.

Figure 4.4 illustrates that the contemporaneous effect of loose money is a fall in loans. Thereafter, loans rise and fall slightly up to the forth month, before moving toward zero in the fifth month. Output seems to roughly move together with loans after the second month. The fact that loans initially fall and rise only slightly following a change in policy appears inconsistent with the view that bank loans are an important component of the monetary transmission mechanism. The fact that production and loans seem to move roughly together is consistent with the preliminary evidence presented in Table 4.7; that movements in loans largely reflect changes in loan demand, and not monetary policy. This trend is also consistent with the observed rise in loans following a shock to IIP (see Figure 4.4, the graphs at the bottom of columns 3 and 4).

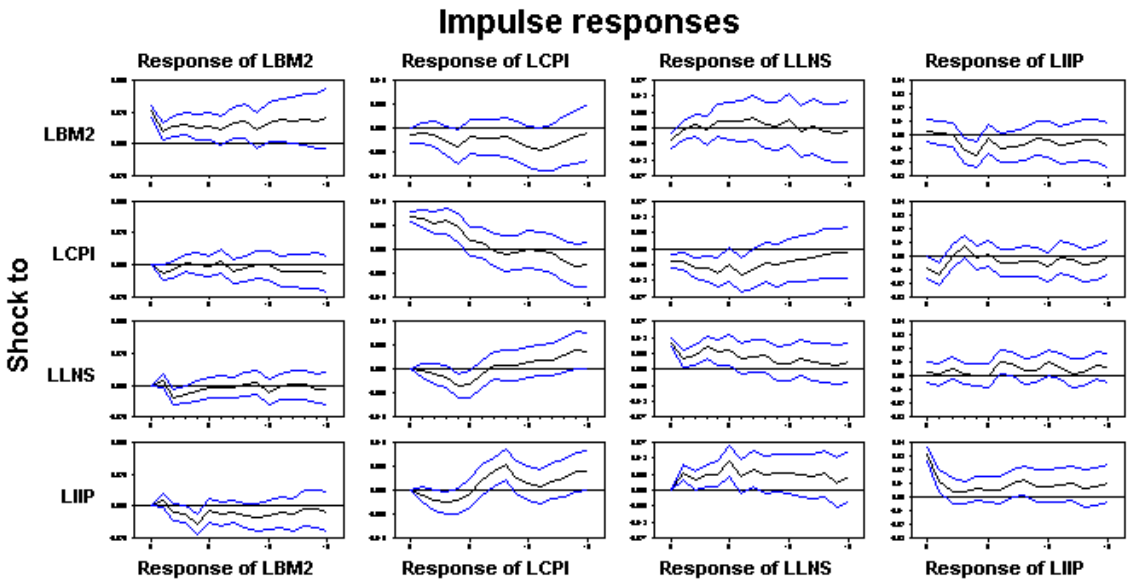


Figure 4.4 Response of Loans and Production to Base Money

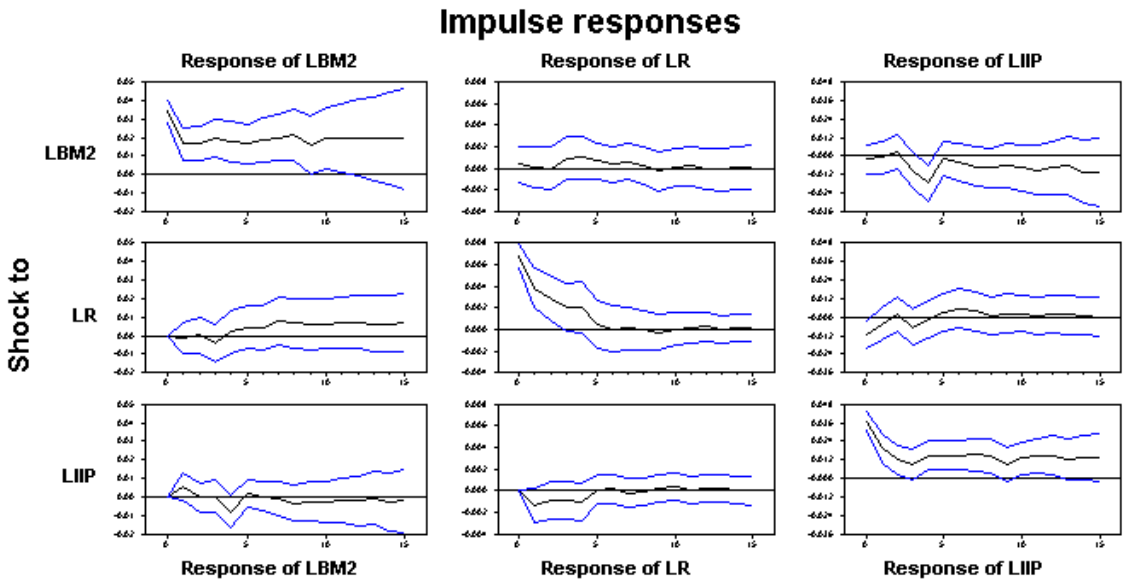


Figure 4.5 Response of the Lending Rate and Production to Base Money

In line with the Granger causality results in Table 4.8, Figure 4.5 shows that lending rates hardly react to changes in monetary policy, providing no support for positive credit channel effects from an expansionary monetary policy. In particular, a 1 standard deviation shock to base money, leads to less than 0.1 standard deviations in the lending rate, which thereafter oscillates up and down within the same range of standard deviations. The "credit view" is closely related to the theory on credit rationing, although credit rationing is not a necessary condition for the "credit view." It is often suggested that banks are slow to change lending rates when monetary policy changes. They may change non-pecuniary terms of the loan contract instead; in effect rationing credit by non-price methods. Figure 4.5 seems to support the presence of credit rationing in the Ugandan financial system. This is consistent with the observation that during the review period, growth of credit extended to the risky sector (agriculture) declined, while the ratio of government securities (a risk free asset) consistently increased (see Table 4.4). Coupled with the result that lending rates do not Granger cause loans and production, this finding indeed seems to suggest that the presence of credit market imperfections may disrupt the conduct of monetary policy.

In the last step, we further test for the effects of credit market imperfections on monetary policy, by considering the relative movements in loans and securities. We exploit the idea that since loans and securities are alternative assets for bank investments, movements in securities should contain information about the response of loans to monetary policy. For example, based on the assumptions of the "credit view," the two aggregates should move together following an increase in base money. On the other hand, a rise in the ratio of securities to bank loans following loose money might reflect either a contraction or no significant increase in bank lending. Table 4.9 presents evidence that lags in securities have a strong correlation with innovations in base money, while lags in loans are not significantly correlated with innovations in base money.

Table 4.9 Joint Significance Tests in a VAR with Base Money, Securities, Loans and CPI

	Dependent Variable			
p-values for	Base Money	Securities	Loans	CPI
Base Money	0.000	0.031	0.123	0.014
Securities	0.244	0.000	0.257	0.020
Loans	0.010	0.154	0.000	0.156
CPI	0.126	0.218	0.940	0.000
Marginal significance levels for the hypothesis that all lags of a variable can be excluded from the model.	0.012	0.048	0.007	0.253

1. Low probability values in the entries indicate that at conventional significance levels, the row variable Granger causes the column variable.
2. Estimates are based on a vector autoregression with 5 monthly lags of each variable.

Figure 4.6 further illustrates that loose money increases bank holdings of government securities much faster than intermediated loans, which could indicate either banks' preferences to invest in the risk free asset or the need to build up their stock of liquid assets. As already mentioned, these two interpretations are plausible given that banks were faced with an unusually high level of default risk in the credit market, and that prudential regulations were strengthened during the reform period, respectively. The rise in Treasury bill rates observed particularly during 1999/2000 might, however, imply that the fast increase in security holdings of banks was partly an ordinary (interest rate driven) portfolio adjustment rather than the result of banks having a lack of confidence in the credit market, or a need to build up their stock of liquid assets.

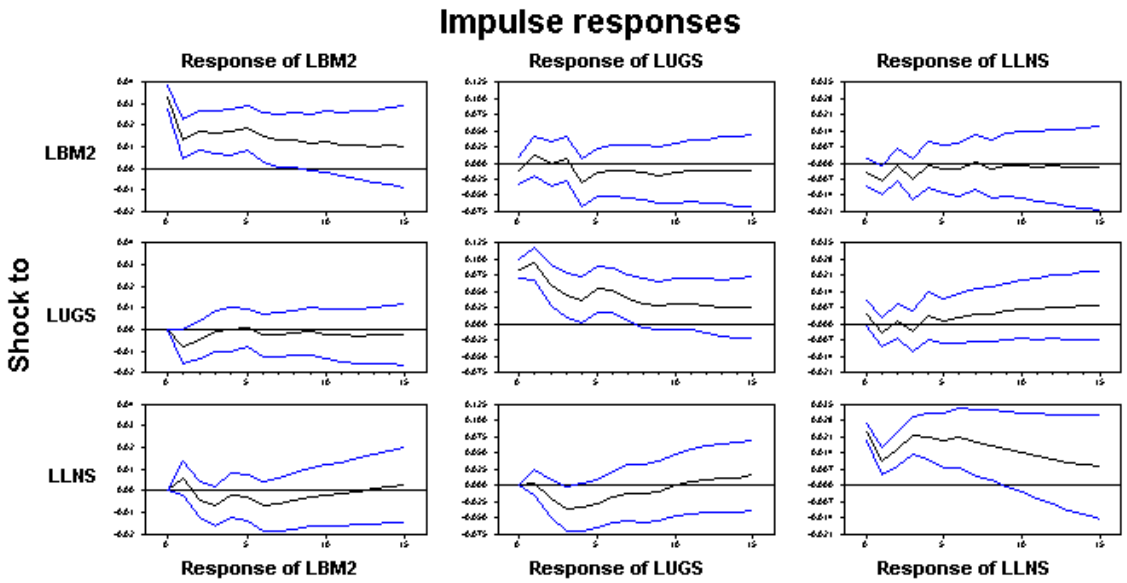


Figure 4.6 Response of Securities and Loans to Base Money

4.6 SUMMARY AND CONCLUSIONS

In this chapter we analyse the effects of credit market imperfections on the conduct of monetary policy in the Ugandan economy. While guided by assumptions of the "credit view" we study the responses of loans and lending rates to shocks to base money (an indicator of monetary policy). Among all the tests conducted, we do not find evidence for a significant role of either variable in the transmission of monetary policy shocks to output. The "credit view" predicts that an expansionary monetary policy will lead to an increase in loans extended, and possibly a fall in lending rates. However, our findings indicate that lags in loans are not significantly correlated with innovations in base money, and loans do not help predict movements in production.

A loosening of monetary policy also increases bank holdings of government securities much faster than intermediated loans, which could indicate either bank preferences towards investing in the risk free asset, or the need to build up their stock of liquid assets. These two interpretations are plausible given that banks were faced with an

unusually high level of default risk in the credit market, and that prudential regulations were strengthened during the reform period. The rise in Treasury bill rates observed particularly during 1999/2000 might, however, imply that the fast increase in securities holdings of banks was partly an ordinary (interest rate driven) portfolio adjustment rather than the result of banks having a lack of confidence in the credit market, or a need to build up the stock of liquid assets. It is also found that while innovations in loans do not help predict production, loans are significantly correlated with innovations in production. This could be explained by exogenous factors affecting the demand for credit. Such factors seem to have contributed to diminishing the role of credit as a transmission channel of monetary policy. It is further established that lending rates hardly react to changes in monetary policy.

Nevertheless, finding no support for an independent credit channel should not imply that credit market imperfections do not have any effect on the conduct of monetary policy. Indeed, since loose money would increase lending and reduce lending rates under the "money view," these findings seem to imply that the presence of credit market imperfections is likely to limit rather than amplify the effects of an expansionary monetary policy on the economy.

However, since there were significant structural and performance differences between different segments of the financial market during the review period, there may be cross-bank differences in loan supply shifts following a change in monetary policy. For example, some banks had up to 80 percent of their loans as non-performing while others recorded no bad loans. Although what we found here implies that banks faced with higher default risk may be reluctant to extend more credit during an expansionary monetary policy, it is possible that they would be more responsive to tight money (that is, to reduce loans) due to their higher degree of risk aversion. This may open a significant monetary policy channel via the supply of loans. The upward revision of minimum capital requirements effected in the year 2000, might also imply that loan supply shifts of banks suffering from large negative capital shocks will be more responsive to tight monetary policy than that of adequately capitalised banks, since such banks may not be able to offset a drain in reservable deposits by issuing large time

deposits. While there have been attempts to identify credit effects by separating banks (or groups of banks) according to asset size (Kashyap and Stein, 1994), by asset size and liquidity (Kashyap and Stein, 1997a), and by asset size and capital adequacy (Kishan and Opiela, 2000), no attempts in the literature have been done to show further existence of a credit channel by differentiating banks by asset quality. This is a task left to future work.

Lastly, our results warrant some policy prescriptions. Finding no support for loans and lending rates as independent sources of monetary transmission, seems to suggest that neither variable performs well as a leading indicator of or an information variable for monetary policy in Uganda. The likely negative impact of credit market imperfections on the conduct of monetary policy further points to the need for financial sector policies to address informational problems.

Table A4.1 Covariance Correlation Matrix – Base Money, CPI, Loans and Index of Industrial Production

	Base Money	CPI	Loans	I.I. Production
Base Money	0,0006	-0,2169	-0,3983	0,0857
CPI	0,0000	0,0000	-0,2822	-0,2762
Loans	0,0002	0,0000	0,0003	0,1432
I.I Production	0,0001	-0,0001	0,0001	0,0010

Note: Entries on/below the diagonal of the covariance matrix indicate the variance and covariances of/between variables respectively. Entries above the diagonal indicate the correlation coefficients between variables.

Table A4.2 Covariance Correlation Matrix – Base Money, CPI, Lending Rate and Index of Industrial Production

	Base Money	CPI	Lending Rate	I.I. Production
Base Money	0.0010	0.0099	0.0860	-0.0790
CPI	0.0000	0.0001	-0.0873	-0.2339
Lending Rate	0.0000	0.0000	0.0000	-0.2605
I.I Production	0.0001	-0.0001	-0.0001	0.0012

Note: Entries on/below the diagonal of the covariance matrix indicate the variance and covariances of/between variables respectively. Entries above the diagonal indicate the correlation coefficients between variables.

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