

# **An empirical analysis of interest rate spread in Kenya**

By

Rose W. Ngugi  
*University of Nairobi*

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# 1. Introduction

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Financial intermediaries arise because of information asymmetry and transaction costs between agents. The intermediaries serve to ameliorate the problems created by information and transaction frictions. They facilitate mobilization of savings, diversification and pooling of risks, and allocation of resources. However, since the receipts for deposits and loans are not synchronized, intermediaries like banks incur certain costs. They charge a price for the intermediation services offered under uncertainty, and set the interest rate levels for deposits and loans. The difference between the gross costs of borrowing and the net return on lending defines the intermediary costs.<sup>1</sup> The wedge between the lending and deposit rates also proxies efficiency of the intermediation process. For example, under perfect competition the wedge is narrower, composed only of the transaction cost, while in an imperfect market, the wedge is wider, reflecting inefficiency in market operation.

Inefficiency in the intermediation process is a characteristic of a repressed financial system. This is because in a control policy regime selective credit policies involve substantial administrative costs, and interest rates with set ceilings fail to reflect the true cost of capital. Such a policy regime constrains the growth of the financial system in terms of diversity of institutions and financial assets and encourages non-price competition. The market fails to develop direct debt and equity to complement the banking institutions. Consequently, the asset portfolio is not diversified to reduce investment risk. If diversification of risks is optimal, idiosyncratic risk disappears and investors pay only a premium to cover the systematic risk. Risk reduction acts as a catalyst in promoting the intermediation process as savings and investment become attractive.

Inefficiency also stems from information asymmetry that is enhanced by a weak legal framework, which creates a disincentive for banks to invest in information capital. A weak legal system constrains the enforcement of financial contracts, exposing banks to legal and credit risk. This arises because of the inability to make agreements that restrict the ability of borrowers to divert funds away from the intended purpose, the lack of disclosure of accurate information on borrowers and the inability to write easily enforceable legal contracts. A weak legal system (without clearly spelled out property rights) also restricts diversification of institutions and therefore denies institutions a chance to diversify the asset portfolio. As a result, the premium charged on credit is high, keeping lending rates high while widening the interest rate spread.

Kenya's experience with the financial reform process shows a widening interest rate spread following interest rate liberalization. This period is characterized by high implicit costs with tight monetary policy achieved through increased reserve and cash ratios. In

addition, financial institutions witnessed declining profitability, non-performing loans and distress borrowing. The treasury bill rate increased as the government relied heavily on the domestic market to finance its fiscal deficit, while the expansionary fiscal policy resulted in increased inflation and tightening of monetary policy. The market was still dominated by commercial banks, especially with the conversion of non-bank financial institutions (NBFIs) and the sluggish development of the capital market. Finally, the period was characterized by macroeconomic and financial instability and yet-to-be accomplished legal reforms. The question is, which of these factors contributed significantly to the widening spread? Does this represent inefficiency or increased costs of the intermediation process? This study aims to assess factors responsible for the widening spread.

The rest of the paper is organized as follows. In Section 2 we trace the trends in the interest rate spread for the period before and after liberalization. Section 3 reviews the literature, emphasizing factors determining the interest rate spread. Section 4 covers the methodology, and Section 5 discusses the data and provides summary statistics. Empirical results are provided in Section 6, and the conclusion in Section 7.

## 2. Financial sector development

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In this section we capture the interest rate spread in four phases that are defined by changes in financial sector policies. Phase I covers the period before 1974, when interest rates remained unchanged. Phase II (1974–1979) is the period when interest rate ceilings are revised upward for the first time. In Phase III (1980–1990), interest rates assume an important role as a monetary policy instrument, while in Phase IV (1991–1999) financial reform is mounted and interest rates are liberalized. Table 1 reports on the observed trends and attempts to relate the spread to developments in the financial market and the economy in general. The period before interest rate liberalization is characterized by financial repression with selective credit controls and fixed interest rate spreads. Variations in the interest rate spread were realized when interest rate ceilings were adjusted to protect any loss in real terms following increased inflation rates. The Central Bank of Kenya (CBK) controlled inflation by increasing the liquidity and cash ratios with no interest paid on reserves. Such statutory requirements act as implicit costs to the banks. With a successful financial reform the interest rate spread narrows to reflect gained efficiency in the intermediation process and reduced costs of transactions with improved market competitiveness. The widening spread in the Kenya market in the post-liberalization period indicates a combination of market inefficiency and increased costs of intermediation. The spread represents the failure to meet prerequisites for successful financial liberalization including lack of fiscal discipline, financial instability and macroeconomic instability. It also shows poor sequencing in the shift to monetary policy tools where reserve requirements continued to take priority in curbing inflationary pressure. Furthermore, the financial market remained uncompetitive and the legal framework was still weak.

### Phase I (before 1974)

The CBK pursued a low interest rate policy aimed at encouraging investment with low-cost capital. This was achieved by fixing minimum saving rates for all deposit taking institutions and maximum lending rates for commercial banks, NBFIs and building societies. Before 1974, interest rates remained unchanged for fear that any changes would create uncertainty and adversely affect investment, but also because the impressive economic performance sustained positive real interest rates. Consequently, the maximum interest rate spread remained constant. Following the balance of payments crisis in 1971–1972, however, increased inflationary pressure induced a negative real saving rate, and a

**Table 1: Trends in interest rates, monetary aggregates and macroeconomic variables**

| Period     | Saving rate | Lend rate | Spread | Real saving rate | Real lend rate | Tbill | NBFIdep /CBSdep | Cbass GDP | NBFias /GDP | GDP grow | Exrate | Inflation | M1nliq | Avliq | M2 grow | M2/M0 | M2/GDP |
|------------|-------------|-----------|--------|------------------|----------------|-------|-----------------|-----------|-------------|----------|--------|-----------|--------|-------|---------|-------|--------|
| 1970       | 3           | 9         | 6      |                  |                |       |                 |           |             | 6.7      | 7.14   |           |        |       |         | 5.0   | 30     |
| 1971       | 3           | 9         | 6      | -0.8             | 4.8            | 1.42  | 13.6            | 22.8      | 5.0         | 6.3      | 7.14   | 3.8       | 12     | 18    | 7.5     | 5.1   | 29     |
| 1972       | 3           | 9         | 6      | -3.3             | 2.4            | 3.49  | 16.7            | 23.1      | 5.5         | 6.8      | 7.14   | 6.4       | 15     | 22    | 13.9    | 4.8   | 30     |
| 1973       | 3           | 9         | 6      | -6.3             | -0.5           | 2.12  | 15.0            | 25.5      | 6.0         | 4.0      | 6.9    | 9.5       | 15     | 25    | 24.7    | 5.5   | 32     |
| Average 3  | 3           | 9         | 6      | -3.47            | 2.23           | 2.34  | 15.1            | 23.8      | 5.5         | 5.95     | 7.06   | 6.57      | 14     | 21.67 | 15.4    | 5.1   | 30.25  |
| 1974       | 5           | 10        | 5      | -11.7            | -6.6           | 5.59  | 16.5            | 24.1      | 5.6         | 3.1      | 7.14   | 17.3      | 15     | 21    | 8.7     | 5.4   | 29     |
| 1975       | 5           | 10        | 5      | -13.8            | -8.6           | 5.70  | 21.5            | 22.8      | 6.9         | 3.1      | 8.25   | 19.5      | 15     | 19    | 17.1    | 5.5   | 29     |
| 1976       | 5           | 10        | 5      | -5.9             | -1.1           | 6.23  | 20.0            | 24.1      | 6.7         | 4.2      | 8.31   | 11.2      | 18     | 25    | 24.1    | 5.2   | 29     |
| 1977       | 5           | 10        | 5      | -9.1             | -4.2           | 1.41  | 20.1            | 27.4      | 7.5         | 8.2      | 7.95   | 14.6      | 18     | 28    | 46.8    | 5.7   | 33     |
| 1978       | 5           | 10        | 5      | -11.6            | -6.6           | 6.67  | 23.3            | 28.5      | 9.2         | 7.9      | 7.40   | 17.2      | 18     | 23    | 13.7    | 6.1   | 34     |
| 1979       | 5           | 10        | 5      | -2.8             | 1.9            | 4.45  | 27.2            | 30.2      | 10.9        | 4.2      | 7.33   | 7.9       | 16     | 23    | 16.1    | 6.1   | 36     |
| Average 5  | 5           | 10        | 5      | -9.15            | -5.73          | 5.01  | 21.43           | 26.18     | 7.8         | 5.12     | 7.73   | 14.62     | 16.67  | 23.17 | 21.1    | 5.67  | 31.67  |
| 1980       | 6           | 11        | 5      | -7.5             | -2.6           | 5.57  | 34.7            | 28.1      | 12.1        | 3.9      | 7.57   | 13.9      | 16     | 18    | -1.2    | 5.4   | 31     |
| 1981       | 10          | 14        | 4      | -1.5             | 2.1            | 9.99  | 36.3            | 27.6      | 12.9        | 5.3      | 10.29  | 11.6      | 15     | 20    | 13.3    | 5.2   | 30     |
| 1982       | 12.5        | 16        | 3.5    | -7.1             | -3.9           | 13.35 | 39.0            | 27.4      | 14.6        | 4.8      | 12.73  | 20.5      | 15     | 26    | 16.1    | 5.7   | 30     |
| 1983       | 12.5        | 15        | 2.5    | 1.0              | 3.1            | 15.00 | 45.5            | 25.4      | 21.8        | 2.3      | 13.77  | 11.4      | 20     | 20    | 4.9     | 5.5   | 28     |
| 1984       | 11          | 14        | 3      | 0.7              | 3.3            | 12.43 | 54.8            | 25.8      | 22.3        | 0.8      | 15.78  | 10.2      | 20     | 24    | 12.9    | 5.8   | 28     |
| 1985       | 11          | 14        | 3      | -1.9             | 0.8            | 14.14 | 57.1            | 25.2      | 21.9        | 4.8      | 16.28  | 13.1      | 20     | 22    | 6.7     | 5.4   | 27     |
| 1986       | 11          | 14        | 3      | 5.7              | 8.2            | 12.15 | 52.1            | 28.1      | 19.0        | 5.5      | 16.04  | 4.7       | 20     | 31    | 32.5    | 5.6   | 30     |
| 1987       | 11          | 14        | 3      | 3.0              | 5.5            | 13.00 | 52.6            | 28.9      | 13.6        | 4.8      | 16.52  | 7.7       | 20     | 31    | 14.2    | 5.3   | 31     |
| 1988       | 10          | 15        | 5      | -1.1             | 3.3            | 13.52 | 55.7            | 26.6      | 13.9        | 5.1      | 18.60  | 11.2      | 20     | 24    | 8.3     | 5.2   | 29     |
| 1989       | 12.5        | 18        | 5.5    | -0.4             | 4.3            | 14.00 | 58.6            | 27.1      | 14.5        | 5.0      | 21.60  | 12.9      | 20     | 24    | 20.8    | 5.5   | 31     |
| 1990       | 13.5        | 19        | 5.5    | -1.9             | 2.9            | 15.93 | 66.0            | 28.7      | 16.1        | 4.3      | 24.08  | 15.6      | 20     | 30    | 15.5    | 5.7   | 31     |
| Average 11 | 11          | 14.91     | 3.91   | -1.0             | 2.45           | 12.64 | 50.22           | 27.17     | 16.61       | 4.2      | 15.75  | 12.07     | 18.73  | 24.55 | 13.1    | 5.48  | 29.64  |

Table 1 continued

| Period  | Saving rate | Lend rate | Spread | Real saving rate | Real lend rate | Tbill | NBFIdep /CBSdep | Cbass GDP | NBFias /GDP | GDP grow | Exrate | Inflation | Minliq | Avliq | M2 grow | M2/M0 | M2/GDP |
|---------|-------------|-----------|--------|------------------|----------------|-------|-----------------|-----------|-------------|----------|--------|-----------|--------|-------|---------|-------|--------|
| 1991    | 12.9        | 20        | 7.1    | -6.0             | 0.3            | 16.77 | 59.1            | 30.3      | 16.5        | 2.2      | 28.07  | 19.7      | 20     | 22    | 20.9    | 5.8   | 34     |
| 1992    | 12.8        | 22.3      | 9.5    | -12.7            | -3.9           | 16.96 | 51.1            | 36.5      | 16.7        | 0.5      | 35.22  | 27.1      | 20     | 31    | 33.6    | 5.8   | 39     |
| 1993    | 11.3        | 38.6      | 27.3   | -31.2            | -5.4           | 39.34 | 42.4            | 36.0      | 16.3        | 0.2      | 68.16  | 46.0      | 20     | 50    | 25.7    | 5.9   | 37     |
| 1994    | 8.6         | 30.9      | 22.3   | -18.6            | 1.6            | 17.90 | 37.5            | 40.6      | 15.0        | 3.0      | 44.84  | 28.8      | 25     | 53    | 30.4    | 6.6   | 41     |
| 1995    | 6.9         | 33.5      | 26.6   | 5.0              | 23.9           | 20.90 | 25.6            | 45.0      | 10.2        | 4.8      | 55.94  | 1.6       | 25     | 41    | 18.4    | 6.7   | 41     |
| 1996    | 8.0         | 36.5      | 29.6   | -1.0             | 20.2           | 21.60 | 16.7            | 50.4      | 7.5         | 4.6      | 55.02  | 9.0       | 25     | 42    | 23.8    | 7.8   | 45     |
| 1997    | 9.7         | 33.7      | 24     | -1.3             | 16.9           | 26.40 | 8.2             | 52.0      | 5.1         | 2.4      | 63.05  | 11.2      | 20     | 37    | 16.6    | 7.7   | 46     |
| 1998    | 7.9         | 28.6      | 20.7   | 1.2              | 17.1           | 11.10 | 8.7             | 47.3      | 4.3         | 1.8      | 61.82  | 6.6       | 20     | 38    | 2.4     | 7.4   | 40     |
| 1999    | 10.9        | 27.1      | 16.2   | 6.7              | 18.6           | 20.5  | 7.2             | -         | -           | 1.4      | 73.94  | 3.5       | 20     | 40    | 3.9     | 6.9   | -      |
| Average | 9.89        | 30.13     | 20.37  | -6.7             | 9.93           | 17.41 | 23.32           | 37.57     | 9.16        | 1.9      | 54.01  | 13.95     | 21.67  | 39.33 | 19.5    | 6.73  | 32.3   |

Note: This table captures nominal and real minimum saving and maximum lending rates. Real interest rates are calculated as  $r = (i-\pi)/(1+\pi)$ . Interest rate spread is defined as the difference between the nominal lending and saving rates measuring the maximum spread. Financial market structure is captured using the financial deepening proxied by the M2/GDP ratio; the ratio of NBFi's and commercial bank assets to GDP (NBFias/GDP; and Cbass/GDP); and the ratio of NBFi deposits to commercial bank deposits (NBFIdep/CBsdep). Policy actions are proxied by the minimum reserve requirement (Minliq), M2 growth, money multiplier (M2/M0) and the treasury bill rate (Tbill).

Source: Central Bank, *Statistical Bulletin*, (various issues).

control policy regime was adopted. To curb inflationary pressure, a cash ratio was imposed on commercial banks at 5% and credit controls were tightened, especially on imports of consumer durable goods. The cash ratio was rescinded in 1972 and in its place the liquidity ratio introduced in 1969 at 12.5% was raised to 15%. The liquidity ratio, which intended to allow banks a hedge against liquidity risk, was extended to cover the NBFIs in 1974.

These actions pulled in conflicting directions. A controlling policy regime distorts the operation of the market and increases inefficiency. Statutory requirements increase the implicit costs, especially if no interest is paid on the reserves. Kenya's financial market was not competitive, with a few commercial banks dominating the sector, while the stock market remained almost dormant as an alternative source of long-term finance. Thus, the spread reflected inefficiency in the financial market, with the high transaction costs attributable to control on credit and interest rates.

## Phase II (1974–1979)

The first review of interest rates in the post-independence period was made in June 1974. At that time the rise in inflation following the first oil crisis made both lending and saving rates negative in real terms. The maximum lending rate was increased by 1%, while the savings rate went up by 2% and the spread was reduced by 1%. Following the coffee boom in 1976/77, inflation came down but with the expansionary fiscal policy, money supply went up, the liquidity ratio was increased and in 1978 the cash ratio was reintroduced. Interest rates offered by government securities were low in order to cause a shift toward quality assets, while the credit guidelines made asset portfolio reallocations inflexible. The effects of these changes were felt in 1979; inflation came down and lending rates became positive in real terms, as money supply was brought under control. However, deposit rates were set at a low level and remained negative in real terms.

The structure of the market changed following the coffee boom as Kenyans started investing in the financial sector and setting up NBFIs. This was made possible by a regulatory framework with lenient entry requirements. For example, the minimum capital requirement for NBFIs was relatively low compared with commercial banks and they were not subjected to the cash ratio. They were allowed to charge higher lending rates and they earned a higher margin compared with commercial banks. For example, for the period before 1974, NBFIs enjoyed a spread of 9%, which was 3 percentage points above the commercial bank margin; in the second phase they had an average of 7%, which was 2 percentage points above the commercial bank margin. Commercial banks set up NBFIs to circumvent the stringent controls and NBFIs mushroomed in a sector previously dominated by commercial banks. NBFIs deposits grew rapidly as a ratio to commercial bank deposits, increasing from an average of 15% in Phase I to an average of over 20% in Phase II. Financial deepening gained very marginally, however.

## Phase III (1980–1990)

During this period interest rates were reviewed several times in an effort to allow commercial banks more room to compete and greater flexibility to meet the needs of customers, thus narrowing the difference in interest rates between NBFIs and commercial banks. The reviews also aimed to make interest rates responsive to changes in the international markets so as to provide protection against adverse movements of funds internationally. In addition, because interest rates have an important role as an instrument of monetary policy, adjustments were made to contain inflationary pressure. For example, the minimum saving rate was increased by 1% in 1980 to a record 6%. In 1981, the saving rate increased to 10% and in 1982 to 12.5%; interest on deposits then became positive in real terms. The rate was reduced to 11% in 1984 following the decline in inflationary pressure. The maximum lending rate was raised to 16% in 1982 and then dropped to 14% in 1984. As a result, the spread narrowed from 5% to 3% in 1980 and 1984, respectively. Further reviews were made in the late 1980s following the increased inflationary pressure resulting from increased money supply. The savings rate increased to 12.5% and 13.5% in 1989 and 1990, but with high inflation it remained negative in real terms. The maximum lending rate was raised to 18% and 19% and the spread widened to 5.5%. By 1990, the CBK had achieved its objective of harmonizing NBFIs and commercial bank interest rates, as both institutions faced the same level of lending rate ceiling and maximum interest rate spread.

Following the high inflationary pressure in the early 1980s, the minimum reserve requirement was increased in 1983, and in 1986 the cash ratio was reintroduced, at the rate of 6%, and the liquidity ratio was raised to 20%. Inflationary pressure was mainly attributed to an expansionary fiscal policy and the second oil crisis experienced at the end of the 1970s. When a tight fiscal policy was adopted in 1983 and 1984, inflation came down. However, this was not sustained as expansionary fiscal policy was again experienced in the mid 1980s, making achievement of monetary policy effectiveness difficult.

There was tremendous growth in the number of NBFIs, from 23 in 1981 to 48 in 1985 and 54 in 1988. At the same time commercial banks increased from 16 in 1981 to 24 in 1988. Commercial banks owned 12 of the largest NBFIs by 1985. Competition intensified between the NBFIs and commercial banks in both the deposit and the credit markets. The deposits for NBFIs as a ratio to commercial bank deposits increased to an average of 50%, from 34.7% in 1980 to 66% in 1990. Because of low entry capital requirements and inadequate supervision, however, most NBFIs were under-capitalized and poorly managed. They mismatched asset and liability maturities, invested in riskier assets, and squeezed their margins by offering higher rates than commercial banks. Ultimately, they faced a credit squeeze, with systemic problems of illiquidity and insolvency affecting a large part of the NBFIs sector. For the period 1984–1989, two commercial banks and nine NBFIs were in problems.

In response to the financial crisis, the Banking Act was reviewed and approved in 1989 with the aim of enhancing the regulatory and supervisory functions of the CBK.



NBFIs were subjected to stringent licensing and operating regulations, where for example the minimum capital requirement was raised as indicated in Table 2.

A deposit protection fund (DPF) was established to enhance the stability of the banking industry by protecting the interests of depositors, especially small depositors who may not have the capacity to evaluate the financial conditions of the banks. The DPF serves as a mechanism for liquidating the assets and paying off the liabilities of failed banks and financial institutions. All deposit taking banks and financial institutions licensed to carry on banking services in Kenya are required to contribute to the fund. Each member pays an annual contribution fee equal to 0.15% of the previous year's average deposits, or Ksh300,000, whichever is higher. The maximum deposit loss covered by the fund is Ksh100,000, consisting of the aggregate credit balance of any accounts maintained by a customer less any liabilities of the customer to the bank or financial institutions.

**Table 2: Minimum capital requirements for financial institutions (Ksh millions)**

| Institution                    | 1980 | 1982 | 1985 | 1994 | 1997 |
|--------------------------------|------|------|------|------|------|
| Bank incorporated in Kenya     | 5    | 10   | 15   | 75   | 200  |
| Bank incorporated outside      | 50   | 100  | 150  | 200  | 200  |
| NBFI incorporated in Kenya     | 1    | 1    | 7.5  | 37.5 | 150  |
| NBFI incorporated outside      | 5    | 5    | 7.5  | 150  | 150  |
| Mortgage incorporated in Kenya | 1    | 1    | 7.5  | 37.5 | 200  |
| Mortgage incorporated outside  | 5    | 5    | 7.5  | 150  | 500  |

Source: Kimura (1998).

## Phase IV (1991–1999)

Interest rates were liberalized in July 1991. Although financial theory predicts an increase in interest rates in a post-liberalization period, in Kenya the minimum saving rate declined from 13.5% in 1990 to 6.9% in 1995, while the maximum lending rate increased to a peak of 38.6% in 1993. As a result, the spread assumed a rising trend. Interest rate liberalization was mounted amidst increasing inflationary pressure and deteriorating economic conditions, indicating a failure to meet the prerequisite for successful financial reform.<sup>2</sup> Inflationary pressure was attributed to the expansionary fiscal policy, which saw an increase in money supply. In addition, the financing of the fiscal deficit shifted to the domestic market using treasury bills and this accelerated the increase in interest rates. As a result, the lending rate went up while the low savings rate became negative in real terms in the first half of the 1990s.

The savings rate increased during the second half of the 1990s but never reached the rates recorded early in the decade. Lending rates declined, but settled at higher levels compared with the period immediately after liberalization. The interest rate spread peaked in 1996.<sup>3</sup>

## *Monetary policy*

During the period, the sector witnessed a shift to indirect monetary policy tools, marked by the first auctioning of treasury bills in the primary market in 1991.<sup>4</sup> The treasury bill market was viewed as a mechanism for facilitating the shift to an indirect monetary policy framework as it allowed the authority to influence the reserve money through the OMO. To enhance its role, treasury bill auction techniques and procedures for tender were revised in 1993. Acting as sales agent for the government, the central bank determined the volumes to be sold in the primary auction, using budgetary needs and monetary policy considerations as guides.

Following the increased money supply and peaking of inflation, the cash ratio was reactivated and raised to 8% in April 1993.<sup>5</sup> It was then increased to 10% in July 1993, 12% in October and 14% in December 1993. The ratio was further raised to 16% in February 1994 and then 20% in March 1994, before declining to 18% in September 1994, 15% in October 1997 and 12% in December 1998. Interest of 5% was paid on the reserves for a short period (December 1995 to May 1996) in order to create an incentive for the banks to reduce their lending rate. The increased cash ratio was accompanied by penalties for institutions failing to meet the set targets. At the same time, activities at the discount window were discouraged by punitive rates as compared with the earlier practice of allowing distressed banks access to the CBK overdraft facility and the discount window. For example, from 1 June 1993, overnight lending by the CBK 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 if halfway 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 only four days and could not exceed ten days in any one month. Bank lending in the inter-bank market did not qualify for borrowing from the CBK 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 the statutory requirement.

Although the tight monetary policy seemed to reduce the money supply, its effectiveness remained elusive especially in the presence of expansionary fiscal policy. Tight monetary policy, with a credible money market, is expected to yield growth in financial assets and liabilities. However, the experience was an increasing money multiplier measured as the ratio of  $M2/M0$ , which implies a temporary loss of monetary control and loss of public confidence. In addition, only marginal gains were realized with financial deepening, with the increasing  $M2/GDP$  to some extent showing a shift in assets and liabilities from the NBFIs to commercial banks as it coincided with the time when NBFIs were converting to commercial banks.

Monetary policy faced a challenge following the reversal of capital flows after the liberalization of the exchange rate in October 1993, where the CBK faced a loss of foreign exchange reserves. A strong linkage between the money and foreign exchange markets was portrayed, as developments in the treasury bill market were associated with the high interest rate differential that attracted capital inflows. The inflow of capital

fueled inflationary pressure that did not come down till mid 1994. In the face of capital inflows and appreciation of the exchange rate, the CBK intervened to limit the appreciation and sterilize the domestic liquidity through the massive sale of treasury bills. These actions were not enough to bring down liquidity injection from the capital inflows, however, as parts of the monetary expansions were attributable to fiscal expansion. Thus, there was need at the same time to achieve fiscal discipline. Another intervention was made in April 1995 to contain further depreciation and loss of international reserves. This was achieved by tightening fiscal policy and extending the reserve requirements to NBFIs. In 1996, the CBK increased the sale of treasury bills to sterilize liquidity injected into the economy due to the large purchase of foreign exchange by the central bank from the inter-bank market and to minimize the impact of increased government borrowing from the central bank. This saw a rise in the treasury bill rate, which pulled up the lending rate. High treasury bill rates were accompanied by excess holding of liquidity by the commercial banks, an indication of a shift in quality assets. A decline in treasury bill rates was desirable to pull down the lending rates. However, even when the treasury bill rate came down, the reduction of lending rates was sluggish and when they did decline they settled at a high level.

By 1996, the restrictions on the use of the discount window were relaxed and new facilities introduced to stabilize commercial bank liquidity. The repurchase order (REPO) was introduced in September 1996, to be used in the money market by the CBK to alter reserve levels, thus improving the bank's efficiency in the day-to-day management of banking system liquidity. The REPO<sup>6</sup> increased the liquidity of existing short-term instruments, especially government securities used in the market, and hence their marketability. At the same time, borrowing from the central bank was relaxed and treasury bills were accepted as collateral for either borrowing or discounting regardless of their time to maturity and even when commercial banks participated in the inter-bank market.<sup>7</sup> By January 1996, the central bank stopped displaying the OMO interest rate on the Reuter in order to allow participants in the inter-bank market to set their interest rates competitively without reference to OMO. Thus, the CBK negotiates OMO rates with individual investors depending on the supply and demand for liquidity in the money market.

### *Regulatory framework*

The review of the Banking Act aimed to harmonize the regulatory framework across institutions. Together with the removal of interest rate regulatory differences, the minimum capital requirements were equalized. There was a change in the licensing procedures of the banks and financial institutions, where institutions were expected to apply to the Ministry of Finance through the CBK. In addition, NBFIs were to convert to commercial banks following the adopted universal banking policy; several NBFIs did so by the mid 1990s as indicated in Table 3. This saw a decline in size of the NBFIs subsector and commercial banks again dominated the sector.

**Table 3: Conversion of NBFIs to commercial banks**

| Action                                      | 1994     |          | 1995     |          | 1996     |          |
|---|----------|----------|----------|----------|----------|----------|
|   | Approved | Commence | Approved | Commence | Approved | Commence |
| Converted and commenced operation as bank   | 5        | 0        | 11       | 9        | 4        | 11       |
| Approved; yet to commence operation as bank | 1        |          | 2        | 2        |          |          |
| Merged institutions                         | 3        | 1        | 1        | 6        | 5        | 2        |
| Converted to mortgage finance               | 1        |          | 1        |          |          |          |

Source: Central Bank of Kenya.

Prudential regulations were tightened in order to strengthen CBK's supervisory role. For example, in 1995 prudential guidelines were prepared to encourage self-regulation, including the code of conduct of directors, chief executives and other employees, duties and responsibilities of directors, chief executives and management, appointment duties and responsibilities of external auditors, and provisions for bad and doubtful advances and loans. The minimum cash balance requirement was extended to NBFIs.

The amendments of 1996 saw the monetary authority gain more independence in formulating and implementing monetary policy. For example, the following conditions were set for lending to the government and commercial banks:

- Terms of loans to banks limited to six months.
- All loans secured by treasury bills or other government instruments specified by the CBK.
- Advances to the government secured with negotiable government securities that mature within 12 months and at market rate.
- Maximum outstanding advance to the government at any time limited to 5% of the gross current revenue of the government in appropriate account pertaining to the latest audit.

### *Composition of the banking sector*

As a financial sector develops, institutional diversity is expected together with diversity of services offered. Moreover, financial reform is expected to promote competitiveness in the banking sector. Although Kenya's financial sector is described as significantly diversified in terms of the number of institutions,<sup>8</sup> banking sector services continued to dominate the sector. In addition, a few banks continued to dominate the banking sector; four major commercial banks shared over 60% of the total credit.

## *Performance of the financial sector and banking institutions*

Maintaining financial stability is crucial to the achievement of positive results from the liberalization process. In Kenya, the sector faced two major banking crises, in the mid 1980s and during the early and late 1990s. Between 1993 and 1996, 6 commercial banks and 12 NBFIs faced insolvency problems. In 1998, five banks were placed under statutory management. The main factors in the financial sector crisis include: under-capitalization, non-performing loans, over investment in speculative property market, which saw a decline in prices, insider lending to directors, loans to non-viable projects under the influence of officials, difficulties in recovering non-performing loans through the judiciary, and conflict of interest in those cases where shareholders participate in day-to-day management of their banks.

By 1997, 11 NBFIs and 5 commercial banks were placed under liquidation as shown in Table 4. In 1996 a total of 4.2% of the total deposits for liquidated banks were under protection, and 79% of the protected deposits had been paid. In 1997, the total protected deposits were 6.8%<sup>9</sup> of the total deposits and 71% had been paid. On the debt recovery, in 1997, the total debt collected was 17.7% of the total at closure date, compared with 16% in 1996. Lack of securities documentation and unresolved court cases hampered the loan collection process.

**Table 4: Institutions liquidated, debt collected and deposits paid by deposit protection fund (DPF)**

| Year                    | Number | Debt at closure (Ksh) | Debt collected (Ksh) | Total deposits (Ksh) | Deposits protected (Ksh) | Deposits paid (Ksh) |
|-------------------------|--------|-----------------------|----------------------|----------------------|--------------------------|---------------------|
| <b>NBFIs</b>            |        |                       |                      |                      |                          |                     |
| 1993                    | 9      | 5,500                 | 1,742                | 5,530                | 236                      | 173                 |
| 1994                    | 2      | 1,662                 | 118                  | 908                  | 63                       | 31                  |
| 1995                    | 0      |                       |                      |                      |                          |                     |
| 1996                    | 0      |                       |                      |                      |                          |                     |
| <b>Commercial banks</b> |        |                       |                      |                      |                          |                     |
| 1993                    | 1      | 3,955                 | 617                  | 4,680                | 461                      | 254                 |
| 1994                    | 1      | 1,433                 | 103                  | 2,526                | 121                      |                     |
| 1995                    | 0      |                       |                      |                      |                          |                     |
| 1996                    | 3      | 3,010                 | 173                  | 3,172                | 448                      | 356                 |

Source: Deposit Protection Fund Annual Reports (various issues).

Loans dominate the asset portfolio of the commercial banks, although government securities comprise an increasing share of the portfolio, as shown in Table 5. The larger loan proportion partly reflects the financial distress of the risk borrowers where loan demand increased with increasing lending rates, the declining role of NBFIs in the credit market and the slow growth of the capital market as an alternative source of credit. The level of non-performing loans increased to over 30% of the total loans, which was a

major factor defining the decline in profitability of the banks. Consequently, the provision for bad loans increased as a requirement to improve banks' asset quality. The overall performance of the banks indicates a decline as the proportion of banks rated "strong" went down (Table 5).

**Table 5: Performance of the banking sector (%)**

|  | 1994  | 1995  | 1996  | 1997  | 1998  | 1999  |
|--|-------|-------|-------|-------|-------|-------|
| <i>Measuring performance using rating scale</i>  |       |       |       |       |       |       |
| <i>Capital adequacy</i>  |       |       |       |       |       |       |
| Strong   | 45    | 32    | 32    | 49    | 55    |       |
| Satisfactory   | 33    | 59    | 48    | 33    | 32    |       |
| Fair and below   | 21    | 10    | 20    | 19    | 13    |       |
| <i>Asset quality</i>   |       |       |       |       |       |       |
| Strong   | 52    | 37    | 34    | 29    | 35    |       |
| Satisfactory   | 9     | 10    | 18    | 14    | 14    |       |
| Fair and below   | 39    | 54    | 48    | 57    | 51    |       |
| <i>Earnings</i>  |       |       |       |       |       |       |
| Strong   | 57    | 59    | 44    | 33    | 29    |       |
| Satisfactory   | 3     | 7     | 18    | 10    | 14    |       |
| Fair and below   | 39    | 34    | 38    | 57    | 57    |       |
| <i>Liquidity</i>   |       |       |       |       |       |       |
| Strong   | 76    | 73    | 70    | 66    | 57    |       |
| Satisfactory   | 6     | 15    | 24    | 13    | 14    |       |
| Fair and below   | 18    | 13    | 6     | 21    | 29    |       |
| <i>Overall</i>   |       |       |       |       |       |       |
| Strong   | 42    | 52    | 6     | 15    | 21    |       |
| Satisfactory   | 24    | 44    | 32    | 45    | 40    |       |
| Fair and below   | 18    | 52    | 29    | 40    | 40    |       |
| <i>Measuring bank performance using ratios calculated using the consolidated balance sheet and income statements</i> |       |       |       |       |       |       |
| Loan/total assets  | 38.83 | 46.35 | 46.70 | 48.84 | 49.89 | 54.83 |
| Treasury bills/total assets  | 17.93 | 9.86  | 12.70 | 11.36 | 16.72 | 16.40 |
| Loan interest income/total earnings  | 60.67 | 56.09 | 62.32 | 64.09 | 64.08 | 57.41 |
| Treasury bill income/total earnings  | 11.68 | 12.07 | 12.81 | 12.08 | 14.47 | 13.24 |
| Profit before tax/total assets   | 11.17 | 13.00 | 12.86 | 12.05 | 11.62 | 11.44 |
| Non-performing loans/total loans   | 20.17 | 18.05 | 18.09 | 30.55 | 32.01 | 41.21 |
| Provisions for bad loans/total loans   | 2.15  | 1.07  | 1.10  | 2.35  | 3.94  | 5.26  |

Source: Central Bank of Kenya.

### 3. Literature review

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Interest rate spread is defined by market microstructure characteristics of the banking sector and the policy environment. In differentiating between the pure spread and the actual spread Ho and Saunders (1981) observe that pure spread is a microstructure phenomenon, influenced by the degree of bank risk management, the size of bank transactions, interest rate elasticity and interest rate variability. Zarruk (1989), considering risk management by the bank, found that risk-averse banks operate with a smaller spread than risk-neutral banks, while Paroush (1994) explains that risk aversion raises the bank's optimal interest rate and reduces the amount of credit supplied. Actual spread, which incorporates the pure spread, is in addition influenced by macroeconomic variables including monetary and fiscal policy activities. Hanson and Rocha (1986) emphasize the role of direct taxes, reserve requirements, cost of transactions and forced investment in defining interest rate spread.

#### Market structure

Market structure encompasses the degree of competition, which reflects the number of market players and the diversity of financial assets, the market share of individual participants, ownership structure and control, policy regime (controlled vs uncontrolled), and the adequacy of the legal and regulatory framework (see Fry, 1995). In a market where the government sets interest rates and credit ceilings, allocation of resources is inefficient because of uneven credit rationing criteria and the lack of incentive by banks to compete for public deposits. In addition, the allocation of funds to poor performing sectors increases the credit risk for commercial banks. With interest ceilings, however, banks are constrained in charging the appropriate interest rate on loans, and the only option is to offer the minimum possible interest rate on deposits. Further, the presence of government owned and controlled banks creates an uncompetitive environment and to some extent makes it difficult to enforce the set regulatory framework, weakening the stability of the banking sector.

Financial reform emphasizes the abolition of interest rate and credit ceilings and the promotion of a competitive environment with reduced government control and ownership. Although achieving competitiveness does not imply nonexistence of an interest rate spread, Ho and Saunders (1981) note that the size of the spread is much higher in a non-competitive market, which also calls for strengthening the regulatory and legal framework to enhance the stability of the market. Caprio (1996) notes that a weak legal system, where the

courts are not oriented toward prompt enforcement of contracts and property rights are ill defined, increases credit riskiness and banks have no incentive to charge lower rates. Cho (1988), in addition, observes that the liberalization theory 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) explains that in the absence of direct financial markets and an equity and bonds market, financial institutions absorb too much risk, as business enterprises rely excessively on debt finance. Thus, conclude Demirguc-Kunt and Huizinga (1997), the interest spread fluctuates, reflecting the substitution between debt and equity financing. As the equity market expands, offering competitive returns, banks increase their deposit rates to compete for funds from the public. The expanded market also reduces the risk absorbed by the banking sector and banks charge competitive lower lending rates, reducing the interest rate margin. Thus, remarks Fry (1995), even in an oligopolistic banking system, there is need for competition from the direct financial market.

Empirical results show that market imperfections widen the interest rate spread. 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 large banks. Barajas et al. (1996) also show a significant influence of loan market power on the interest spread. Elkayam (1996) observes that in a competitive banking system. The interest rate spread derives solely from central bank variables (including the discount window loans, reserve requirement and interest on liquid assets on deposit with the central bank), while under a monopolistic (or oligopolistic) structure the interest rate spread is in addition affected by elasticities of demand for credit and deposits. He also found that there was more market power in the credit market than the deposit market. In addition, considering monetary policy, Elkayam (1996) found that an increase in money supply under elastic demand reduces the spread more in a monopolistic than in a competitive market.

## Legal and regulatory framework

The regulatory and legal framework influences the functional efficiency of banking institutions and thus defines financial stability. In the reform process, financial stability is identified as a prerequisite for successful financial liberalization. Financial instability, with unsound and improperly supervised lending practices, increases the risk premium charged on loan rates and widens the spread. This is because weak supervision gives rise to moral hazard and adverse selection problems. With adequate supervision an increase in interest rates results in banks' rationing credit instead of taking new borrowers. However, regulatory differences across financial institutions destabilize the financial sector by diverting intermediation into the informal, less regulated and less taxed part of the sector.

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 create credit management problems and the premium charged on credit increases. This is because banks are unable to make agreements that limit the ability of borrowers to divert funds away from the intended purpose, to disclose accurate information on borrowers, and to write easily enforceable legal contracts. On the other hand, a weak legal system without clearly spelled out property rights denies the diversity of institutions a chance to diversify risk. Banks have no incentive to invest in information and human capital, which propels the information asymmetry problem. 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 of the reduced risk premium attached to the bank lending rate. As Fry (1995) explains, liberalization in the presence of inadequate prudential supervision and regulation magnifies the impact of exogenous shocks by accommodating distress borrowing. Notable is that in developing countries, regulations exist on paper but in practice they are not enforced consistently and effectively.

A deposit insurance scheme is instituted to protect the depositors and maintain the 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 deposit insurance schemes, especially if they are accompanied with high macro instability. On the other hand, banks never seek to reduce adverse selection in credit rationing, especially if there is a positive relationship between instability and returns on alternative banking financed projects. With protection for depositors provided, banks choose riskier lending strategies especially if macro instability produces strongly correlated outcomes. Thus, in setting up explicit insurance schemes, the banking system must be fairly stable, prudential regulation and bank supervision effective, and funding for the depository fund adequate. Also, the fund should have the necessary backup support that may be required to get the system through a period of stress.

## Taxation

**B**oth implicit and explicit taxes widen the interest spread as they increase the intermediation costs. These include: reserve requirement, withholding taxes, stamp duties, transaction taxes, value added taxes, profit taxes and license fees.

Reserve and liquidity requirements, mandatory investment levels, and interest controls are categorized as implicit taxes. A reserve requirement with no interest payment tends to have a higher opportunity cost as it squeezes the excess reserve available for banks to advance credit, reducing the bank's income earning asset. However, Fry (1995) observes that the impact of a reserve requirement will depend on the elasticity of loan and deposit interest rates. On the other hand, mandatory investment, where banks continue providing funds to priority sectors despite the rate of return, squeezes the bank profit margin if the sector's investment yield is low. And interest rate controls limit the bank's efforts to capture high yielding investments.

Explicit taxes, just like the 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 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 the inter-bank market, which can play a major role in improving resource allocation and the effectiveness of monetary policy. With heavy taxation at the inter-bank market, 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. In case the discount facility is restrictive, however, then banks may face liquidity problems and be forced to offer attractive deposit rates to attract more deposits. Conversely, interest ceilings prevent banks from negotiating terms of inter-bank loans and insufficient penalties for shortfalls in required reserves. Barajas et al. (1996) and Demirguc-Kunt and Huizinga (1997) saw a positive relationship between high interest rate spreads and high levels of taxation of the intermediation.

## Macroeconomic environment

The macroeconomic environment affects the performance of the banking sector by influencing the ability to repay borrowed loans; the demand for loans with the unpredictable returns from investment and the quality of collateral determine the amount of premium charged and therefore the cost of borrowed funds to the investors. With an unstable macroeconomic environment and poor economic growth, investors face uncertainty about investment return and these raise the lending rates as the level of non-performing loans goes up, squeezing the bank margin. For example, poor output prices reduce firm profitability while reduced asset prices reduce the value of assets for collateral and therefore the credit-worthiness of the borrowers. As a result, return on investment declines, increasing the level of non-performing loans, and banks charge high-risk premiums to cover their default risk.

Cukierman and Hercowitz (1990) attempt to explain the relationship between anticipated inflation and the degree of market power measured as the spread between the debit and credit rates. They find that when the number of banking firms is finite, an increase in anticipated inflation leads to an increase in interest spread. When banking firms approach infinity (competitive case), there is no correlation between interest spread and inflation because the spread tends towards marginal cost of intermediation as the number of banks increases.

## 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. For example, when banks hold unmatched maturities of deposits and loans they are exposed to interest rate risk.<sup>10</sup> This is especially so when banks raise funds through short-term deposits to finance long-term loans or purchase security with longer maturity. Interest rate risk is also defined by variability of the market interest rate.

Banks are exposed to credit risk due to information asymmetry. Banks do not know *ex ante* the proportion of loans that will perform and even when they carry out appraisals, credit losses are not fully eliminated. To cover credit risk, banks charge a premium whose size depends on the bank credit policy, interest on alternative assets, amount borrowed, type of client and size of collateral. This increases the effective rates paid by borrowers and reduces the demand for loans.

Foreign exchange risk arises especially when banks fund themselves 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 and leave the banks with insufficient reserves (for example during a bank run customers withdraw their deposits in response to their loss of confidence with the bank).

## Interest rate elasticities

**I**nterest rate elasticity reflects market power. The lower the elasticity, the greater the monopolistic power and the wider the spread. The effect is greater with an undiversified asset basket and with an underdeveloped money market. Elkayam (1996), assuming market power in both the deposit and the loan markets, concludes that interest spread depends on the elasticities of demand for credit and deposit. The higher the elasticity, the more competitive the market and the narrower the spread.

## 4. Modelling interest rate spread

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In modelling interest rate spread two models are used to define the spread: the accounting value of net interest margin and the firm maximization behaviour. The accounting value of net interest margin uses the income statement of commercial banks, defining the bank interest rate margin as the difference between the banks' interest income and interest expenses, which is expressed as a percentage of average earning assets.<sup>11</sup> However, both Hanson and Rocha (1986) and Barajas et al. (1996) criticize the accounting approach, saying that it does not indicate if there is equilibrium in economic sense or the type of market structure generated.

The firm maximization behaviour, on the other hand, allows derivation of profit maximization rule for interest rate and captures features of market structure. Depending on the market structure and risk management, the banking firm is assumed to maximize either the expected utility of profits or the expected profits. And, depending on the assumed market structure, the interest spread components vary. For example, assuming a competitive deposit rate and market power in the loan market, the interest rate spread is traced using the variations in loan rate. But with market power in both markets, the interest spread is defined as the difference between the lending rate and the deposit rate.

Barajas et al. (1996) uses a combination of firm maximization behaviour and the accounting approach to model the interest rate spread. The study assumes a competitive deposit rate market and market power in the loans market. When elasticity is infinite, there is no market power ( $\phi = 1$ ), while definite elasticity implies existence of market power ( $\phi < 1$ ). Super competitive solutions exist when ( $\phi > 1$ ). Given the competitive deposit rate and assuming linear function of real level of financial intermediation, he defines the lending rate as a function of policy and marginal cost variables. Interest rate spread is equated to loan rate. Demirguc-Kunt and Huizinga (1997) use the accounting method, defining the spread as the interest margin. Assuming a linear relationship between the spread and various variables, they use cross-sectional data for both developed and underdeveloped countries. Zarruk (1989) compares a risk averse and a risk neutral situation and considers interest risk assuming no default risk and implicit tax (reserve requirements). A bank is assumed to be an interest spread setter as it sets both loan and deposit rates simultaneously. Assuming the bank is out to maximize the expected utility of profits the study adopts the Von Neumann–Morgenstein utility function, so that the bank is assumed to face the following model:

$$\begin{aligned} \text{Max } \hat{\mu} &= E[\mu(\Pi)] = \mu(\Pi)g(\mu)d\mu \\ \text{s.t. } L + B &= D^* + E \\ D^* &= D(R_D) + \xi \end{aligned}$$

$g(\mu)$  = Random term for deposit uncertainty

Wong (1997) took the cost of goods sold and the firm maximization behaviour to evaluate the determinants of the optimal bank interest margin. The model features a risk averse bank with credit risk and interest risk. The bank is assumed to be a loan rate setter and a quantity setter in the deposit market, so that deposit rate is not a choice variable and the properties of the optimal bank interest margin are similar to the optimal loan rate. The concept of market power is captured by the reciprocal of interest elasticity where a high value indicates the bank possesses more market power. Paroush (1994) models a risk neutral bank whose objective is to maximize expected profits. Credit risk in addition to the deposit and lending rates is considered as a decision variable. Collateral is used to categorize a short-run and medium-term period. Gheva et al. (1992) also assume the bank has two decision variables, loan rates and deposit rates. The bank sets both rates and allows the volumes to be set by public demand for credit and supply of deposits. The model assumes a risk neutral bank, therefore a bank out to maximize expected profits. In addition, the model assumes that a bank is out to minimize the difference between actual (short-run) and desired (long-run) returns. To capture the adjustment process a partial adjustment model is fitted and a linear relationship assumed. Ho and Saunders (1981) integrate the hedging and expected utility approaches to analyse determinants of bank margins. Their approach assumes a bank is a dealer in the credit market, acting as an intermediary between demanders and suppliers of funds and aiming to maximize the utility of expected terminal wealth. New loans and deposits are made in a passive way so that prices and quantities are determined exogenously. The authors define the prices of loan and deposit as:

$$\begin{aligned} P_L &= P - b \\ P_D &= P + a \end{aligned}$$

where  $P$  is the bank's opinion of the price of loan or deposit, and  $(a)$  and  $(b)$  are fees for provision of intermediation services. Spread was defined as  $(a + b)$ .

Demirguc-Kunt and Huizinga (1997) note that interest margin and interest spread are different unless there are zero non-interest bearing funds. However, spread is superior to margin as an indicator of the bank policy in determining the conditions and volume of intermediation. Interest spread can be measured ex post and ex ante. Ex ante spread equals the difference between the contractual rates charged on loans and the rates paid on deposits. Ex post spread measures the difference between the bank interest revenues and their actual interest expenses. Ex ante spread is biased, however, as perceived risks

are reflected in the ex ante yields. The ex post spread problem is in terms of interest income and loan loss reserve associated with a particular loan that tend to materialize in different time periods.

In this study we capture interest rate spread by combining the accounting and optimal firm behaviour models. We attempt to incorporate the various factors identified in the literature and the local market in modelling interest rate spread. These include market power, credit risk, interest risk, tax and policy related variables. We assume the bank makes decisions in a single period and both loans and deposit markets are imperfect. The treasury bill market is explicitly included to capture monetary and fiscal policy actions. For example, as indicated earlier, with a shift to local sources to finance its budget deficit, the government relied so heavily on the treasury bills that fluctuations in treasury bill interest rates tended to reflect the demand for funds by the government and thus the position of the budget deficit. In addition, with the shift to indirect monetary policy tools, the CBK used the open market operation to regulate money supply. At the beginning of the period, levels of deposits and loans are unknown. At the end of the period, banks adjust their portfolio by participating in the inter-bank market and/or the central bank discount window. Participation in either of the markets depends on interest rate levels and policy action.

Assume a simple intermediation model for the banking sector given by the following balance sheet identity.:

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

where

|     |   |                              |
|-----|---|------------------------------|
| L   | = | loans                        |
| B   | = | government securities        |
| R   | = | reserve requirement          |
| D   | = | deposits                     |
| IN  | = | inter-bank market operations |
| ONL | = | other net liabilities        |

Reserve requirements are a proportion ( $\rho$ ) of the total deposits. We assume no interest is paid on reserve requirements. Thus, reserve ratio is an implicit tax, which reflects fiscal and monetary policy actions (Hanson and Rocha, 1986).

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

The choice between investing in government securities or in loans is determined by expected returns. Banks set the loan interest rate ( $r_l$ ), while the government securities interest rate ( $r_b$ ) is exogenous. The loan interest rate depends on the demand for investment funds and other composite variables including the alternative sources. We assume a homogenous class of loans, where demand for loans ( $L$ ) is determined by the interest rate on loans, interest rate on other sources of funds ( $r_{other}$ ) and income levels.

$$L = f(r_l, r_{other}, y) \quad (3)$$

Given the credit risk, the total earnings of the bank deviate from the contractual loan repayment as defined by the realized loan repayment. The proportion of non-performing loans ( $w$ ) can be assumed to be random, taking values between (0,1). In his analysis Klein (1971) assumes a bank with three assets, cash, government security and private security (loans). He assumes that all borrowers are identical and face fixed and similar non-interest loan terms. Private loans are influenced by contract rates of interest and exogenous variables on the demand side. As a rational investor in an environment characterized by risk or uncertainty, banks face default risk ( $\delta_i$ ), so that the expected returns on loans ( $E_i$ ) are less than the contract rate of interest ( $r$ ), thus,  $E_i < r$  if  $\delta_i > 0$ .

The default risk is measured as the standard deviation of the probability of loan payments. With the assumption made on borrowers, the estimated standard deviation is equal to population standard deviation  $\delta_i = \sigma_i$  and the default risk is taken as exogenous to the bank. Wong (1997) measured credit risk as a random variable ( $\Theta$ ) that is not affected by the lending level, so that the degree of uncertainty per dollar is constant and the actual loan payment is equal to  $(1 - \Theta)R_i L_{ri}$  where ( $\Theta$ ) is the increased returns. Paroush (1994) defined the credit risk as a proportion of performing loans to non-performing loans, assuming a non-zero probability of default. In the short run, collateral policy was assumed constant, while in the medium term, the lending rate, the deposit rate and collateral requirements are the decision variables. Credit risk brings a wedge between the contractual interest rate and the expected rate of return ( $E$ ) on its assets, so that  $r = E + t$  and  $E = r(1 - w)$ ; where  $r$  = interest on credit,  $E$  = expected returns,  $t$  = risk premium, and  $w$  = the proportion of performing loans that is influenced by interest rate on loans, uncertainty in the economy and the bank policy on collateral. Thus, credit risk includes both the endogenous and exogenous risk.

Barajas et al. (1996) incorporated uncertainty by assuming that return for loans is an exogenous risk of default. Thus, they assume it is independent of the bank's action as opposed to the situation where the risk incurred by adverse selection is an endogenous risk because banks affect the risk by choosing the interest rate charged to the borrowers. It is exogenous, and determined by economic performance, changes in interest rate policy, and adequacy in monitoring and evaluation of investment. Assuming that the amount of loan repaid is not influenced by the amount borrowed, then the degree of uncertainty per shilling of loan is constant. The realized earnings at the end of the period are equal to:

$$r_l(1 - w)L \quad (4)$$

The amount of deposits received by the bank at the beginning of the period is determined by the deposit interest rate, the interest rate on other financial assets and economic performance. In addition, the bank's demand for liquidity and the bank's performance influence the level of interest rates set by the bank. At the end of the period, if the bank is facing deficits or surplus in financing its investment, then it engages in secondary market activities. Thus, the bank will raise funds from the central bank (discount

window) and/or other banks (inter-bank market).<sup>12</sup> The liquidity gap ( $IN$ ) faced by the bank is defined as:

$$IN = L - (1 - \rho)D \quad (5)$$

Assume that for any balances faced in one market the bank fills the gap by approaching the other market. For example, if the bank is able to raise ( $\psi$ ) proportion of liquidity gap from the inter-bank market then  $(1 - \psi)$  proportion will be raised from the discount window. Thus, the amount raised from the inter-bank market is  $(\psi IN)$  and from the discount window  $(1 - \psi)IN$ . The two markets are used as either substitutes or complements depending on market characteristics, including policy directives, interest rates charged and the level of development of the market. Our model assumes that a high proportion of gap filling is made in the inter-bank market, so that the discount window adjustments are treated as part of the other net liabilities. Thus, substituting Equations 3 and 5 into Equation 1 we get:

$$L + B = (1 - \rho)D + \psi M + ONL \quad (6)$$

Expressing Equation 5 to show the earnings and costs of the bank, the following profit model ( $\pi$ ) is derived:

$$\Pi = r_l(1 - w)L_i + r_b B_i - r_d(1 - \rho)D_i - r_m \psi M - C(L_i, D_i) \quad (7)$$

The profit maximization problem is defined as:

$$\begin{aligned} \text{Max} \Pi &= r_L(1 - w)L_i + r_b B_i - r_d(1 - \rho)D_i - r_M \psi(L - (1 - \rho)D) - C(L_i, D_i) \\ \text{Subject to: } &L_i + B_i = (1 - \rho)D_i + \psi M + ONL \end{aligned} \quad (8)$$

The lagrangian function is expressed as follows:

$$\begin{aligned} \omega &= r_L(1 - w)L_i + r_b B_i - r_d(1 - \rho)D_i - r_M \psi(L_i - (1 - \rho)D_i) - \\ &C(L_i, D_i) + \lambda[L_i + B_i - (1 - \rho)D_i - \psi M - ONL] \end{aligned} \quad (9)$$

We differentiate the lagrangian function with respect to  $L_i, D_i, B_i$  and  $\lambda$ , assuming that the demand and supply functions for investment funds are inverse functions.

$$\frac{d\omega}{dL_i} = r_L(1 - w) + \frac{dr_L}{dL_i}(1 - w)L_i - r_M \psi C_L + \lambda(1 - \psi) = 0 \quad (10)$$



$$\frac{d\omega}{dD_i} = r_d(1-\rho) - \frac{dr_d}{dD_i}(1-\rho)D_i + r_m\psi(1-\rho)(C_d - \lambda(1-\rho)(1-\psi)) = 0 \quad (11)$$

$$\frac{d\omega}{dB_i} = r_b + \lambda = 0 \quad (12)$$

$$\frac{d\omega}{dX} = L_i + B_i - (1-\rho)D_i - \psi M - ONL \quad (13)$$

To capture the loan and deposit elasticities and also the individual bank's share in the total loans and deposits, Equations 10 and 11 are multiplied and divided by  $L$  and  $dL$  and  $D$  and  $dD$ , respectively.

Thus, we rewrite Equation 10 and 11 as follows:

$$\frac{d\omega}{dL_i} = {}_{rL}(I-w)\phi - r_m\psi - C_L + \lambda(1-\psi) = 0 \quad (10b)$$

$$\frac{d\omega}{dD_i} = r_d(1-\rho)\sigma + r_m\psi(1-\rho) - C_d - \lambda(1-\rho)(1-\psi) = 0 \quad (11b)$$

where

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

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

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

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

$$\eta_D = \frac{dr_d}{dD} \frac{D}{r_d}$$

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

From Equation 11  $\lambda = -r_b$ , we substitute for  $\lambda$  in Equations 10b and 11b to eliminate  $\lambda$ .

$$r_i(1-w)\phi - r_m\psi - C_i - r_b(1-\psi) = 0 \quad (10c)$$

$$r_d(1-\rho)\sigma + r_m\psi(1-\rho) - C_d + r_b(1-\rho)(1-\psi) = 0 \quad (11c)$$

We derive the  $r_L$  and  $r_d$  from equation 9b and 10b to get:

$$r_L = \frac{r_m\psi}{(1-w)\phi} + \frac{C_L}{(1-w)\phi} + \frac{r_b}{(1-w)\phi} \quad (14)$$

$$r_d = \frac{C_d}{(1-\rho)\sigma} - \frac{r_m\psi}{\sigma} - \frac{r_b(1-\psi)}{\sigma} \quad (15)$$

Interest rate spread is defined as  $r_L - r_d$

$$r_L - r_d = \frac{r_m\psi}{(1-w)\phi} + \frac{C_L}{(1-w)\phi} + \frac{r_b}{(1-w)\phi} - \frac{C_d}{(1-\rho)\sigma} + \frac{r_m\psi}{\sigma} + \frac{r_b(1-\psi)}{\sigma} \quad (16)$$

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

$$C_d = C_{d0} + C_{d1}D^* \quad (17)$$

$$C_i = C_{i0} + C_{i1}L^* \quad (18)$$

Substituting Equations 17 and 18 into Equation 16 we get:

$$r_L - r_d = \frac{C_{L0}}{(1-w)\phi} - \frac{C_{d0}}{(1-\rho)\sigma} + C_L \frac{1}{(1-w)\phi} L^* - \frac{C_{d1}}{(1-\rho)\sigma} D^* + r_m\psi(1 + \frac{1}{\sigma}) + r_b(\frac{1}{(1-w)\phi} + \frac{1-\psi}{\sigma}) \quad (19)$$

Equation 19 implies that the spread is defined by the operational costs, interest rate elasticities, reserve requirements, demand and supply of funds, costs of adjustment in the secondary market, returns on other financial assets, and policy actions.

Assuming Equation 19 is an implicit function, we can analyse the expected direction of relationship between interest rate spread ( $s = r_t - r_d$ ) and various determinants identified in the theoretical and empirical literature. Results of the differential analysis are given in Appendix A.

## 5. Data

The data consist of monthly observations of treasury bill rates, commercial bank loans and deposits, lending rates, deposit rates, inter-bank rates, provision for bad loans, and liquidity and cash ratios. These data were obtained from the Central Bank of Kenya. The sample runs from July 1991 to December 1999 for all data sets except the inter-bank rate, which is only available from April 1993. Estimating recursively a lending and deposit rate model given by equations 14 and 15 captured interest rate elasticities. The models were estimated with log level variables to capture long-run trends. Cointegration tests were carried out to ensure long-run relationships. Regression results are reported in Table 6.

**Table 6: Regression results for the lending rate and deposit rate models**

|                    |                       | Variable            | Coefficient     | t-statistic |
|--------------------|-----------------------|---------------------|-----------------|-------------|
| Lending rate model | Regression results    | Constant            | -0.7550         | -5.0612     |
|                    |                       | Lntbill             | 0.2298          | 6.4662      |
|                    |                       | Lnexliq             | 0.4098          | 6.5864      |
|                    |                       | Lnloan              | 0.0439          | 6.3792      |
|                    |                       | Lncash              | 0.6902          | 7.6184      |
|                    |                       | Lndebt              | -0.4883         | -4.6893     |
|                    |                       | R <sup>2</sup>      | 0.7478          |             |
|                    |                       | F-statistic         | 11.3029(0.0000) |             |
|                    | Cointegration results | C                   | 0.0002          | 0.8712      |
|                    |                       | $\mathcal{E}_{t-1}$ | -0.3175         | -3.6524     |
| Deposit rate model | Regression results    | Constant            | -0.5545         | -2.2300     |
|                    |                       | Lndeposit           | 0.0336          | 1.8847      |
|                    |                       | Lntbill             | 0.2307          | 3.3024      |
|                    |                       | Lncash              | 0.4790          | 4.7823      |
|                    |                       | Lnexliq             | 0.3665          | 4.7885      |
|                    |                       | Lninterbank         | 0.0273          | 2.7116      |
|                    |                       | R <sup>2</sup>      | 0.7532          |             |
|                    |                       | F-statistic         | 12.2042(0.0000) |             |
|                    | Cointegration results | C                   | -0.0003         |             |
|                    |                       | $\mathcal{E}_{t-1}$ |                 | -3.4192     |

Note: In this table we provide regression results of the models used in deriving the elasticities of deposits and loans to interest rates recursively. The models were estimated using log levels of the variables to capture the long-run relationship. The Engle and Granger (1987) procedure is used to test for cointegration. The variables are Lntbill = log treasury bill rate; Lnexliq = log of excess liquidity measured as the difference between the average and minimum liquidity ratio; Lncash = log of the cash ratio; Lndebt = log of bad debt provision as a percentage of the total loans; Lnloan = log of loans advanced; Lninterbank = log of inter-bank rate.

Table 7 reports summary statistics for the sample. Our results show tremendous increase in spread when monetary policy was tightened, reducing marginally when monetary policy is relaxed. More variability is indicated with the tight monetary policy. This is explained by the increase in the lending rate with an average of about 9 percentage points as compared with 2 percentage points for deposit. In addition, treasury bill rates increased by about 10% and saw excess liquidity that increased with more than 20 percentage points. When monetary policy is relaxed, spread increases marginally with about 1 percentage point. This is because the deposit rate recorded a 3% decline, while the lending rate declined by only 1% despite a fall in treasury bill rates by more than 8 percentage points. At the same time, the debt ratio increased, reflecting the growing non-performing loans, and the inter-bank rate went up by about 4 percentage points. Our preliminary results thus show that the stickiness of the lending rate downward sustained the high interest spread. Figures 1 and 2 provide a graphical representation, while Appendix Table A1 reports the correlation matrix.

**Table 7: Summary statistics**

| Variable                | Period I | Period II | Period III |
|-------------------------|----------|-----------|------------|
| Spread                  | 4.4723   | 12.4219   | 13.5202    |
| Lending rate            | 18.3207  | 27.7299   | 26.3473    |
| Deposit rate            | 13.8484  | 15.3080   | 12.8271    |
| Debt ratio              | 0.0499   | 0.0798    | 0.1071     |
| Treasury bill rate      | 17.4514  | 27.5780   | 19.4156    |
| Excess liquidity        | 0.0245   | 0.2105    | 0.1921     |
| Inter-bank rate         | -        | 20.7094   | 16.0000    |
| Growth in real deposits | 0.0027   | -0.0044   | -0.0031    |
| Growth in real loans    | -0.0074  | -0.0052   | 0.0044     |

Note: This table reports average values for the specified period. The three periods are:  
 Period I 1991(7)–1993(3) before tight monetary policy is adopted  
 Period II 1993(4)–1997(9) when tight monetary policy is in operation  
 Period III Central Bank relaxes tight monetary policy

**Figure 1: Trends in deposit rate, lending rate, spread and treasury bill rate**

**Figure 2: Interest rate spread, average liquidity, minimum liquidity, cash ratio and inter-bank rate**

## 6. Empirical results

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We first analyse the time series characteristics of the data using the augmented Dickey–Fuller test. According to this test, a time series  $X_t$  is non-stationary if  $\beta = 1$  in the following autoregressive function:

$$X_t = \alpha_0 + \alpha_1 t + \beta X_{t-1} + \sum_{j=2}^n \gamma_j X_{t-j} + \varepsilon_t \quad (20)$$

Unit root test results are reported in Table 8. The results indicate the data series to be non-stationary at levels. Thus, we proceed to test if these variables have a long-run relationship by testing for cointegration using the Engle and Granger (1987) procedure. This procedure involves estimating the following model:

$$y_t = \alpha + \beta X_t + \varepsilon_t$$
$$\varepsilon_t - \varepsilon_{t-1} = -b\varepsilon_{t-1} + \theta_t \quad (21)$$

If  $b$  is significantly different from zero, then  $y_t$  and  $X_t$  are cointegrated. Cointegration results are also reported in Table 8. The results show cointegration between the spread and the real deposits, real loans, credit risk, cash ratio, and responsiveness of loans to interest rates. The cointegration factor mimics a profit model where bank profitability is defined by the nature of the credit market (which is the source of bank income), implicit tax that squeezes the ability of the bank to earn income, the level of credit risk and the responsiveness of demand for loans.

With the cointegrating factor we estimate an error correction model that takes the following general form:

$$y_t = \sum_{j=1}^m a_{t-j} X_{t-j} + \sum_{i=1}^m b_j y_{t-i} + \delta \varepsilon_{t-1} + \theta_t \quad (22)$$

**Table 8: Unit root and cointegration results**

| Unit root test             | Variable           | ADF statistic  | Phillips–Perron |
|----------------------------|--------------------|----------------|-----------------|
|                            | Lending rate       | -3.1292        | -1.7862         |
|                            | Treasury bill rate | -3.1741        | -2.5964         |
|                            | Bad debt ratio     | -1.3152        | -1.3322         |
|                            | Excess liquidity   | -2.1296        | -1.8758         |
|                            | Inter-bank rate    | -2.9365        | -2.4470         |
|                            | Loan elasticity    | -1.4128        | -2.7536         |
|                            | Deposit rate       | -3.0720        | -1.9812         |
|                            | Real deposits      | -2.9840        | -5.2924         |
|                            | Spread             | -1.8734        | -1.9108         |
|                            | Real loans         | -1.3747        | -0.7790         |
| Cointegrating factor       | Variable           | Coefficient    | t-statistic     |
|                            | Constant           | 0.3539         | 1.9347          |
|                            | Bad debt ratio     | 0.2402         | 4.0987          |
|                            | Real deposits      | -0.0828        | -3.1449         |
|                            | Real loans         | 0.0588         | 3.0773          |
|                            | Cash ratio         | 0.5881         | 11.8570         |
|                            | Elasticity of loan | 0.1570         | 3.4074          |
|                            | R <sup>2</sup>     | 0.83           |                 |
|                            | F-statistic        | 20.150(0.0000) |                 |
| Cointegration test results | Constant           | -0.0003        | -0.3677         |
|                            | $\epsilon_{t-1}$   | -0.5200        | -5.6014         |

Note: Unit root test is based on ADF and Phillips–Perron test. Cointegration test uses the Engle and Granger (1987) approach.

Table 9 reports the reduced form regression results and Appendix Table A2 provides the parsimonious model. A positive relationship is predicted between the treasury bill rate and the spread, given the predicted positive relationship between the lending rate and the treasury bill rate and the negative relationship with the deposit rate. However, our results show a negative relationship in the short run and no significant relationship in the long run. The insignificant long run relationship may be attributed to the almost equal magnitudes in the lending and deposit rates to the treasury bill rate as shown in Table 6. The negative relationship in the short run reflects the significantly higher decline in deposit rates as the treasury bill rate declined and the almost insignificant change in lending rate as shown in Table 7. As a result, the spread increased because as the treasury bill rate declined, the lending rate did not, indicating the asymmetric response of the lending rate to the treasury bill rate.



**Table 9: Preferred model**

| Variable                     | Coefficient | Standard error |
|------------------------------|-------------|----------------|
| Constant                     | 0.0015      | 0.0013         |
| Bad debt ratio               | 0.2760      | 0.1715         |
| Real deposit                 | 0.0948      | 0.0320         |
| Excess liquidity             | -0.1871     | 0.0868         |
| Inter-bank rate              | -0.0153     | 0.0450         |
| Elasticity of loan           | -0.0046     | 0.0135         |
| Treasury bill rate           | -0.1826     | 0.0455         |
| Real loans                   | -0.1119     | 0.0349         |
| Ecm <sub>(t-1)</sub>         | -0.8456     | 0.1745         |
| Seasonal                     | -0.0129     | 0.0082         |
| Wald test X <sup>2</sup> (9) |             |                |
| 36.241(0.0000)               |             |                |

This relationship may also be explained by the bank's attempt to maintain profit margins faced with a high level of non-performing loans, and declining earnings from the alternative source (treasury bills). This is supported by the positive relationship between the spread and bad debt provision, which means that faced with rising credit risk, banks kept lending rates high as they charged higher risk premiums to maintain their profits.

Inter-bank rates take a negative sign in the short run, while an insignificant relationship is portrayed in the long run. However, a positive relationship is indicated with the deposit rate, which would imply that as net borrowers, banks in the long run opted to compete for more deposits from the public as they would offer lower interest rates compared with the interest rate charged at the inter-bank market. Banks were net borrowers in the inter-bank market because of the restrictions at the discount window, the increased implicit tax following the tight monetary policy and the slow growth in deposits.

The model predicts a positive relationship between the spread and the real loans, which reflects the positive relationship between the real loans and the lending rate. The magnitude of the relationship depends on the credit risk and the control the bank has in the credit market. Increased deposits depress the spread given the positive relationship between deposits and the deposit rate. However, deposits will reduce the spread by a greater margin if the financial market is competitive and the implicit tax is low. Our results show a positive relationship between the spread and the real loans which implies increased implicit costs, thus the positive relationship between the cash ratio and the lending rates. Consequently, the spread increases with increased real loans due to the increase in the lending rate as banks attempt to cover implicit costs by charging a premium on lending rates. A negative relationship is indicated by the real deposits, as banks increased their deposits by offering higher deposit rates (see results in Table 6).

Our model predicts a decline in the spread as the market shows high sensitivity to the interest rate, resulting in a decline (rise) in lending (deposit) rates as the market gains competitiveness. Our results show a negative relationship in the short run, which does not imply increased competitiveness in the credit market, but indicates an increase in deposit rates as banks face high demand for credit with low deposits.

Finally, the cointegrating factor indicates that any distortions that squeeze targeted profits result in banks' adjusting the spread upwards.

## 7. Conclusions

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The study aimed to explain the factors determining interest rate spread for Kenya's banking sector. For the pre-liberalization period, the minimum and maximum ceilings on deposit and lending rates set a maximum interest rate spread. Variations in the spread reflect monetary and fiscal policy actions, where expansionary fiscal policy partly increased inflationary pressure and the monetary authority responded by tightening the monetary policy and revising interest rates upwards. During the post-liberalization period, we expect the spread to narrow to reflect efficiency gains and reduced transaction costs with the removal of distortionary policies and strengthening of the institutional set-up. However, Kenya's experience indicates a widening spread in the post-liberalization period.

Our results show that the interest rate spread increased because of yet-to-be gained efficiency and high intermediation costs. The increase in spread in the post-liberalization period stemmed from the failure to meet the prerequisites for successful financial reforms and the lag in adopting indirect monetary policy tools and reforming the legal system. Variations in the interest spread are attributable to bank efforts to maintain threatened profit margins. For example, banks that faced increasing credit risk as the proportion of non-performing loans went up responded by charging a high risk premium on the lending rate. High non-performing loans reflect the poor business environment and distress borrowing, which is attributed to the lack of alternative sourcing for credit when banks increased the lending rate, and the weak legal system in enforcement of financial contracts. Fiscal policy actions saw an increase in treasury bill rates and high inflationary pressure that called for tightening of monetary policy. As a result, banks increased their lending rates but were reluctant to reduce the lending rate when the treasury bill rate came down because of the declining income from loans. They responded by reducing the deposit rate, thus maintaining a wider margin as they left the lending rate at a higher level. Thus there was an asymmetric response of lending rates to treasury bill rates. High implicit costs were realized with the tight monetary policy, which was pursued with increased liquidity and cash ratio requirements. Consequently, banks kept a wide interest rate spread even when inflationary pressure came down.

We recommend reform of the legal system to enhance the enforcement of financial contracts. This would work as an incentive for banks to invest in information capital, thus reducing the information asymmetry problem. Consequently, the proportion of non-performing loans will be reduced hence lower risk premium attributed to credit risk. In addition, efforts should be made to revitalize the growth of the economy and to attain macro stability in order to increase the return on investment and reduce uncertainty. Furthermore, the development of the capital market is vital to enhance competitiveness.

Fiscal and monetary policy actions should also target development of the financial market. For example, fiscal discipline is identified as a prerequisite for successful financial liberalization, while monetary policy using indirect policy tools rather than the reserve requirement reduces the implicit costs faced by banks. Further stability of macroeconomic conditions and growth of the economy are imperative for the enhanced performance of the financial market.

## Notes

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1. Intermediary costs include information costs, transaction costs (administration and default costs) and operational costs.
2. Edwards (1984), Mirakhor and Villanueva (1993), and Montiel (1995) indicate macroeconomic and financial stability and fiscal discipline as prerequisites for successful financial liberalization.
3. The CBK attributed the widening spread to inflationary expectations that kept the lending rates high; inadequate competition where four banks controlled over 70% of the deposit; and loans market; excess demand for loans in the midst of low deposits, inefficient operations of the banks; increased non-performing loans; monetary and fiscal policy actions; and profitability of the banks (Central Bank of Kenya, *Monthly Economic Review*, September 1995: 4–6).
4. For a successful shift the following procedure is expected: Excess liquidity is absorbed first, using the reserve requirement to sterilize the excess liquidity accumulated with credit control regime. Then, credit controls and interest controls are removed and efforts made to foster growth of money and government securities market. An open market type operation in the form of auctions of government short-term securities is introduced, and because the reserve requirement is a disincentive in the intermediation process, the ratio is reduced to allow the operations with securities to sterilize any excess liquidity (Alexander et al., 1995).
5. The cash ratio was first introduced in 1971 at 5%, then rescinded in 1972, and reintroduced in 1978 at 4%, to be rescinded again in 1981 and reintroduced in 1986 at 6%. The main aim was to reduce the banks' free cash base and hence curb their capacity to give loans and advances. With no interest paid, reserve requirements served as an implicit tax on commercial banks (except for a short period of time when the banks paid an interest 5%, i.e., December 1995 to May 1996, aiming to achieve a decline in interest rate levels). Cash ratio was extended to the NBFIs from July 1995.
6. This was an agreement made by the CBK to buy back at short notice earmarked treasury bills sold to the bank, such that there is temporary withdrawal of liquidity from banks and the situation normalized with the CBK buying back the treasury

bills or reserves through the REPO. Thus the REPO provided participants with an alternative channel for either borrowing or lending. At the moment the REPO is agreed between the CBK and commercial banks with treasury bill paper.

7. As a lender of last resort the CBK revised the lending and rediscount rates; overnight lending rate on the Lombard facility (window 1), which was a cheaper facility, was set at 3 percentage points above the treasury bill rates from June 1997, down from 4% in November 1996. Interest rate on rediscount and overnight loans (window 2) was reduced to 5% in June 1997, from 6% in November 1996.
8. By 1996, the financial system had 51 commercial bank, 23 NBFIs, 5 building societies, 39 insurance companies, 3 reinsurance companies, 10 DFIs, a capital market, 13 forex bureaus, and 2,670 savings and credit cooperative societies (Ngugi and Kabubo, 1998). This changed to 53 banks, 11 NBFIs, and 4 building societies and mortgage finance companies in 1999.
9. This ratio is very small, implying that individual depositors make heavy losses in case of bank liquidation, and the large depositors are penalized more.
10. This is the risk that the value of financial liabilities will fluctuate in response to change in market rates
11. Accounting methods:
  - Interest received (IR)
  - (-) Interest paid (IP)
  - = Interest margin
  - + Other income net (OI)
  - = Gross earning margin (GM)
  - (-) Operating costs (OC)
  - = Net earnings margins
  - + Net (other credit) (OCR)
  - = Net profit before tax (PBT)

So that

$$IR - IP + OI = GM = OC + PBT - OCR$$

12. To introduce interest rate risk in his model Zarruk (1989) assumed that a bank is a quantity setter in the deposits market, thus facing a perfectly elastic supply of deposits. Given a maturity period of less than one period, deposits are rolled over at the prevailing unknown one-plus deposit rate so that the bank faces fixed rate loans and variable rate of deposits. This exposes the bank to interest rate risk. Gheva et al. (1992) capture the risk factor by assuming the bank engages in money market activities. They assume that a bank sets the rates of both deposits and loans and the volumes are left to be set by public demand for credit and supply of

deposits. Interest rates are set at the beginning of the period and at that point volumes are uncertain. At the end of the period the bank resorts to the secondary market for adjustment borrowing from the central bank or commercial banks or reduces its indebtedness. Ho and Saunders (1981) explain that banks face interest rate risk with assumed long-term maturity of deposits and loans and the uncertainty over transaction arrivals as they hold unmatched portfolios of deposits and loans at the end of the period and the short-term rate of interest changes. Wong (1997) also introduced interest rate risk in his model by assuming a bank is a quantity setter in deposits and faces a perfectly elastic supply. While the deposit rate is variable, the loan rate is fixed within the period so that the bank is exposed to interest rate risk.

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# Appendix A: Model results

Table A1: Correlation matrix

|                    | Spread             | Tbill rate         | Real loans         | Inter-bank rate    | Excess liquidity   | Bad debt           | Cash ratio         | Loan elasticity    | Deposits           | Lending           |
|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|
| Spread             | 1                  |                    |                    |                    |                    |                    |                    |                    |                    |                   |
| Treasury bill rate | -0.1803<br>(0.070) | 1                  |                    |                    |                    |                    |                    |                    |                    |                   |
| Real loans         | 0.4138<br>(0.000)  | -0.4399<br>(0.000) | 1                  |                    |                    |                    |                    |                    |                    |                   |
| Inter-bank rate    | -0.6704<br>(0.000) | 0.8936<br>(0.000)  | -0.3763<br>(0.001) | 1                  |                    |                    |                    |                    |                    |                   |
| Excess liquidity   | 0.6853<br>(0.000)  | 0.2010<br>(0.043)  | -0.0837<br>(0.403) | -0.1122<br>(0.319) | 1                  |                    |                    |                    |                    |                   |
| Bad debt ratio     | 0.6266<br>(0.000)  | -0.1787<br>(0.072) | 0.4003<br>(0.000)  | -0.4246<br>(0.000) | 0.5637<br>(0.000)  | 1                  |                    |                    |                    |                   |
| Cash ratio         | 0.8655<br>(0.000)  | -0.0256<br>(0.799) | 0.0514<br>(0.608)  | -0.3829<br>(0.000) | 0.7387<br>(0.000)  | 0.3545<br>(0.000)  | 1                  |                    |                    |                   |
| Loan elasticity    | 0.6221<br>(0.000)  | -0.6968<br>(0.000) | 0.9232<br>(0.000)  | -0.5451<br>(0.000) | -0.4513<br>(0.000) | 0.4153<br>(0.000)  | -0.0736<br>(0.517) | 1                  |                    |                   |
| Real deposits      | 0.5769<br>(0.000)  | -0.4072<br>(0.000) | 0.9471<br>(0.000)  | -0.4381<br>(0.000) | 0.1868<br>(0.060)  | 0.4699<br>(0.000)  | 0.2701<br>(0.006)  | 0.9124<br>(0.000)  | 1                  |                   |
| Lending rate       | 0.7097<br>(0.000)  | 0.3425<br>(0.000)  | -0.0553<br>(0.581) | 0.3198<br>(0.004)  | 0.7474<br>(0.000)  | -0.2082<br>(0.036) | 0.7954<br>(0.000)  | -0.2939<br>(0.008) | 0.1576<br>(0.114)  | 1                 |
| Deposit rate       | -0.2333<br>(0.018) | 0.6809<br>(0.000)  | -0.5777<br>(0.000) | -0.7063<br>(0.000) | 0.1907<br>(0.055)  | -0.4860<br>(0.000) | 0.0489<br>(0.626)  | -0.6240<br>(0.000) | -0.4825<br>(0.000) | 0.5192<br>(0.000) |

**Table A2: Parsimonious model**

| Variable                | Coefficient    | t-statistic |
|-------------------------|----------------|-------------|
| Constant                | 0.0011         | 1.133       |
| Spread (t-3)            | 0.2540         | 3.078       |
| Bad debt ratio(t-1)     | 0.2059         | 1.638       |
| Real deposit(t-1)       | 0.0707         | 3.202       |
| Excess liquidity        | -0.1396        | -2.243      |
| Inter-bank rate         | -0.1141        | -3.736      |
| Elasticity of loan(0)   | 0.2860         | -4.079      |
| Elasticity of loan(t-1) | -0.1229        | -1.950      |
| Elasticity of loan(t-4) | -0.1665        | -2.898      |
| Treasury bill rate(t-3) | -0.1363        | -4.468      |
| Real loans(0)           | -0.0240        | -2.735      |
| Real loans(t-1)         | -0.0594        | -3.144      |
| ECM(t-1)                | -0.6308        | -6.749      |
| Seasonal(t-1)           | -0.0100        | -3.713      |
| Seasonal(t-2)           | -0.0085        | -3.065      |
| Seasonal(t-7)           | 0.0044         | 1.635       |
| R <sup>2</sup>          | 0.6416         |             |
| F-statistic             | 6.4906(0.0000) |             |
| $\sigma$                | 0.0058         |             |
| DW                      | 2.18           |             |
| RSS                     | 0.0019         |             |

# Appendix B: Derivation of the partial derivatives

---

## 1. Spread and treasury bill rate

$$\text{a) } \frac{ds}{dr_b} = \frac{1}{(1-w)\phi} + \frac{1-\psi}{\sigma} \quad (1)$$

$$\text{b) } \frac{dr_L}{dr_b} = \frac{1}{(1-w)\phi} \quad (2)$$

$$\text{c) } \frac{dr_d}{dr_b} = \frac{-(1-\psi)}{\sigma} \quad (3)$$

## 2. Spread and inter-bank rate

$$\text{a) } \frac{ds}{dr_m} = \psi \left( \frac{1}{(1+w)\phi} + \frac{1}{\sigma} \right) \quad (4)$$

$$\text{b) } \frac{dr_L}{dr_m} = \frac{\psi}{(1-w)\phi} \quad (5)$$

$$\text{c) } \frac{dr_d}{dr_m} = \frac{-\psi}{\sigma} \quad (6)$$

## 3. Spread and volume of loans

$$\text{a) } \frac{ds}{dL^*} = \frac{C_{LI}}{(1-w)\phi} \quad (7)$$

$$\text{b) } \frac{dr_L}{dL^*} = \frac{C_{L1}}{(1-w)\phi} \quad (8)$$

## 4. Spread and volume of deposits

$$a) \quad \frac{ds}{dD^*} = \frac{-C_{d1}}{(1-\rho)\phi} \quad (9)$$

$$b) \quad \frac{dr_d}{dD^*} = \frac{C_{d1}}{(1-\rho)\sigma} \quad (10)$$

## 5. Spread and performing loans

$$a) \quad \frac{ds}{d(1-w)} = -\frac{C_L + r_b}{(1-w)^2\phi} \quad (11)$$

$$b) \quad \frac{dr_L}{d(1-w)} = \frac{-r_m\psi + C_L + r_b}{(1-w)^2\sigma} \quad (12)$$

## 6. Spread and power in loan market

$$a) \quad \frac{ds}{d\phi} = \frac{-C_L + r_b}{(1-w)\phi^2} \quad (13)$$

$$b) \quad \frac{dr_L}{d\phi} = \frac{-r_m\psi + C_L + r_b}{(1-w)\phi^2} \quad (14)$$

## 7. Spread and power in deposit market

$$a) \quad \frac{ds}{d\sigma} = \frac{1}{\sigma^2} \left[ \frac{C_d}{(1-\rho)} - \psi r_m - r_b(1-w) \right] \quad (15)$$

$$b) \quad \frac{dr_d}{d\sigma} = \frac{1}{\sigma^2} \left[ \frac{C_d}{(1-\rho)} - \psi r_m - r_b - r_b(1-\psi) \right] \quad (16)$$

## 8. Spread and available reserves

$$a) \quad \frac{ds}{(1-\rho)} = \frac{C_d}{(1-\rho)^2\sigma} \quad (17)$$

$$b) \quad \frac{dr_d}{d(1-\rho)} = -\left[ \frac{C_d}{(1-\rho)^2\sigma} \right] \quad (18)$$

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## Abstract

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Financial reform predicts achievement of efficiency in the intermediation process and reduced transaction costs, which is proxied by a narrowing wedge between the lending and deposit rates. Kenya's experience shows a rise in interest rate spread during the financial reform and subsequent financial liberalization process, which suggests the failure to meet the prerequisites for successful financial liberalization. Interest rates were liberalized amidst inflationary pressure, declining economic growth, financial instability, the failure to sustain fiscal discipline and lack of proper sequencing of the shift to use monetary policy tools. At the micro level, our results show that when the profit margin is threatened, banks sustain a widening spread. Faced with a rising credit risk due to distress borrowing and poor macroeconomic conditions, banks charge a higher risk premium on their lending rate. The accumulation of non-performing loans results from a weak legal system and a poor business environment that squeezes the profit margin, and banks respond by increasing the lending rate. Policy actions also affect the spread. An asymmetric response is indicated with the treasury bill rate where lending rates increase with the treasury bill rate, and become sticky downward when the treasury bill rate declines. Further, increased implicit costs that accompany tight monetary policy sustain a widening spread even when inflationary pressure is reduced. Thus a widening interest rate spread indicates inefficiency in the intermediation process and rising costs of intermediation.