

Banking Sector Interest Rate Spread in Kenya

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Njuguna S. Ndung'u and Rose W. Ngugi

*Macroeconomic and Economic Modelling Division
Kenya Institute for Public Policy Research and Analysis*

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Abstract

A key indicator of financial performance and efficiency is the spread between lending and deposit rates. If this spread is large, it works as an impediment to the expansion and development of financial intermediation. This is because it discourages potential savers due to low returns on deposits and thus limits financing for potential borrowers. This has the economy-wide effect of reducing feasible investment opportunities and thus limiting future growth potential. It has been observed that large spreads occur in developing countries due to high operating costs, financial taxation or repression, lack of a competitive financial/banking sector and macroeconomic instability. That is, risks in the financial sector are high.

Financial reforms and liberalization should improve efficiency in the intermediation process. This implies that the spread will decline over time as liberalization is accomplished and the financial sector develops. But in Kenya, financial liberalization seems to have led to a widening interest rate spread. The main factors that appear to propel this are distortions in the loans market, institutional impediments and the policy environment. This paper presents empirical support for these views and argues that disequilibrium in the loans market is a major factor in driving the spread and has substantial feedback effects, which reflect persistence of the disequilibrium. Institutional and policy factors impact on transaction costs and compound the effects of risks and uncertainty in the market, thus exacerbating the spread.

To narrow interest rate spread, it is important to maintain a stable macroeconomic environment and thus reduce credit risks. There is also a need to minimize implicit taxes like reserve and cash ratios, accompanied by fiscal discipline to reduce the demand for financing budget deficit with low-cost funds. Banks should perform more intermediation/screening functions than simply investing in Treasury bills to enhance economic growth and promote financial development. In addition, banks should invest in information capital to reduce the moral-hazard and adverse-selection problems. Furthermore, by enhancing competitiveness in the Treasury bills market and promoting diversification of financial assets for investors, banks will have an incentive to increase deposit rates in order to compete for public funds. The result of this will be to squeeze the spread from the increasing deposit rate. Above all, strengthening the institutional base is important to enhance enforceability of contract.

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Summary and conclusions

This study attempts to explain factors behind the widening interest rate spread following interest rate liberalization in Kenya. Our analysis shows that:

- Interest rates did not follow the theoretical expectations either in level or spread. There was a modest increase initially, and when the interest rates rose and were positive in real terms they were also very high, an indication of financial distress and instability.
- The period following interest rate liberalization was characterized by macroeconomic and financial instability. There were also attempts at institutional reforms in the financial and other sectors. The reform process, however, failed in several respects to meet preconditions/prerequisites for successful financial reform.
- In addition, the period was characterized by diminishing policy credibility, especially with conflicting policy signals emanating from the monetary and fiscal authorities. This created uncertainty in the market, for example, with inflationary expectations.

Our survey shows that market fundamentals and institutional impediments influence interest rate spread. The empirical results show that:

- Disequilibrium in the loans market is a major factor that propels the widening of interest rate spread. The situation is mainly explained by the availability of deposit resources, the alternative investment channels for banks and the ease of portfolio adjustment at the end of the period.
- Institution constraints, market micro-structures and policy actions explain substantial variations in interest rate spread. This is because of their impact on the transaction costs and a compounding effect from risk and uncertainty in the market.
- Performance in the loans market reflects the macroeconomic environment where macroeconomic stability serves to reduce the risk premium and ensure positive returns for investment, reducing the credit risk. It also reflects the moral-hazard and adverse-selection

problems that are compounded by poor monitoring and evaluation of the investment projects as the banks relegate their screening roles to the background. This also reflects weak enforcement of loan contracts, which impacts on transactions costs and the risk premium on loans.

- High implicit taxes (reserve requirements) increase the spread through the lending rate as banks aim to maintain their profit margins. This is propelled by demands to finance fiscal deficit using low-cost funds.
- An attractive Treasury bills rate in a non-competitive market compels banks to shift their portfolio towards risk-free quality assets, and this reduces their intermediation role. In addition, high minimum capital for investment in Treasury bills reduces the banks' incentive to increase deposit rates.

In the light of these findings, some policy recommendations that seem to follow from the analysis and the above discussion can be outlined:

- There should be a concerted effort to strengthen the institutional framework, including a review of the regulatory and legal framework. This should target enhancing confidence among depositors and investors and strengthening enforceability of loan contracts. This will enhance stability in the financial sector, and reduce costs of capital to investors.
- Macroeconomic stability is vital for a successful financial liberalization process, thus policy actions should be taken to ensure stability and sustainable growth of the economy. Stability of key prices, including the exchange rate, commodity prices and interest rates, is crucial. This will stimulate high investment returns and reduce the credit risk, consequently reducing the risk premium tagged on to the loan interest rate. In addition, it will discourage banks from non-intermediation activities while enhancing the move towards an equilibrium position in the loans market.
- Implicit taxes should be kept at minimal levels by maintaining low reserve- and cash-requirement ratios. This will ensure that lending rates are kept down in the banks' efforts to maintain their profit margins.

- Banks should perform more of the intermediation functions than simply investing in Treasury bills. Realigning the Treasury bill rates with other returns on financial assets and ensuring competitiveness in the market can achieve this and in turn remove the distortions in the yield curve.
- Banks should also divert their efforts to investing in information capital to reduce the moral-hazard and adverse-selection problems that are compounded by poor monitoring and evaluation of investment projects.
- Conduct of monetary policy by the monetary authority should be in tandem with the overall goals of financial-sector reform and economic growth targets. The conduct of monetary policy should support growth of the financial sector. For example, the current policy conflict between monetary and fiscal policy in the use of open-market operations serves to weaken the credibility of monetary policy and reduce the incentive for financial development through financial intermediation.

1 Introduction

This study assesses the impact of financial liberalization on bank interest rate spread. A theoretical model for the relationship between spread and various factors is derived and empirically tested. The study is useful in highlighting the actions that are required to enhance efficient operation of the financial system in Kenya. The basic question is whether policy makers and the monetary authorities should focus on institutional infrastructure, the policy environment or the micro-structure of the financial system. We also pose the following auxiliary questions:

- To what extent and in which direction are policy actions reflected in interest rate spread?
- When are these policy actions most effective?

We outline Kenya's financial-sector problems and explore possible causes of interest rate spread. We provide charts of interest rate levels and spread and measures of liquidity in the banking sector. A particularly interesting measure of financial development is the spread between lending and deposit interest rates. The spread is used as a proxy for the efficiency of financial intermediation. As efficiency improves, and the financial sector becomes competitive, the spread should narrow down.

2 Motivation

A repressed financial system is viewed as a hindrance to economic growth as it promotes inefficiency in the allocation of resources (with credit controls and distorted price indicators); curtails domestic resource mobilization (with interest rates set at low levels), thus making the economy dependent on foreign savings; and supports fiscal indiscipline as the government obtains almost zero-interest-denominated resources to finance its deficit. Thus, with financial liberalization, it is expected that greater efficiency in the financial sector will stimulate savings

(hence economic growth), enhance fiscal discipline and reduce excessive dependence on foreign capital.

Financial liberalization entails a variety of measures such as liberalization of interest rates, establishing freedom of entry into and procedures for orderly exit from the banking industry, reducing reserves and liquidity requirements, eliminating or minimizing credit allocation directives, eliminating preferential credit at concessional interest rates, and removing controls in the capital account of the balance of payments (Montiel 1995).

Despite the assumed benefits of financial liberalization (McKinnon 1973; Shaw 1973), financial sectors in most developing countries are characterized by fragility, volatile interest rates, high-risk investment and inefficiencies in the intermediation process. These threaten stability of the financial sector as the system experiences banking crises, misallocation of resources, high levels of non-performing loans and high costs of intermediation. This situation is explained by:

- weak institutions with weak prudential regulations, inadequate supervision and poor enforcement of contracts and regulations
- increased risk exposure, including interest-rate, credit, legal and foreign-exchange risk
- failure to meet the prerequisites for successful liberalization, including macroeconomic and financial stability and fiscal discipline
- macroeconomic instability which increases the risk premium on loan rates, and increases the default risk with a poor business environment
- an uncompetitive market microstructure with a few banks being in control, and non-diversified financial assets.

Widening interest rate spread is an indicator of the underlying weak institutional and policy set-up of the financial sector. How does this happen? When there are no ceilings on lending rates it is easier for banks to charge a higher risk premium and therefore to give loans to more risky projects. This increases the rate of bank insolvency as non-performing assets increase. As a result, banks attempting to defend their profit margins will

charge high interest rates on the performing loans. The impact is felt more with economic shocks, when there is no hedging of such risky loans by a well-diversified portfolio, and if investment in information capital, especially to cater for adequate analysis in monitoring and evaluation of funded projects, is yet to be carried out. On the other hand, if the interbank market is not well developed and there are restrictions on the discount window, banks will face a tight liquidity situation. If this is coupled with high reserve requirements, the banks' stability will be threatened. In addition, the presence of implicit or explicit insurance promotes adverse selection and moral hazard problems, and as capital controls are relaxed, banks are exposed to foreign exchange risk.

While interest rate levels and volatility have been used to assess the impact of financial liberalization on economic growth, interest rate spreads are used as a measure of the impact of financial liberalization on efficiency in the intermediation process. In addition, the spread reflects economic activity in that it is used to forecast macroeconomic variables. Inefficiency in the intermediation process is attributable to the incentive problem, which includes both information and enforcement components. Information asymmetry promotes moral hazard and adverse selection problems. Lack of accumulation of information capital and inadequate disclosure of information ameliorate both problems, allowing for efficient allocation in the asset portfolio. However, any information gathered in the pre-reform period is nullified by institutional and policy changes. Thus, banks are required to build up their information capital once more. This is costly for the financial intermediaries as it calls for a change in institutional arrangements even though such investment is unavoidable if efficiency in the intermediation process is to be achieved.

Weaknesses in enforcement of financial contracts create credit-management problems exposing banks to legal and credit risk. These weaknesses may be manifested in an inability to make sufficiently restrictive agreements that prevent borrowers from diverting funds away from the intended purpose (fungibility), failure to disclose accurate information on borrowers, as well

as an inability to write easily enforceable legal contracts. A weak legal system (without clearly spelt out property rights) also narrows the scope of institutions and therefore the opportunity to diversify the asset portfolio. As a result, the premium charged on credit is high, keeping lending rates high and widening the interest rate spread.

The unstable macroeconomic environment that the banks find themselves in serves to exacerbate the incentive problem and increase what we might call policy-induced risks due to unstable prices and hence unpredictable returns. Similarly, the incentive problem worsens the macroeconomic conditions. Uncertainty created by price volatility increases risk, while deteriorating macroeconomic performance impacts on the creditworthiness of the borrower. A decline in output or the price of outputs reduces the value of assets for collateral, thus reducing that creditworthiness. Poor economic performance also impacts on investment returns. Poor business returns imply a weak position for the investor for repaying loans and thus the loan default rate increases. It may also reflect distress borrowing as banks borrow to repay previous loans. Consequently, productive investment declines, accelerating the deterioration in economic performance. This in turn perpetuates the increase in risk premium charged on loans. In addition, market segmentation, where there are preferred banks for deposit and credit allocation as a result of political patronage, may polarize the financial sector and increase risks, thus maintaining inefficiency in the intermediation process. Most of these factors are applicable to Kenya's financial sector and show why interest rate spread is a topical issue for research or for attention in the policy arena. A concerted effort should be made to document these factors, demonstrate trends and thus propose policy options for reducing the interest rate spread and thus improve financial intermediation. It is hoped that a more growth-friendly environment would result and therefore private investments and savings would be stimulated.

3 Interest Rate Levels and Spread

The main objective of the paper is to analyse the spread between lending and deposit rates. This spread is taken to reflect the profitability and efficiency of the intermediation process in the banking sector. However, before that is done, we provide some background information to the problem.

In Kenya interest rates were liberalized in July 1991. Financial repression theory predicts that after liberalization positive real interest rates should be realized as nominal interest rates increase from the government set low levels when price stability is achieved. The financial system also gains efficiency in the intermediation process such that the interest rate spread between the lending and deposit rate narrows. In Kenya, however, nominal interest rates increased minimally immediately after liberalization, and as inflation accelerated very high negative real rates were recorded (see Appendix Table A1). Interest rate spread widened, indicating either inefficiency in the intermediation process with weak institutional infrastructure, and/or macroeconomic instability, and/or a non-competitive structure in the banking sector. Deposit rates remained at low and almost constant levels, while lending rates began moving upwards. This may be explained by several factors:

- Lack of diversity in financial institutions and assets creating an uncompetitive financial market. For example, the stock market was still in its infancy, there were constraints on individual investors competing for government securities with a strictly set minimum investment capital level.
- Inflationary pressures because of the lack of an appropriate mechanism to hedge against future inflation. This implies that there was a preference for holding inflationary hedges rather than deposits, whose rates were low and did not change to compensate for inflation.

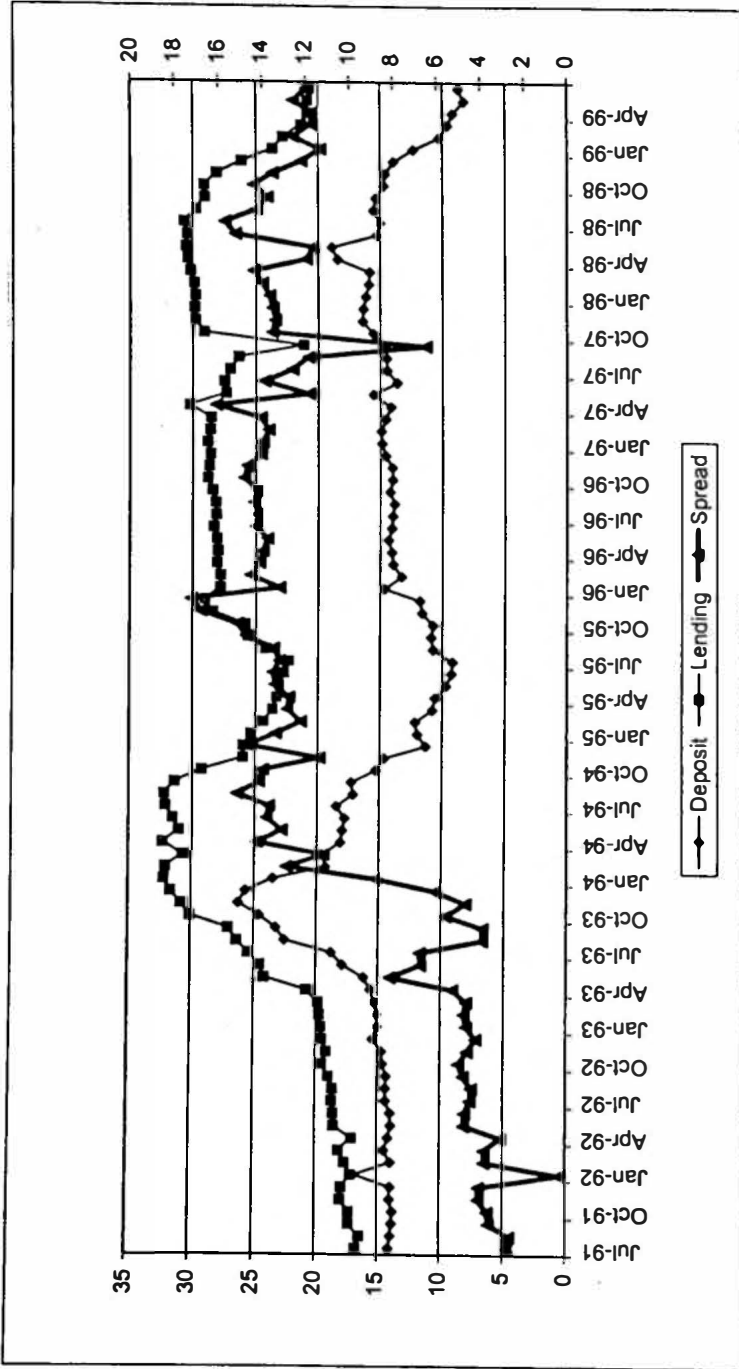


Figure1 The spread between lending and deposit rate

- Uncertainty on bank income earnings with macro and financial instability, and accumulated high liquidity coupled with lower credit demand. This reduced banks' commitment to payment of costs for deposits.
- A Treasury bill rate maintained at persistently high levels encourages banks to hold Treasury bills and thus relegate to the background their screening and monitoring roles in the financial intermediation process.

Lending rates increased gradually after liberalization and were accelerating as the sector faced a more risky environment. In addition, Treasury bill rates were kept high so that the lending rates tended to follow the Treasury bill rate over time. Even with a favourable environment for flexible interest rates, the lending rates were sticky downwards, and even when they did decline they settled at relatively high levels. The persistently high lending rates were attributed to inflationary expectations, expectations regarding exchange rate depreciation, high implicit taxes, poor loans portfolios, a non-competitive financial system, and an inefficient intermediation process. Given these trends in interest rates in both markets, a widening interest rate spread was thus evident, as shown in Figure 1.

This trend in interest rate spread can be discussed in relation to liberalization efforts and macroeconomic conditions. For example, reform measures during the period included a change to a floating exchange rate regime, trade liberalization, attempts to strengthen the regulatory system, tight monetary policy and interest rate liberalization. At the macro level, inflation accelerated, the economy went into prolonged recession, while the Treasury bill rate was very high as the Central Bank used high interest rate Treasury bills to finance the government's growing budget deficit (see Appendix Table A2). As steps towards liberalization of foreign exchange transactions, the shilling was devalued three times during the period. However, given the modest changes in lending and deposit rates, there was only a modest increase in the spread, which recorded an average of 4.3%.

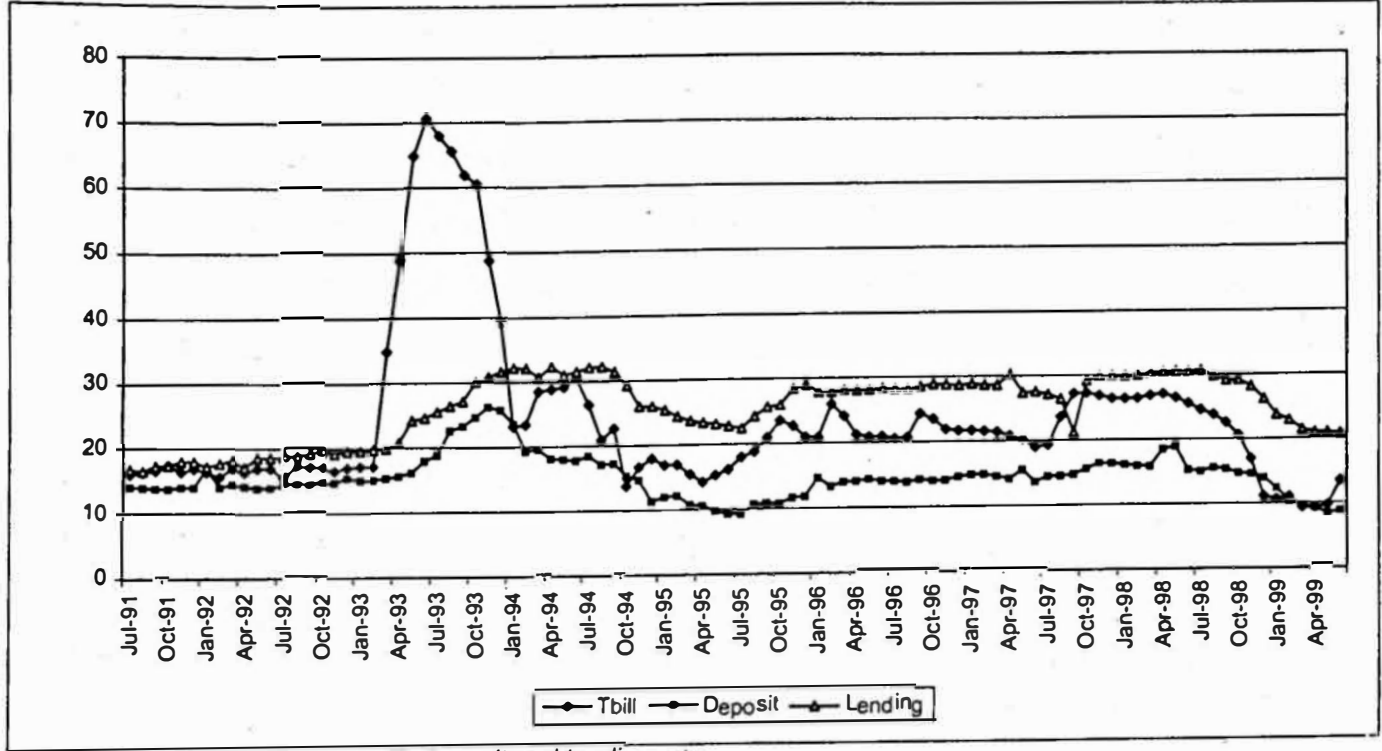


Figure 2 Treasury bill, deposit and lending rate

In the period November 1993–December 1995, a tight monetary policy was adopted with increased reserve requirements and restrictions set on the use of a discount window. At the same time, the Central Bank asked the non-bank financial institutions (NBFIs) to convert to commercial banks or retain their true status as non-banking financial institutions, and cash ratio coverage was extended to include NBFIs as a way of harmonizing the regulatory system. As the Treasury bill rate increased, other short-term interest rates increased at an even faster rate, as shown in Figure 2. However, the lending rate increased faster than the deposit rate and the spread almost tripled recording an average of 12.9%.

At the macro level, GDP performance improved following the tight monetary policy adopted—inflation came down to a single digit and attempts at fiscal discipline also brought down the deficit. In addition, the Central Bank intervened in the market to defend the exchange rate. However, credibility in monetary policy was still low and lending rates were sticky downwards with inflationary and depreciation expectations.

In the period January 1996–July 1998, interest rate spread increased very marginally. This period was characterized by efforts to enhance money and capital market performance and to strengthen the supervisory role of the Central Bank. The market was also being enlarged as several NBFIs converted to commercial banks, while others merged with their parent banks. This was a policy intended to discourage financial segmentation. Monetary policy moved towards using indirect tools. However, the economy experienced instability with a sudden outflow of short-term capital as the pull factors weakened, while foreign aid was suspended. As a result, during the following period, interest rate spread declined and averaged 8.24%.

Thus, the period covered by this analysis was characterized by various policy and institutional changes and macroeconomic instability. However, the relationship between these factors and the interest rate spread is not clear. The next section details the institutional characteristics of the financial sector.

4 Financial Market Structure

4.1 Market composition

As the financial sector develops, greater institutional diversity is expected, together with diversification of the services offered. Although Kenya's financial sector can be described as being relatively diversified in terms of the number of financial institutions,¹ banking services continue to dominate the sector. Financial reform is expected to promote competitiveness in the banking sector, although policy changes, for example on entry requirements, tend to restrict entry. In the 1970s and 1980s, the development finance institutions (DFIs) and NBFIs were set up to offer long-term credit. By 1988, the number of NBFIs had almost tripled from the 1981 level, while commercial banks experienced a 50% growth (Table 1). However, DFIs failed to deliver as expected—they faced management problems and also failed to attain autonomy from government control in financing. The mushrooming of NBFIs was attributed to weaknesses in institutional infrastructure.

The situation changed in the 1990s with the review of the Banking Act aimed at strengthening the sector's institutional framework. However, this worked to further strengthen the position of the banks in the financial system. Thus, the observed structure of the financial sector has an historical as well as a policy dimension, and in the 1990s four banks continued to dominate the sector. With this outcome, it was necessary to liberalize the financial sector with the intention of stimulating it to become more dynamic. From Table 1 it can be seen that the increase in the number of NBFIs follows an inverted U-shape with a peak of 54 in 1988. The following decline is a reflection of the number of NBFIs that collapsed, but from 1996 many of these institutions converted to banks, as indicated by the increase in the number of banks in the same

¹ The financial system had 51 commercial banks, 23 NBFIs, 5 building societies, 39 insurance companies, 3 reinsurance companies, 10 DFIs, a capital market, 13 forex bureaux, and 2,670 savings and credit cooperative societies (Ngugi and Kabubo 1998).

period. However, the banking crisis of 1998 and 1999 saw the collapse of some of the smaller of these banks.

Table 1. Growth of financial institutions, 1981–1998

Year	Number of NBFIs	Number of commercial banks
1981	23	16
1984	40	22
1985	48	24
1986	52	23
1988	54	24
1990	52	26
1993	51	33
1994	48	36
1995	39	41
1996	24	48
1997	16	53
1998	13	49*

Source: *Economic Survey*, various issues.

* There were 56 licensed commercial banks, of which 2 were yet to start operation, while 5 were placed under statutory management by the Central Bank.

Credit and deposit market

Loans continued to dominate the asset portfolio of the commercial banks and this trend has increased, while the distribution across sectors seems to reflect removal of a credit ceiling. Although at first glance these trends seem to be an outcome of liberalization, in fact several factors could be advanced to explain them. They include financial distress of the risk borrowers, where loan demand increased with increasing real lending rates; a declining role of NBFIs, or an increase in their risk rating on the credit market; and slow growth in the capital market.

It would be expected that with financial liberalization positive real interest rates would result and this would create a signal for increased mobilization of resources, thus increasing the deposits level. Time deposits as a ratio of total deposits have

indeed increased, with a rising trend in real time deposits. A peak was recorded in 1995, which to some extent reflects the shift in liabilities from the NBFIs as the latter converted to commercial banks. This partially explains why commercial banks kept their deposit rate low as there was little incentive to accumulate more deposits from the public.

Regulatory framework

An adequate regulatory framework ensures stability of the financial system. The Central Bank is responsible for supervision. In Kenya, during the reform process that followed review of the Banking Act prudential regulations were tightened, while the supervisory role of the Central Bank was strengthened. Among the statutory requirements introduced were minimum liquid-asset and cash-balance ratios for the financial institutions. A liquidity ratio was first imposed on commercial banks in 1969 (when it was set at 12.5%) and extended to NBFIs in 1974. The ratio was increased to 20% in 1983 and to 25% in March 1994, and then reduced to 20% in May 1997.

Despite these high minimum statutory requirements, banks had excess liquidity. In the 1993–1995 period, the average liquidity ratio was almost twice the minimum statutory requirement. The excess liquidity can be attributed to several factors, including ‘misses’ in the implementation process, restrictions placed on commercial banks at the discount window coupled with a thin interbank market, a high reserve requirement, and purchase of government securities. From June 1993, the overnight lending by the Central Bank was restricted in terms of eligibility of securities as collateral. The eligible securities were Treasury bills, Treasury bonds and government bearer bonds. Treasury bills were discounted only if they were half way to maturity and securities if they had at least two working days to maturity. By April 1994, commercial banks could borrow for a maximum of four days and could not exceed ten days in any one month. Bank lending on the interbank market did not qualify for borrowing from the Central Bank on the same day. A penalty of 0.2% per day was introduced for banks that failed to comply,

and banks that failed to meet the cash ratio for over 30 days were placed under statutory management.

The Banking Act has been reviewed several times to correct for weaknesses that became evident in the previous legislation, to give more legal powers to the monetary authorities and to broaden the responsibilities and coverage of institutions. The first comprehensive review was made in 1985 following the rapid growth of NBFIs that was mainly attributed to weakness in the regulatory framework. There was a change in the licensing procedures for banks and financial institutions such that institutions were expected to apply to the Ministry of Finance through the Central Bank.

Following the banking crisis of 1985/86, a deposit protection fund (DPF) was established to stabilize the banking industry. This was to be achieved through protecting the interests of small depositors who are disadvantaged by being unable to evaluate the financial status of the various banks. The DPF acted as a mechanism for liquidating the assets and paying off the liabilities of collapsed banks and financial institutions. Thus, its main activities were to manage the deposit insurance scheme, maintain confidence in the financial system and carry out the liquidation of insolvent institutions (by repaying protected deposits and dividends, debt recovery, and winding up the institutions under liquidation). In 1995, further amendments of the Banking Act were made aimed at further strengthening supervision of the banking industry. Prudential guidelines were revised to encourage self-regulation and covered codes of conduct for directors, chief executives and other employees; duties and responsibilities of directors, chief executives and management; duties and responsibilities of external auditors; and the definition of bad and doubtful advances and loans.

Minimum capital requirements influence entry to the financial sector and its stability. The capital base is a measure of the credit worthiness of financial institutions: the higher the capital base, the more stable the bank and the more stable the financial system of which it is a part. High capital requirements,

however, constrain entry and thus hinder creation of a competitive market. Thus, in 1988 the Central Bank revised capital requirements upwards to avoid a repeat of the banking crises experienced in the mid-1980s and early 1990s. To this end, the gearing ratio was raised to 7.5% from 5%. In addition, the financial institutions were required to observe the statutory reserve fund. If the reserve fund was less than the paid-up capital, the affected banks would be required to transfer 12.5% of their net profits each year to this fund. This was aimed at curbing financial crises due to the fact that banks were not providing adequately for bad debts. In order to protect the banks from capital erosion, the Banking Act was amended to allow banks to invest the reserve fund in government securities or other securities. So far few banks have met these requirements.

As shown in Table 2, although the majority of the banks show a capital ratio that is above the satisfactory level, the performance of the sector within the regulatory environment indicates an increased credit risk. Non-performing loans and advances from commercial banks increased from Ksh 31.8 billion to Ksh 37.9 billion between 1995 and 1996, an average 18% increase for the sector. In the case of banks, non-performing assets increased from Ksh 15.9 billion in 1995 to Ksh 17.4 billion in December 1996. The low asset quality was associated with poor credit administration. It may also reflect the institution's weak information capital.

The sector faced two major banking crises, in the mid-1980s and the early 1990s. The main reason for the banking crisis was under-capitalization and non-performing loans. The most hit were the NBFIs, but the number of commercial banks increased in the 1990s. This is an indication of financial fragility and loss of public confidence with the financial sector.

Table 2. Performance rating of the commercial banks (no. of banks)

Performance category	Year	Strong	Satisfactory	Fair or below	Total
Capital adequacy	1996	16 (32)	24 (48)	10 (20)	50
	1995	13 (32)	24 (59)	4 (10)	41
	1994	15 (45)	11 (33)	7 (21)	33
Asset quality	1996	17 (34)	9 (18)	24 (48)	50
	1995	15 (37)	4 (10)	22 (54)	41
	1994	17 (52)	3 (9)	13 (39)	33
Earnings	1996	22 (44)	9 (18)	19 (38)	50
	1995	24 (59)	3 (7)	14 (34)	41
	1994	19 (57)	1 (3)	13 (39)	33
Liquidity	1996	35 (70)	12 (24)	3 (6)	50
	1995	30 (73)	6 (15)	5 (12)	41
	1994	25 (76)	2 (6)	6 (18)	33
Overall	1996	9 (18)	28 (56)	13 (26)	50
	1995	10 (24)	18 (44)	13 (32)	41
	1994	14 (42)	17 (52)	2 (6)	33
Overall %	1996	18	56	29	100
	1995	24	44	32	100
	1994	42	52	6	100
Market share: assets (%)	1996	28	48	24	100
	1995	30.1	44.8	25.1	100
Market share: deposits (%)	1996	26	51	23	100
	1995	28.9	47.3	23.8	100

Source: Annual Reports Bank Supervision.

Percentages in parentheses.

5 Determinants of Interest Rate Spread

As argued above, several factors seem to influence the performance of the banking sector. They include market structure of the banking sector, the policy environment, interest rate levels, interest rate spread, and volatility of the interest rates. These factors serve as indicators of the underlying processes acting in the financial sector.

5.1 Market structure

In this section we review the literature on the factors influencing the size of the spread and empirical procedures. Internal organization and management, including government ownership and control and the regulatory framework, define market structure. For example, a repressive financial system is characterized by credit ceilings that impose uneven credit-rating criteria and reduce efficiency in resource allocation. In addition, a repressed financial system has interest rate ceilings that create a disincentive for resource mobilization as investors are poorly rewarded, while banks have no incentive to compete for deposits as extra deposits represent idle cash reserves. Consequently, deposit supply and demand is sub-optimal. In addition, the presence of government-owned and controlled banks and a weak legal system make it difficult to enforce the regulatory system. Thus, the market structure incorporates the degree of competition, concentration and interlocking control between financial institutions and business enterprises and the degree of specialization (Fry 1995).

Financial liberalization calls for the abolition of interest-rate ceilings and the promotion of free competition among financial intermediaries. It emphasizes reducing government ownership and control and the establishment of a strong regulatory and legal framework to facilitate competitiveness. Although competitiveness does not imply the non-existence of interest rate spread (Ho and Saunders 1981), the size of the spread is much higher with a non-competitive market structure. In addition, Cho (1988) argues that financial liberalization overlooks endogenous constraints to efficient allocation of resources by the banking sector where, in the absence of a well-functioning equities market, efficient allocation of capital is not realized even with financial liberalization. Fry (1995) points out that, in the absence of direct financial, equity and bonds markets, financial institutions absorb too much risk and business enterprises rely excessively on debt finance. Thus, interest rate spread will widen reflecting the substitution between debt and equity financing (Demirguc-Kunt and Huizinga 1998). However, as the equity market expands

offering competitive returns the risk absorbed by the banking sector falls, and as they increase deposit rate to compete for funds from the public, the interest rate margin declines. Thus, Fry (1995) argued that in an oligopolistic banking system there is a need for competition from the direct financial market. The question that remains is how competition can be introduced into the banking system. This is an institutional as well as a policy question.

Previous empirical works show support for market power in the loans market, indicating a non-competitive environment. For example, Ho and Saunders (1981), approximating market power with bank size, found a significant difference in spread between large and small banks, where smaller banks had higher spreads than the larger banks. The results of Barajas et al. (1996) and Elkayam (1996) also supported the hypothesis of non-competitiveness in the credit market. Elkayam (1996) observed that in a competitive banking system interest rate spread is driven solely by central bank variables (including the discount window loans, reserve requirement and interest on liquid assets deposited with the central bank). However, under a monopolistic, or oligopolistic, structure interest rate spread is also affected by the responsiveness of demand for credit and deposits to interest rate. This study finds that an increase in money supply under interest elastic demand reduces the spread more drastically in a monopolistic than in a competitive market.

5.2 Legal and regulatory framework

Functional efficiency is influenced by the regulatory and legal framework. The regulatory framework incorporates regulations by the monetary authority aimed at achieving financial stability. Thus, in the liberalization process a major goal is to achieve financial stability by creating a strong regulatory framework. Financial instability with unsound and improperly supervised lending practices may result in high real loan rates and a widening spread because of an information asymmetry problem. With adequate supervision an increase in interest rate results in banks rationing out credit instead of taking on new borrowers. Imposing different regulatory guidelines for banks

and non-bank financial institutions also results in financial-sector instability by diverting intermediation into the informal, less regulated and less taxed part of the financial system.

The legal framework incorporates the adequacy of commercial law and the efficiency with which the judicial system makes and enforces legal decisions. Weaknesses in enforcement of financial contracts will create credit management problems so that the premium charged on credit increases. This is because banks face a credit risk associated with their inability to make agreements that restrict the ability of the borrowers to divert funds away from the intended purpose, disclose accurate information on borrowers or make legal contracts easily enforceable. In addition, a weak legal system without clearly spelt out property rights hinders diversity of institutions thus denying them the opportunity to diversify risk. In their study, Demirguc-Kunt and Huizinga (1997), found that better contract enforcement, efficiency of the legal system and lack of corruption are associated with lower realized interest margins. This is because they reduce the risk premium attached to the bank lending rate. As Fry (1995) showed, liberalization in the presence of inadequate prudential supervision and regulation magnifies the impact of exogenous shocks by accommodating distress borrowing. However, it is noted that in developing countries regulations tend to be on paper but in practice are not enforced consistently and effectively. Thus, expectations for a competitive banking sector and contract enforcement have become elusive.

Deposit insurance schemes are instituted to protect the depositors and maintain stability of the financial sector. However, insurance (explicit or implicit) promotes moral hazard and adverse selection problems. Fry (1995) argues that adverse selection arises with a deposit insurance scheme, especially if accompanied by high macro instability. In addition, banks seldom seek to reduce adverse selection in credit rationing, especially if there is a positive relationship between instability and returns on alternative bank financed projects. With protection for depositors provided, banks choose riskier lending strategies, especially if macro instability produces

strongly correlated outcomes. Thus, explicit insurance for the banking system should first of all make sure that the system is stable, regulated and has effective supervision, and then that it has an adequate depository fund. This fund should have some back-up support to cushion banks against periods of financial stress or shocks.

5.3 Taxation

Reserve and liquidity requirements and mandatory investment and interest controls are categorized as implicit taxes. A reserve requirement with no interest payment tends to have a high opportunity cost as it squeezes the excess reserve available for banks to advance credit, reducing the scope of the banks' income-earning assets. Similarly, mandatory investment implies inefficient allocation of resources where banks continue giving funds to prioritized sectors despite a non-optimal rate of return, while interest rate controls limit the banks' efforts to capture high-yielding investments.

Explicit taxes, like implicit taxes on the financial intermediation process, may provide a negative effective protection to the domestic financial system and encourage financial intermediation abroad, especially if there is tax discrimination. Discriminatory taxation of financial intermediation reduces the flexibility of the system by significantly reducing the funds available for discretionary lending. Tax discrimination also leads to financial-sector instability by driving intermediation into the informal, less regulated and less taxed part of the market. The presence of explicit and implicit taxes also discourages the development of an interbank market, where the latter plays a major role in improving resource allocation and effectiveness of monetary policy. With heavy taxation at the interbank market level, all financial transactions make short-term overnight borrowing uneconomical and increase the reliance on Central Bank discount facilities that provide inexpensive and unlimited loans to banks in need of funds. However, with a restrictive discount facility, the banks may face liquidity problems and they may resort to offering attractive deposit rates to attract more deposits. For example, Barajas (1997) and Demirguc-Kunt and

Huizinga (1997) found a positive relationship between high interest rate spreads and high levels of taxation of the intermediation process, while Fry (1995) argues that the impact of the reserve requirement depends on the loans and deposit interest rate elasticity.

5.4 Macroeconomic environment

Macroeconomic instability is both a cause and effect of banking-sector performance. It increases uncertainty and adversely impacts on the credit worthiness of the borrower, thus increasing the risk premium charged by banks on lending rates. This disrupts the supply of credit as demand declines, increasing the interest rate spread. Inflation, for example, is associated with a high interest margin as it creates uncertainty and therefore raises the risk premium charged. Similarly, low output prices and a slowdown in production and economic activity generally reduce the value of assets for collateral, and therefore the credit worthiness of borrowers diminishes. This pushes banks to charge higher lending rates to cover for default risk. In an environment where the exchange rate is volatile and the interest rates are sticky downward, expectations of exchange rate depreciation will result in higher lending rates. This widens the spread.

Anticipated inflation thus leads to increased interest rate spread. Cukierman and Hercowitz (1990) found that when the number of banking firms is finite, an increase in anticipated inflation leads to an increase in interest rate spread. As the number of banks approaches infinity, that is, as the number increases (competitive case), there is no correlation between interest spread and inflation as the spread tends towards marginal cost of intermediation with increasing number of banks.

5.5 Risk factors

Banks are exposed to various risks (including interest risk, credit risk, foreign exchange risk and legal risk) as a result of uncertainty, information asymmetry and the policy environment. When banks hold deposits and loans with

unmatched maturities they are exposed to interest rate risk² as they adjust to the available assets and liabilities at the end of the period by engaging in money and secondary-market operations or roll over the deposits. A decline in market interest rate lowers the present value of the outstanding amount of loan even if the credit risk is low. This is especially so when banks raise funds through short-term deposits to finance loans or purchase security with a longer maturity period, and thus leads to a significant increase in the volatility of market interest rate. This is because the short-term interest rates are highly volatile and affected by nominal shocks.

Banks are exposed to risk in the credit market as they do not know *ex ante* the proportion of loans that will perform. To cover this credit risk, banks charge a premium whose magnitude depends on the credit policy, the interest rate on alternative assets, amounts borrowed and types of client. This increases the effective rate to borrowers and may reduce the demand for loans. With an unstable macroeconomic environment, investors face increasing risks to their investments. In addition, if lending rates are also high, investors find it costly to finance their loans. As such, instability and an escalating interest rate increase credit risk and the level of non-performing loans for banks, thus widening the spread.

Foreign exchange risk arises especially when banks borrow abroad, while legal risk is faced when the legal framework for collateral and bankruptcy is not clear. Liquidity risk arises if depositors demand to withdraw their funds leaving the banks with insufficient reserves, for example, when banks face a run as customers respond to a loss of confidence in the bank. On the other hand, banks earn zero income when holding cash and prefer to invest in order to earn some income. Decisions on the amount of excess reserves to hold relative to deposits will depend on the return on alternative uses of funds, so that the opportunity cost of holding excess reserves is the market rate (the rate that bank could obtain by lending or investing its

² This is the risk that the value of financial liabilities will fluctuate in response to change in market rates.

funds). The higher the market rate, the lower the excess reserves; thus banks trade off between being caught with no funds and having to liquidate their assets. Banks can participate in the interbank market or use the repurchase agreement for government securities to reduce their liquidity risk. Considering risk management by banks, Zarruk (1989) found that risk-averse banks operate with a smaller spread than risk-neutral banks. Thus, the expected size or scale of operation is larger in the case of risk aversion. Paroush (1994) showed that risk aversion raises the bank optimal interest rate and reduces the amount of credit supplied.

6 Modelling Interest Rate Spread

From the above review of empirical and theoretical literature, and the Kenyan experience during the period of analysis, it appears that interest rate spread is influenced by various factors including market powers, credit risk, interest risk, implicit taxes, macroeconomic policy variables and the institutional set up and the environment all these create (Figure 3). We use Ngugi's (1999) proposed model in deriving the optimal interest rate spread. The model borrows from the theoretical literature and captures the Kenya-specific situation. The model assumes market power in both the loans and deposit market reflecting the market microstructure³ and a one-period analysis. In addition, the model assumes a bank maximizes expected profits.⁴

³ While some studies assume that the bank is an interest-spread setter with both deposit and lending rates as decision variables (see Zarruk 1989; Gheva et al. 1992; Ho and Saunders 1981), others like Wong (1997) and Barajas (1997) assume that the bank sets the lending rate while the deposit market is competitive.

⁴ Zarruk (1989) and Wong (1997) assume that banks maximize expected utility of profits, and thus analyse risk preferencing. Paroush (1994), assumes that banks are risk neutral and thus maximize the expected profits.

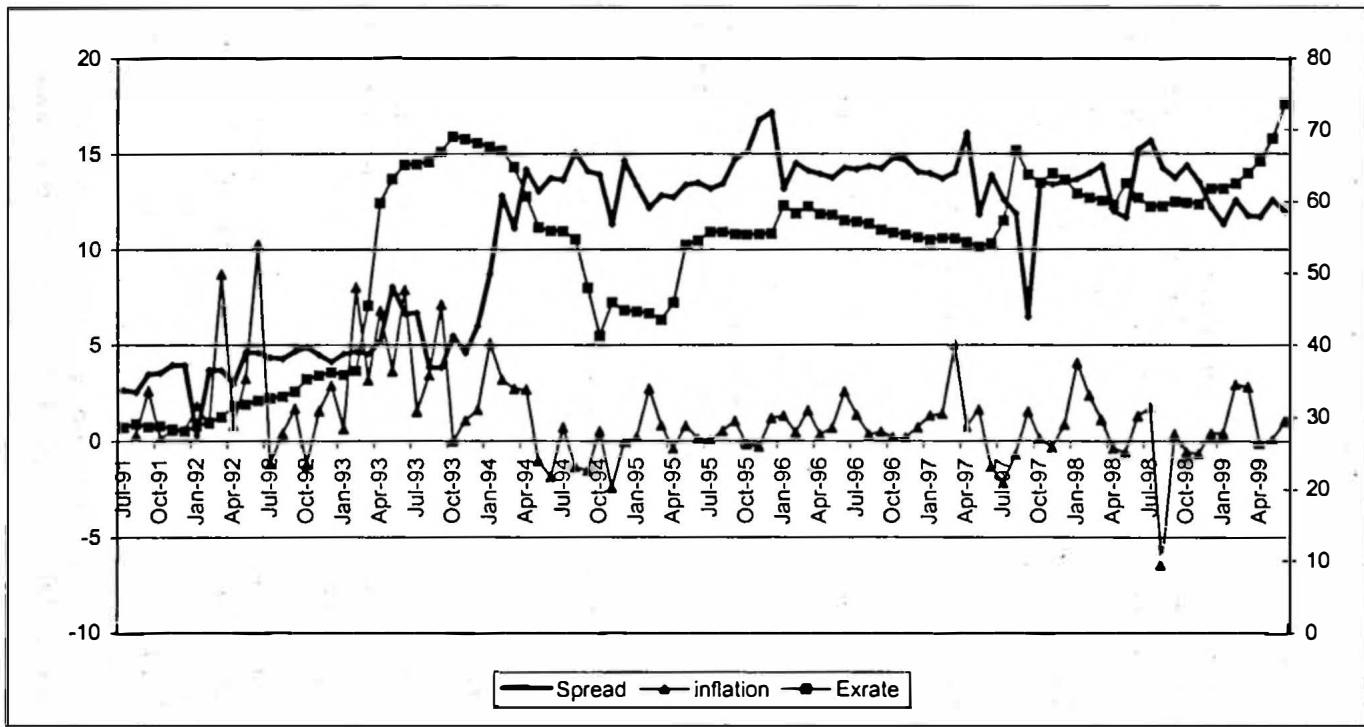


Figure 3 The interest rate spread and macroeconomic indicators

We start by laying out a simple intermediation model for the banking sector given by the following balance-sheet identity:

$$L + R + B = D + M + ONL \quad (1)$$

where L = loans, R = reserve requirements, B = government securities, D = deposits, M = secondary market operations and ONL = other net liabilities. As indicated previously, fiscal operations in the Treasury bill market heightened during the period as they were used to finance fiscal deficit with a highly attractive rate. Participation of the banking institutions in the Treasury bills auction was very significant given that this was a risk-free investment and that high minimal investment deterred most of the public from directly participating in the market. In addition, despite having a floating exchange rate regime the Central Bank intervened in the market. This is log sterilizing the effects of liquidity injection into the economy using the Treasury bills with attractive short-term returns. Thus, to stabilize the exchange rate, a high interest rate regime was necessary. This variable captures the conflicting monetary and fiscal policy actions.

Reserve requirement is a proportion (∞) of total deposit liabilities:

$$R = \infty D \quad (2)$$

We assume that no interest is paid on reserves such that the reserves are interest-free assets and reflect implicit tax to the banking system.

As discussed earlier, the credit market is dominated by a few commercial banks, thus we assume a non-competitive loans market. At the same time, we assume that the bank allocates its available funds to credit (risky asset) and Treasury bills (risk-free asset). The bank determines the credit interest rate (r_L), while the interest rate on government securities (r_B) is exogenous. Like Wong (1997), we assume away any information asymmetry that might confront a bank in setting the loans' interest. We capture information asymmetry by

looking at the banks' exposure to credit risk. Faced with credit risk, total earnings deviate from the contractual loan repayment as defined by the realized loan repayment. We express the realized earnings at the end of the period as:

$$r_L (1-w)L \quad (3)$$

where w = proportion of non-performing loans.

The amount of deposit received by the bank at the beginning of the period is determined by the net interest paid to the investors and the bank demand for liquidity. Idle reserves are costly to the bank so that banks faced with excess liquidity will have no incentive to mobilize more savings by increasing interest rate. At the same time, if the capital and money markets do not provide competition for deposits from the public, then banks will continue dominating in the deposit market in terms of setting the rewards for investors.

At the end of the period, the bank participates in the secondary market to make adjustments by raising funds from the discount window or the interbank market. The bank's liquidity gap is defined as:

$$M = L - (1 - \alpha) D \quad (4)$$

As indicated previously, when the Central Bank adopted a strict monetary policy, restrictions were set on the discount window to restrain banks from using the facility to solve their liquidity problems. At the same time, development of the interbank market was at an infancy stage and yet to become competitive. Our model assumes that a large proportion (Ψ) of the liquidity adjustment is made in the interbank market so that the discount window adjustments are treated as part of other liabilities.

We use the expressions in (2) and (4) to rewrite the bank balance sheet in (1) as:

$$L + B = (1 - \alpha) D + \Psi M + ONL \quad (5)$$

Equation (5) is used to show the earnings and costs of the banks using the respective interest rates and the following profit model, Π , is derived:

$$\Pi = r_L (1-w)L + r_b B - r_d (1-\alpha)D - r_m \Psi M - C(L, D) \quad (6)$$

Maximizing the profit function subject to the constraint implied by (5) derives the optimal spread as:

$$r_L - r_d = \frac{C_{LO}}{(1-w)\sigma} - \frac{C_{DO}}{(1-\rho)\sigma} + C_{LL} \frac{1}{(1-w)\sigma} L^* - \frac{C_{DL}}{(1-\rho)\sigma} D^* + r_m \psi \left(1 + \frac{1}{\sigma} \right) + r_b \left(\frac{1}{(1-w)\sigma} + \frac{1-\psi}{\sigma} \right) \quad (7)$$

Equation (7) defines the spread in terms of the credit risk, market power, operational costs, development of the interbank market and the fiscal–monetary policy actions. For empirical analysis, we take a general model capturing the variables indicated in equation (7), as follows:

$$S_t = \beta_0 + \beta_1 L_t + \beta_2 D_t + \beta_3 r_{mt} + \beta_4 r_{bt} + \varepsilon_t \quad (8)$$

where the betas are the reduced form coefficients from equation (7). Equation (8) is used for empirical analysis; however, it excludes some factors discussed earlier as influencing the spread. Such variables include the structural variables and those for which data were not available. The model is estimated using monthly data covering the period 1993 (4) to 1999 (6).

7 Empirical Results

Before the empirical model is estimated, the time-series properties of the variables, including the unit root tests and co-integration tests, are analysed. Results are reported in Table 3. This was crucial in order to understand the level of integration of the data series. If the data series is trended, this would provide us with reason to believe that there are persistence effects, such that the observed trend is an accumulation of historical effects from policy changes, market action or simply

shocks. If the variables show trending, then we further analyse the long-run properties. This is because we anticipate the variables to move together, so uncovering these long-run co-movements would allow us to model the short-run responses. These two aspects are necessary if the integrated data are of an order greater than zero. First they purify the regression analysis and then make sure that the standard statistical distributions are valid and hence ensure validity in interpreting the regression parameters. The derived error correction term was defined as:

$$\text{Loans} = -3.267 + 1.47 \text{ deposits} + 0.34 \text{ T-bill} + 0.19 \text{ Interbank} + 1.04 \text{ spread.}$$

This long-run relationship seems to capture the bank's supply of loans to customers and shows that this supply of loans is highly sensitive to availability of resources. It also indicates that the bank's investment in different assets is complementary and that rising spread increases the amount of loans supplied during financial distress, leading to a rise in loan interest rate. Thus, we expect that disequilibrium in the loans market will widen the spread as it feeds back to the loan interest rate.

Table 3. Summary unit root test

Variable	WS	DF	PP
Spread	-1.492 (.894)	-3.274 (.071)	-15.500 (.167)
Interbank rate	-2.117 (.565)	-2.411 (.374)	-10.485 (.404)
T-bill	-2.168 (.528)	-5.082 (.000)	-6.871 (.675)
Loans	-0.789 (.986)	-2.243 (.466)	-13.413 (.248)
Deposits	-1.570 (.870)	-1.929 (.639)	-26.911 (.017)

Note: the tests are weighted symmetric test (WS), Dickey-Fuller test (DF) and Phillip-Perron test (PP).

The general and preferred models are given in Appendix 1 Tables A3 and A4. The solved model is shown in Table 4.

Table 4. Solved model

Variable	Coefficient	t-ratio	Relative contribution
Constant	-0.002	0.444	-3.68
Deposits	0.228	3.304	27.1
Loans	-0.231	2.596	-21.5
Interbank	-0.180	3.462	-28.7
T-bill	-0.260	2.524	-20.9
ECMt-1	0.123	3.727	30.9
D958	-0.024	2.182	-18.07
D961	-0.0052	3.714	-30.8
D979	-0.038	3.167	-26.2
D9710	0.068	4.857	40.2
Seasonality	0.030	0.638	5.3

WALD test $\chi^2(10) = 41.064 (0.0000)$

AR-1 F (4,32) = .354 (.839)

ARCH 4 F (4,28) = .099 (.982)

Normality test $\chi^2(2) = .284 (.868)$

RESET F (1,35) = .027 (.870)

Theoretical expectations with regard to the explanatory variables show a positive relationship between deposits and spread, where the size of the coefficient depends on the level of implicit and explicit tax and the market structure, including market power in the deposit market and operational costs.⁵ As the market for deposits becomes more competitive, where the public is offered an opportunity to diversify portfolio allocations, the deposits rate should rise as institutions attempt to capture their share of the public deposits, thus squeezing the interest rate spread. On the other hand, high reserve requirements reduce the implicit costs and widen the spread as banks attempt to maintain their desired profit margin by imposing a higher premium on the lending rate. A positive relationship is expected between the loans and the spread, especially when the increased loans reflect financial distress. A negative relationship may be established if the increased loans are met with lower interest rates, especially in a situation where banks face high excess reserves and the macroeconomic situation is right for investment, thus reducing the risk

⁵ Ngugi (1999) gives a detail of the comparative static analysis.

premium. In addition, a negative relationship may reflect increased customer confidence such that the bank charges less and less risk premium. A positive relationship between the spread and the Treasury bill rate is expected given the negative relationship between the Treasury bill rate and deposits and the positive relationship between the Treasury bill rate and the lending rate. These relationships indicate competition for financial assets and the incentive for investment or risk premium between the Treasury bills on the one hand and the lending and deposit rates on the other.

Our results indicate that disequilibrium in the loans market results in the spread adjusting upward by 12.3% every period. The short-run results, however, seem to reflect various distortions in the market such that the responses are not driven by the fundamentals. For example, Figure 1 indicates that the spread swings up and down, and no clear relationship is apparent between the variables. The results give the coefficients different signs from those expected in the long-run relationship. However, these are short-run results, which may be explained by various factors in Kenya's financial history and policy environment. These factors include the conversion of NBFIs to commercial banks, policy changes in the Treasury bill market, macroeconomic instability, and increases in reserve requirements. The conversion of NBFIs resulted in a shift of assets and liabilities to commercial banks and did not necessarily reflect the portfolio adjustment by the banks. In the Treasury bill market the minimum investment went down, while the interest rate came down as the government moved away from relying on the Treasury bills to finance the government deficit. A reduced minimum investment resulted in competition for Treasury bills from the non-banking sector. A declining Treasury bill rate meant that the banks' profit margin was being squeezed such that they had to maintain the margin by raising interest and non-interest charges on loans, thus increasing the spread.

The model explains only 51.4% of the variations in spread, however, while 48.6% are unexplained. The remainder may be attributed to institutional factors, including the weak legal and

regulatory framework, a market structure that is not competitive and inefficient at the intermediation level, and a policy environment that compounds macroeconomic problems and risks.

8 Conclusions

This study analysed factors behind the widening interest rate spread following interest rate liberalization in Kenya.

Our survey of indicators shows that market fundamentals and institutional factors influence interest rate spread. Similar results come from the financial market structure analysis. However, due to data limitations and difficulties in capturing institutional factors, as with all empirical models having an institutional dimension, empirical analysis has been limited to observable fundamentals. Thus, as stated earlier, the empirical model explains 51.4% of the variation in spread and leaves 48.6% unexplained—a potential area for future research work to explain the residual effects.

The results show that:

- Disequilibrium in the loans market is a major factor in propelling the widening of interest rate spread. There are also feedback effects from the other fundamentals to the loans market. The factors that drive the interest rate spread are availability of deposits, alternative investment channels for banks and the ease of portfolio adjustment at the end of the period.
- Some institutional factors like micro-market structures and policy actions explain substantial variations in interest rate spread. This is because of their impact on transaction costs and the compounding effect on risk and uncertainty in the market.
- Performance in the loans market reflects a macroeconomic environment in which stability serves to reduce the risk premium and ensure positive returns for investment, thus reducing the credit risk. High implicit taxes increase the

spread through the lending rate as the banks aim to maintain their profit margins.

- At the same time, an attractive Treasury bills rate in a non-competitive market compels banks to reallocate their asset portfolio and invest in risk-free assets. This weakens the intermediation processes. The Treasury bill is a default-free commercial paper since the government cannot default on sovereign debt.

In the light of these conclusions, some policy recommendations that would follow logically from them can be outlined:

- It is necessary to strengthen the institutional framework, including review of the regulatory and legal framework. This should target enhancing confidence among depositors and investors and strengthening enforceability of loan contracts. As a result, this will enhance stability in the financial sector and reduce costs of capital to investors. It should also serve to strengthen the supervisory and monetary control role of the Central Bank and will avoid the current conflict between monetary and fiscal policy in the use of open market operations in the sale of Treasury bills. At the same time, there is an urgent need to strengthen the credibility of monetary policy. This also allows the financial sector to gain stability and thus reduce risk to investors. Enhancing enforcement of contracts would also reduce risk premium in the financial sector.
- Macroeconomic stability is vital for a successful financial liberalization process, thus policy actions should be taken to ensure sustainable growth of the economy. Stability of key prices, including the exchange rate, commodity prices and interest rates, is crucial. This will stimulate high investment returns and reduce the credit risk, consequently reducing the risk premium tagged on loan interest rate. In addition, it would discourage banks from non-intermediation activities while enhancing the move towards an equilibrium position in the loans market.
- Implicit taxes should be kept at minimal levels by maintaining low reserve- and cash-requirement ratios. This will ensure that lending rates are kept down as banks endeavour to maintain their profit margins. Banks should

perform more of the intermediation process than investing in short-term Treasury bills, and this could be achieved by re-aligning Treasury bill rates with other returns on short-run financial assets and pushing for competitiveness in the market. The end result will be to force banks to divert their efforts to investing in information capital, thus reducing the moral-hazard and adverse-selection problems that are compounded by poor monitoring and evaluation of the investment projects.

- Conduct of monetary policy should be in line with the goals of financial-sector reform and the conduct of monetary policy should support financial-sector growth. This can be achieved by using the main instrument of monetary policy, that is, the interest rate. So far it has worked to discourage financial intermediation and to turn banks into short-term deposit-taking institutions. Fortunately, some banks have recently realized that this route has weakened their operations and are reverting to long-term finance.

8.1 Some areas for further research

For a more encompassing and exhaustive empirical analysis, disaggregated financial data, especially for the banking subsector are required. These data are required in order to capture factors such as:

- credit risk, i.e. the level of non-performing loans
- market power
- transaction costs
- banks' adjustment strategies at the end of the period
- interest rate risk as reflected in loan-term structure and available deposit facilities
- an in-depth study on institutions and risk analysis.

In addition, it would be interesting to examine the information content of the spread in terms of forecasting macroeconomic variables such as investment, inflation and growth. What is the relationship between the bank interest rate margin and growth of the economy? What is the implication of widening spread on investment and mobilization of savings? These are questions

that should be addressed in future given the importance of the subject for the financial market.

This paper, its results, conclusions and policy recommendations is a first step towards a comprehensive analysis of the financial sector in Kenya. A healthy and competitive financial sector is crucial for stimulating, supporting and sustaining growth in the economy, with the private sector and fiscal and monetary authorities being an integral part.

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Appendices

Appendix 1. Data and results tables

Table A1. Real interest rates¹ and spread 1973–1996

Year	Real deposit rate	Real lending rate	Real T-bill rate	Spread
1973	-9.5	-4.92	-10.92	4.58
1974	-8.99	-5.43	-8.80	3.56
1975	-9.71	-5.74	-9.43	3.96
1976	-1.62	2.70	-0.82	4.32
1977	-11.71	-7.84	-15.04	3.87
1978	-6.27	-2.16	-5.12	4.11
1979	-3.68	0.55	-4.53	4.22
1980	-5.33	-1.89	-6.32	3.44
1981	-7.45	-6.58	-8.60	0.86
1982	-1.30	-0.28	-1.28	1.02
1983	2.53	5.57	4.81	3.03
1984	0.69	3.28	1.49	2.59
1985	7.14	9.50	9.63	2.36
1986	-1.40	0.77	-0.87	2.17
1987	0.08	3.95	3.04	3.88
1988	-1.22	1.20	-0.10	2.42
1989	-1.17	3.23	0.37	4.40
1990	-4.61	-1.10	-3.45	3.50
1991	-0.48	3.96	2.01	4.43
1992	-14.11	-9.42	-12.50	4.69
1993	-19.05	-15.99	-9.95	3.06
1994	6.78	27.82	10.62	21.05
1995	5.43	20.50	13.11	15.07
1996	3.82	16.03	9.72	12.21
1997	7.40	20.70	17.00	13.30

Source: Calculated using data from Central Bank statistical bulletins.

1 Real interest rate = ((interest rate - inflation) / (1 + inflation)) * 100

Table A2. Macroeconomic indicators, 1991–1999

Period	GDP rate	Inflation	Budget deficit	T-bill rate	Exchange rate
1991	2.2	19.6	-5.6	16.59	28.074
1992	0.5	27.3	-3.1	16.53	35.216
1993	0.2	46.0	-8.2	49.80	68.163
1994	4.0	28.8	-6.1	23.32	44.839
1995	4.8	1.6	-1.0	20.90	55.939
1996	4.6	9.0	-0.2	21.61	55.021
1997	2.3	11.2	-1.0	26.36	62.678
1998	1.8	6.6	-1.6	11.07	61.906
1999	1.4	5.0	0.5	13.40	72.911

Source: Central Bank Statistical Bulletin and Economic Survey

Table A3. General model results

Variable	Lags						
	0	1	2	3	4	5	6
Constant	-0.006						
Spread		.093 (.660)	.371 (2.775)	.378 (2.676)	.220 (.1.456)	.015 (.094)	-.515 (3.315)
Deposit	-.044 (-0.451)	.110 (1.370)	.111 (1.595)	.001 (.022)	.023 (.332)	-.020 (-.263)	-.078 (1.135)
Loans	-.160 (-1.203)	.006 (.051)	.221 (2.161)	-.103 (-1.039)	-.015 (-.164)	-.108 (-.980)	.035 (.266)
Interbank	-.128 (-1.776)	-.005 (-.064)	.035 (.502)	.106 (1.182)	.045 (.546)	.015 (.202)	-.053 (-.914)
T-bill rate	-.195 (-1.586)	.069 (.619)	-.253 (-2.086)	.069 (.556)	-.024 (-.213)	-.144 (-1.366)	.002 (.020)
ECM-1	0.143 (3.210)						
D96 (1)	-.064 (-3.656)						
D97 (9)	-.030 (-1.671)						
D97 (10)	0.071 (4.146)						
D95 (8)	-.034 (-2.157)						

R2 = .914; F(50,17) = 3.6335(.0026); σ = .0095; DW = 1.66; RSS = .0015

Table A4. Preferred model

Variable	Lags						
	0	1	2	3	4	5	6
Constant	-0.002 (-.446)						-0.414 (-5.424)
Spread			.225 (2.715)	.220 (2.706)			
Deposit		.108 (2.625)	.113 (2.533)				
Loans	-.513 (2.770)		.106 (1.539)	-.057 (-1.103)		-.120 (-2.336)	
Interbank	-.146 (-3.916)						-.028 (-1.108)
T-bill rate	-.093 (-1.604)	.094 (1.668)	-.116 (-1.910)			-.137 (-2.669)	
ECM-1	.120 (4.822)						
D96 (1)	-.050 (-5.018)						
D97 (9)	-.036 (-3.559)						
D97 (10)	.066 (6.631)						
D95 (8)	-.023 (-2.225)						

R² = .87; F (31,36) = 8.0778 (.0000); σ = .0079; DW = 2.00; RSS = .0023

Appendix 2. Derivation of optimal interest rate spread

Following from equation 6(b) the profit maximization problem is defined as follows:

$$\text{Max } \Pi = r_L (1 - w) L_i + r_b B_i - r_d (1 - \rho) D_i - r_m \Psi (L - (1 - \rho) D) - C(L_i D_i)$$

$$\text{Subject to: } L_i + B_i = (1 - \rho) D_i + \Psi M + ONL \dots (1)$$

The langragian function is expressed as follows:

$$\omega = r_L (1 - w) L_i + r_b B_i - r_d (1 - \rho) D_i - r_m \Psi (L_i - (1 - \rho) D_i) - C(L_i, D_i) + \lambda [L_i + B_i - (1 - \rho) D_i - \Psi M - ONL] \dots (2)$$

We differentiate the langragian function with respect to L_i , D_i , B_i and λ .

$$\frac{d\omega}{dL_i} = r_L (1 - w) + \frac{dr_L}{dL_i} (1 - w) L_i - r_m \Psi - C_L + \lambda (1 - \Psi) = 0 \dots (3)$$

$$\frac{d\omega}{dD_i} = -r_d (1 - \rho) - \frac{dr_d}{dD_i} (1 - \rho) D_i + r_m \Psi (1 - \rho) - C_D - \lambda (1 - \rho) (1 - \Psi) = 0 \dots (4)$$

$$\frac{d\omega}{dB_i} = r_b + \lambda = 0 \dots (5)$$

$$\frac{d\omega}{d\lambda} = L_i + B_i - (1 - \rho) D_i - \Psi M - ONL \dots (6)$$

To capture the loans and deposits elasticities and also the individual banks share in the total loans and deposit equation (9) and (10) are multiplied and divided by L & dL and D and dD respectively.

This we rewrite equation (9) and (10) as follows:

$$\frac{d\omega}{dL_i} = r_L(1-w)\phi - r_m\psi - C_L + \lambda(1-\psi) = 0 \dots 3(a)$$

$$\frac{d\omega}{dD_i} = r_d(1-\rho)\sigma + r_m\psi(1-\rho) - C_d - \lambda(1-\rho)\chi(1-\psi) = 0 \dots 4(a)$$

where

$$\phi = [1 + \eta_L \frac{dL}{dL_i} P_L]$$

$$\eta_L = \frac{dr_L}{dL} \cdot \frac{L}{r_L}$$

$$P_L = \frac{L_i}{L}$$

$$\sigma = [-1 + \frac{i}{\eta_D} \frac{dD}{dD_i} P_D]$$

$$\eta_D = \frac{dr_D}{dD} \cdot \frac{D}{r_D}$$

$$P_D = \frac{D_i}{D}$$

From equation (11) $\lambda = -r_b$, we substitute for λ in equation 3 (a) and 4 (a) to eliminate λ .

$$r_L(1-w)\phi - r_m\psi - C_L - r_b(1-\psi) = 0 \dots 3(b)$$

$$r_d(1-\rho)\sigma + r_m\psi(1-\rho) - C_d + r_b(1-\rho)(1-\psi) = 0 \dots 4(b)$$

We derive the r_L and r_d from equation 9 (b) and 10 (b) to get

$$r_L = \frac{r_m\psi}{(1-w)\phi} + \frac{C_L}{(1-w)\phi} + \frac{r_b}{(1-w)\phi} \dots (7)$$

$$r_d = \frac{C_d}{(1-\rho)\sigma} - \frac{r_m\psi}{\sigma} - \frac{r_b(1-\psi)}{\sigma} \dots (8)$$

Interest rate spread is defined as $r_L - r_d$

$$r_L - r_d = \frac{r_m \psi}{(1-w)\phi} + \frac{C_L}{(1-w)\phi} + \frac{r_b}{(1-w)\phi} - \frac{C_d}{(1-\rho)\sigma} + \frac{r_m \psi}{\sigma} + \frac{r_b(1-\psi)}{\sigma} \dots (9)$$

If we define the marginal cost as linear functions of real deposit and loans.

$$C_d = C_{d0} + D_{d1} D^* \dots (10)$$

$$C_L = C_{L0} + C_{L1} L^* \dots (11)$$

Substituting equations (16) and (17) into equation (15) we get

$$r_L - r_d = \frac{C_{L0}}{(1-w)\phi} - \frac{C_{d0}}{(1-\rho)\sigma} + C_L \frac{1}{(1-w)\phi} L^* - \frac{C_{d1}}{(1-\rho)\sigma} D^* + r_m \psi \left(1 + \frac{1}{\sigma} \right) + r_b \left(\frac{1}{(1-w)\phi} + \frac{1-\psi}{\sigma} \right) \dots (12)$$

5 Other KIPPRA Discussion Papers

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