

Financial Liberalisation and Interest Rate Risk Management in Sub-Saharan Africa

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Abstract: The appropriateness of financial liberalisation in Africa - at least over the short-term - is in doubt. It has been suggested that the *credit risks* faced by financial institutions will be detrimental to the supply of credit. The contribution of this paper is to point out that financial liberalisation creates a significant *interest rate risk*. It is argued that this interest rate risk will bias African banks' activities towards brokerage rather than maturity-transformation functions. Furthermore, it is stressed that the management of interest rate risk is in itself likely to lead to a reduction in the supply of credit. In this regard the usefulness of capital adequacy as defined by the Basle Committee is investigated.

1. Introduction

An increasing number of African countries are undertaking trade liberalisation measures as part of structural adjustment programmes, often with the assistance of the IMF and World Bank. In most cases these programmes are accompanied by financial liberalisation because "structural adjustment has been hampered in several countries, because resources have continued to flow to unprofitable uses rather than to the activities made profitable by devaluations and trade reforms" (Long, 1991:162).

Recently it has argued that financial liberalisation might adversely affect structural adjustment in Africa (Collier,1993; Adam & Ncube,1994; Nissanke, 1991a and Adam, 1995). It is emphasised that banks in Africa face more substantial credit risks during structural adjustment because many of their major borrowers have to face more competitive and riskier circumstances than before.

A less emphasised aspect of financial liberalisation is the fact that it also results in significant interest rate risks for banks. This could strain bank management and thus jeopardise structural adjustment since,

" The experience of many countries that have undertaken this process of interest rate liberalization shows that the transition process from rigid interest rates to a system of more flexible and market-determined rates can be traumatic if not properly managed"

(Leite and Sundararajan, 1991:148.) Partly this trauma will be due to bank insolvency caused by mismanagement (De Juan, 1991:45).

The purpose of this paper is to determine the implications of interest rate risk management by commercial banks in the African context. African financial liberalisations are taking place against the backdrop of a general period of financial fragility, with bank failures and bank restructuring occurring in major international financial centres the United Kingdom, United States, Norway, Sweden, Singapore and Japan (see Corbo & Hernandez, 1993:95). To avoid financial distress and the failure of structural adjustment programmes, it is important that policymakers in Africa take note of the pitfalls that interest rate movements might have on bank profitability, how banks should manage these risks, and what the implications of their behaviour will be for trade liberalisation and export expansion programmes.

As background, the next section briefly describes trade and financial liberalisation in Africa. Lessons from the Southern Cone - as far as interest rate risks are concerned - are

drawn out in section 3. Section 4 considers the interest rate experiences of five African countries with financial liberalisation, namely The Gambia, Ghana, Kenya, Nigeria and Zimbabwe. In section 5 methods to minimise interest rates in a deregulated environment is explored. Section 6 contains a summary and conclusions.

2. Trade and Financial Liberalisation in Africa

After independence most African countries chose import-substitution industrialisation, with heavy state involvement, as an economic growth strategy. This required quota restrictions and tariffs on imports and fixed (overvalued) exchange rates. The excess demand for foreign exchange generated by this combination of policies led to foreign exchange being allocated by the government, and resulted in substantial rents to importing firms with access to foreign exchange. It also resulted in parallel (and often illegal) markets for foreign exchange. Because an overvalued exchange rate implicitly taxes exports, it also led to smuggling and growing external deficits (Bevan *et al*, 1990). Higher state expenditure, accompanied by a shrinking tax base resulted in growing budget deficits. Initially many governments imposed further controls on imports to maintain external balance, kept interest rates at artificially low levels and directed domestic lending. However, with foreign exchange reserves becoming depleted, many governments were subsequently forced into structural adjustment programmes at the end of the 1970s (Lall, 1987). These programmes consisted of trade liberalisation measures coupled with controls on credit to the government. The aim of these were to move resources towards the production of tradables, and therefore required devaluation and scrapping of import quotas to generate expenditure reducing and expenditure-switching effects (Cooper, 1991).

Much has been written on the proper timing, sequencing and speed of trade liberalisation measures (e.g. Edwards, 1990; Falvi & Kim, 1992). The current (fragile) consensus is reflected in the almost standardised approach followed by the IMF and World Bank. The most often described examples in Africa are those of Ghana and perhaps Kenya, and in more recent years Zimbabwe, The Gambia and Ethiopia. Since financial markets in African countries are generally considered to have been "repressed", at some time or another in the past, financial liberalisation/deregulation is often prescribed to accompany trade liberalisation (Gupta, 1994; Nissanke, 1991).

Villanueva (1988 : 67) lists some of the African countries implementing financial liberalisation according to its main objective. In Algeria, Egypt, Botswana and Mauritius the objective of financial reform is to improve the monetary (indirect) control system. In Zaïre and Kenya the objective is to improve the mobilisation and allocation of domestic resources by developing money markets and bank regulation and legislation. In Mauritania, Senegal, Burundi, the Gambia and Sierra Leone the objective is to improve the level and structure of interest rates.

Collier (1993:2) lists African financial liberalisations according to the most conspicuous measures undertaken. For instance, a deregulation of interest rates has taken place in Angola, Burundi, Congo, Cote d'Ivoire, the Gambia, Ghana, Kenya, Madagascar, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Zambia and Zimbabwe. Bank restructuring is taking place in Cote d'Ivoire, Ghana, Guinea, Kenya, Senegal, Tanzania, Rwanda and Uganda. Some bank privatisation has taken place in Cote d'Ivoire, Guinea-Bissau, Madagascar and Senegal, while bank liquidation and new bank entries have occurred in Benin, Kenya, Rwanda, Senegal, Nigeria, Uganda, Ethiopia and Zambia. Adam (1995) contains a succinct account of the financial liberalisation difficulties that occurred in Zambia.

3. Lessons from the Southern Cone

The justification for financial liberalisation is the financial repression hypothesis, which maintains that interest rate ceilings and state intervention in credit allocation is detrimental to the availability and quality of savings and investment (McKinnon, 1973; Shaw, 1973; Fry, 1982). This hypothesis underwent a re-assessment following the experiences of the Southern Cone countries, Argentina (1977-80), Chile (1975-81) and Uruguay (1977-82)¹. For instance, Dornbusch and Reynoso (1989:205) are convinced that the financial repression paradigm is "a kernel of truth and a vast exaggeration". The consensus seems to be that financial reform in itself, as envisaged in the financial repression paradigm is desirable, but where it has failed, it was either due to the design and sequencing of the reform measures (McKinnon, 1988), or caused by adverse factors such as external shocks and macroeconomic policies during the process (Corbo *et al*, 1986).

¹ The financial and trade liberalisation episodes in the Southern Cone have been studied extensively elsewhere, see for e.g. Corbo *et al* (1986), Corbo & de Melo (1987), Urrutia (1988) and Faruqi (1993).

Given the focus of this paper on the management of interest rate risk the relevant question is : what lessons can be derived from the Southern Cone experience ? In this regard, financial liberalisation² in the Southern Cone resulted in exceptionally high levels of real interest rates, and in diverging spreads between deposit and loan rates. It will be argued below that these were symptomatic of inappropriate bank management and eventually affected trade reforms adversely.

(i) High Levels of Real Interest Rates

In all three countries real interest rates increased to levels well above LIBOR plus the rate of expected devaluation. In Chile the average real lending rate was 41 percent per annum between 1975 and 1981, in Argentina 17 percent per annum between 1977 and 1980, while in Uruguay the lending rate averaged 15 percent per annum between 1977 and 1982. Although these higher interest rates were partly caused by overvalued exchange rates which created expectations of devaluation and initially strict monetary policies, a more fundamental cause was weak supervision which gave rise to moral hazard and adverse selection problems amongst banks and their clients.

In Latin American, as recently with the Savings-and Loan crises in the United States, moral hazard arose due to implicit or explicit deposit insurance which increased the incentives for risk-taking (Diaz-Alejandro, 1985). Normally, under circumstances of adequate bank supervision, banks will rather ration credit than take on additional borrowers if interest rates increase (Stiglitz and Weiss, 1981). Under inadequate supervision, adverse selection of borrowers may occur because the probability of repayment of a loan is negatively related to the interest rate charged by the bank. If banks can be assumed to be maximising expected profits, which will depend on the interest rate as well as the probability of repayment, the bank's expected profit could peak at a non-market clearing interest rate.

² The measures implemented by Southern Cone countries were those typically recommended by economists supporting the financial repression hypothesis, such as the removal of interest rate ceiling and credit controls. In the Southern Cone's case, these steps were implemented abruptly, and were accompanied by a relaxation of banking supervision.

If banks engage in risky activities and suffer losses as a result, a principal-agent problem can occur, as indeed happened in the Southern Cone. In this regard, banks that suffered losses to their capital bases, were tempted to invest in riskier projects in an attempt to quickly recover these losses. To attract deposits, especially when facing increased competition in the wake of financial liberalisation, many banks increased deposit rates to very high levels, and often interest was paid by attracting new deposits, i.e. banks became engaged in Ponzi-schemes. As such, high deposit rates following a financial liberalisation episode might be an indication that banks are in need of liquidity. In the Southern Cone, less supervision had another adverse selection problem, namely that less risk averse firms entered the banking market, especially through large conglomerates obtaining majority shareholding in commercial banks (Tybout, 1985). These banks were then encouraged to make high risk loans to its holding firm or its subsidiaries, and where loans could not be repaid, it was rolled-over (a process known as "evergreening", since it does not appear on the banks books as a nonperforming loan). The Southern Cone experience in this regard suggests a deficiency in Stiglitz and Weiss' (1983) modelling of the dynamic aspects of credit rationing. They investigated the effect of banks threatening risky clients with future credit denial in case of default, but omitted to take into account that such threats are time inconsistent, since if the bank carries out its threat in the future it might forego potential future profits from lending.

Related to the adverse selection problem for banks, distress borrowing by firms which are negatively affected by trade reform measures may create a false demand for credit (Harberger, 1985). Especially when the trade reform measures are considered to be incredible, will there exist an incentive for inefficient firms to borrow to cover what they perceive as temporary losses. In this respect, high interest rates may be a symptom of distress borrowing if it is accompanied by high and variable inflation, an overvalued exchange rate and large and unsustainable government deficits. All of these factors were present in the Southern Cone (Hanson & Rocha, 1986). A false demand for credit, as well as a large share of nonperforming loans in a banking system implies an empirical testable proposition, namely that the interest rate elasticity of credit demand will decrease as false demands and nonperforming loans increase. Estimation of such credit demand functions falls outside the scope of the present paper.

In Bolivia in 1985-86, high real interest rates were observed after financial liberalisation. These were largely caused by high banking operating costs. For instance, following a fall in inflation as a result of successful stabilisation, most banks found themselves over-staffed and burdened with high operating costs, a legacy of a high-inflation environment. Many banks as a consequence reduced their personnel and closed branches, but still needed to impose high lending rates in order to meet the high unit operating costs (Moretti, 1992:23).

(ii) Spreads between Deposit and Loan Rates

A second visible effect of financial liberalisation on bank management in the Southern Cone was that spreads between borrowing and loan rates increased dramatically, averaging about 13 percent in the three countries during the liberalisation periods (Ramos, 1988:56). In the Southern Cone, and also later in Bolivia, this was mainly caused by high operating, transaction and default costs. High operating and transactions costs were incurred because banks preferred that the majority of their assets had short-term maturities. This was due to the fact that the majority of their deposits were of a short duration (less than 30 days). In essence, banks in the Southern Cone became brokerage firms rather than asset transformation firms, and thus no financial deepening in the normal sense of the word took place. For long-term projects, short-term loans were rolled over frequently, which increased transaction costs. High default costs were due to a large and increasing proportion of non-performing loans in total assets. In an attempt to remain solvent, banks increased the wedge between loan and deposit rates.

It was noted in a previous section that financial liberalisation in the Southern Cone took place abruptly, without macroeconomic stability having been attained beforehand. From a depositor's point of view, high inflation associated with macroeconomic instability will drive a wedge between (real) deposit and loan rates. To see this, consider first the case of no inflation. If a bank is required to keep cash reserves, the wedge between deposit and loan rates (w) is equal to $l - l(1-r)$, where l = the loan rate and r = the reserve requirement. If inflation equal to p is now generated, the wedge would increase to $l - l(1-r) - p$, implying that the inflation tax on reserves is being passed on to depositors. This would decrease the supply of deposits, and will therefore not be conducive for financial deepening. It can also be observed

that high inflation creates an incentive for governments to increase banks' cash reserve ratio's, which will have the effect of further increasing the wedge between loan and deposit rates and discouraging deposits further (Fry, 1985).

(iii) Outcomes

In Argentina and Chile, despite the inflow of funds into banking deposits and an inflow of foreign capital due to the high interest rates, the quantity and quality of investment and saving did not improve. To a large degree this was due to a repressed demand for consumer durables. It is interesting to note that in Chile asset values (as measured by prices on the stock exchange) increased substantially following the increase in interest rates. This gave added stimulus to the demand for consumer goods. The fact that a stock exchange boom was observed in Chile following interest rate deregulation is, however, unexpected, since at higher interest rates future income streams are discounted at greater percentages and the present value of stock prices should thus fall once interest rates increase. More specifically, if the expectations theory of the interest rate is valid, then stock prices should fall when the financial liberalisation measures are announced. However, the extent of the stock exchange price increase was such that a speculative bubble³ developed in Chile between 1979Q3 and 1980Q4. A possible explanation for this is that economic agents expected the high interest rates to be transitory. Applying the reasoning underlying the expectations theory of the interest rate, this suggests an inverse yield curve. In this sense the Chilean experience is one where agents initially thought that the trade and financial reform would lead to an increase in investment and future growth, and their preliminary expectations were reflected in stock prices. After a period however, as the inconsistencies in the program became clear, expectations of future growth were revised downwards, external circumstances changed adversely and the bubble burst during the early 1980s. The consequences for the banking systems in the Southern Cone countries are described by Ramos (1988:73) who concludes that "the three experiences came close with their financial systems in a shambles" (Ramos, 1988:73). In all three countries the government had to intervene in bankrupted banks, and in

³ A speculative bubble can be defined as a situation in which share prices increase faster than the interest rate for a number of periods, after which the change in share prices is smaller than the change in interest rates for a number of periods.

Chile for instance, banks were all re-nationalised. The economy-wide effects of the failed liberalisation attempts were reflected in significant declines in real GDP per capita : in Argentina real GDP per capita growth between 1981-84 was -11.8 %, in Chile -10.5 % and in Uruguay, -16.2 %.

To derive the relevant aspects for African economies from the Southern Cone's experience, it is necessary to note differences in macroeconomic circumstances and the nature of existing financial systems in Africa. With respect to the former, at the time of the Southern Cone's liberalisations, domestic liquidity levels were high, and external interest rates were at historical lows. Accordingly, the Southern Cone countries in effect adopted "debt-led" growth strategies, by borrowing heavily abroad (Bianchi, 1988:23). Abundant use was made of financial resources offered by private international banks. These favourable external circumstances allowed inappropriately risky bank management to continue unabated until the early 1980s, when the international environment changed adversely. The consequent decline in the Southern Cone's terms of trade, the increase in real international interest rates and the sharp decline in the net inflow of capital was among the factors that finally triggered a massive collapse in the financial systems of these countries. As far as the common elements between the Southern Cone and Africa are concerned, one of the most striking is the preference of banks to grant short-term loans (Nissanke, 1991a). A reason for this in Africa is due to information deficiencies and lack of reputation in African financial markets, which cause banks to prefer short-term loans in order to keep borrowers within arms' reach (Collier, 1993).

As in the Southern Cone, trade and financial liberalisation were accompanied by banking crises and bank restructuring in Africa. This was probably the most severe in Benin, where all the banks were forced to close their doors. In Kenya, the relative ease of entry into the banking sector during 1982-86 had resulted in a rapid growth in the number of financial institutions, a number of which suffered difficulties in recent years. In Ghana, the net worth of the banking system was negative by the second half of 1988, mainly due to foreign exchange losses and a high proportion of nonperforming loans (World Bank, 1990:53).

A common feature of the African episodes of financial distress is the authorities' late and belated recognition of the distress. Popiel (1994:4) point to the fact that "In many cases,

bank supervisors were either technically unable or politically reluctant to take stock of the true extent of the losses of distressed banks". This is somewhat different from the Southern Cone case where supervision and regulations were in fact intentionally relaxed. Another common feature of African episodes of financial distress is that bank restructuring and rehabilitation took a relatively long time to accomplish. For instance in Ghana, the restructuring took eight years (Harvey, 1993:28).

In addition to differences in the macroeconomic environment, the relevance of the Southern Cone experience should also be judged in light of the nature and structure of banking in Africa. A first characteristic of financial systems in Africa is that the level of domestic saving in the continent as a whole is well below that of all other developing regions (Popiel, 1994:1). It is thus imperative that financial intermediation in African economies be improved, although the opposite took place during the 1980s. According to Popiel (1994:3) this was due to financial repression in the form of direct government intervention in setting interest rates and granting credit that led to (i) the lack of appropriate legal, regulatory and prudential frameworks; (ii) widespread insolvency and illiquidity of firms; (iii) a lack of adequate financial and accounting information and (iv) a lack of sufficient human skills and technology. Also, the widespread occurrence of informal financial markets may have hindered financial deepening (Chhibber & Shafik, 1991).

Formal financial systems in Africa are dominated by commercial banks. With some exceptions, commercial banks usually own approximately 85 to 95 percent of the total assets of the financial system. These commercial banks are often highly concentrated in their ownership structure : for instance in Ghana one commercial bank accounts for more than 50 percent of the total assets of the financial system.

The dominance of commercial banks in Sub-Saharan Africa's financial systems can be explained by Leland and Pyle's (1977) theory on the existence of banks. They view financial markets as being characterised by imperfect information, so that banks become "insiders" into firms' investment decisions. In this way, banks' willingness to lend to a firm gives investors (depositors) information about the quality of the firm. Thus, by granting loans to the firm, banks demonstrate their commitment to the portfolio and signal the value of the underlying

assets. This accords with Diamond's (1991) result that relatively new borrowers without well-established reputations have the most to gain from bank monitoring, and hence choose bank loans instead of equity to finance investment.

The two basic functions that banks perform as financial intermediaries is that of brokerage and maturity-transformation (Niehans, 1978). If a bank precisely matches the maturity of its deposits and loans, it functions in essence as a broker. The broker's usefulness is simply to reduce the search costs of joining borrowers and lenders. If a bank modifies the attributes of financial claims, such as their duration, it is said to be engaged in maturity transformation. Maturity transformation may facilitate liquidity creation, especially on the long-term side of the market. In addition, when a bank engages in maturity transformation, there will exist enhanced incentives for screening and monitoring (Bhattacharya & Thakor, 1993 :12).

The balance sheets of banks in Africa are characterised by a dominance of short-term lending and short-term deposits. Long-term markets for funds are virtually absent in most cases. This implies that if financial liberalisation is to succeed in developing financial markets and in facilitating trade liberalisation and export expansion, incentives have to be created for banks to expand their activities from being brokerage firms to being maturity transformers.

Similar to the Southern Cone's experience, banking in Africa is generally characterised by high intermediation costs. However, in Africa, it is mainly due to many banks being under government control with the consequence of severe overstaffing. In some African countries, most notably Ethiopia and Tanzania, the banking sector is wholly state-owned, and the largest proportion of outstanding loans is held by the government. In such cases, interest rate deregulation will for obvious budgetary reasons not be feasible.

The above discussion has highlighted that financial liberalisation should be an undertaking African countries should consider with caution. Specifically, the problems of moral hazard and adverse selection can be expected *a priori* to occur, given the weaknesses in the structure of banking in Africa. Tell-tale signs of these might be high levels of real interest rates, divergences between deposit and loan rates, and finally, in light of the preference for banks to

play only a brokerage role in Africa, the yield curve itself might change slope and might become inverted. The next section analyses these issues empirically.

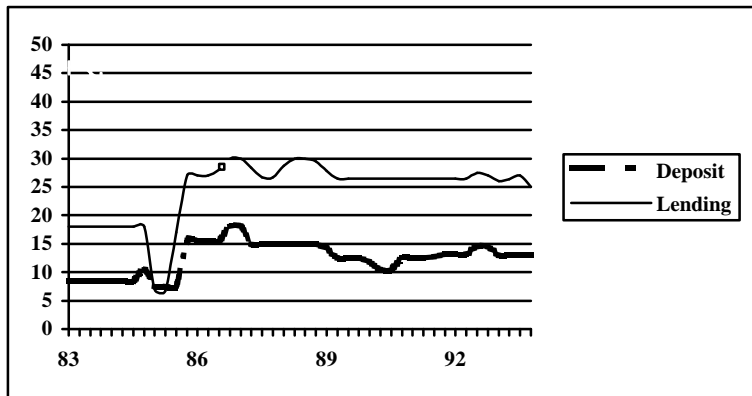
4. African Experiences with Financial Liberalisation

With reference to the level of interest rates, the spread between deposit and loan rates and the term structure of interest rates, five African economies are analysed in this section, namely The Gambia, Ghana, Kenya, Nigeria, and Zimbabwe. This is a small sample but nevertheless include the countries with the most advanced financial systems in Sub-Saharan Africa (Kenya and Zimbabwe), as well as the countries where structural adjustment has been an ongoing process for more than a decade (Kenya and Ghana).

(i) The Gambia

In August 1985 The Gambia adopted an Economic Reform Programme (ERP) in collaboration with the IMF and World Bank. To facilitate the adoption of a floating exchange rate system, interest rates were deregulated. Previously maximum limits were imposed on the interest rates charged and paid by commercial banks. The deregulation of interest rates took place abruptly. Figure 1 below shows the evolution of commercial bank loan and deposit rates in The Gambia, from 1983 to 1993.

Figure 1
Average Loan and Deposit Rates, The Gambia, 1983-1993



(Source of data : IMF Financial Statistics)

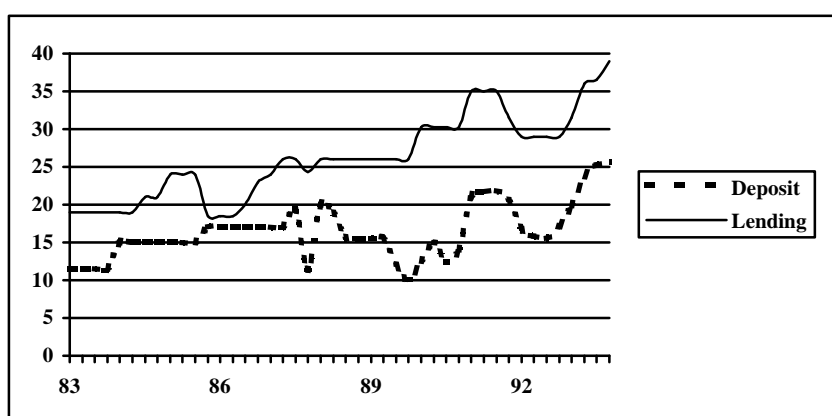
It can be seen from Figure 1 that for a period following financial liberalisation, 1985:1 to 1985:2 that average deposit rates exceeded average loan rates for a short period. This was caused by a sudden switch in the term structure of interest rates- evident in the sharp fall in loan rates. Weber (1966) and Stigum (1976) have pointed out that interest rates will move sluggishly for banks with long-lived assets. The consequence is that in oligopolistic banking systems, as in Africa, banks will be forced to adjust deposit rates more slowly than market forces would dictate. Evidence of this sluggish adjustment in the case of the Gambia can be seen from Figure 1 in that deposit rates only started increasing substantially from 1986 onwards, after loan rates jumped to a higher level. Thus, to generalise, given the structure of banking in Africa, switches in the term structure of interest rates will be a disincentive for banks to lend out long. Banks thus revert to fulfilling a pure brokerage function to the detriment of maturity-transformation⁴.

⁴ On the other hand, in an economy where financial liberalisation has actually succeeded in fostering maturity transformation by banks, sluggish adjustment due to changes in interest rate regulation will be likely. Since indirect monetary policy measures will then have a slower impact on the economy, policy makers could become frustrated and be tempted to revert to direct controls over interest rates and credit - see the discussion of Nigeria below.

(ii) Ghana

Ghana introduced a structural adjustment and stabilization programme in April 1983. The essential outline of this programme is a typical example of the IMF and World Bank assisted programmes in Africa, and is described in Kapur *et al* (1991). In contrast to The Gambia, interest rate deregulation proceeded gradually. In October 1983 all interest rates were raised by between 3 and 5 percent. The spread between key deposit and lending rates was narrowed while interest rates for priority sectors were adjusted upwards. In September 1987 interest rates were finally liberalised by abolishing maximum lending and minimum deposit rates. The evolution of interest rates in Ghana between 1983 and 1993 is shown in figure 2.

Figure 2
Average Loan and Deposit Rates, Ghana, 1983-1993



(Source of data : IMF Financial Statistics)

Figure 2 indicates that shortly after the interest rate liberalisation, the gap between average deposit and lending rates initially contracted, before widening again. This contraction might be due to the same sluggishness of response as was described in the case of The Gambia. However, the degree of sluggishness did not result in deposit rates exceeding lending rates, as was the case in The Gambia. Compared to the pre-liberalisation period, the average gap between lending and deposit rates increased significantly.

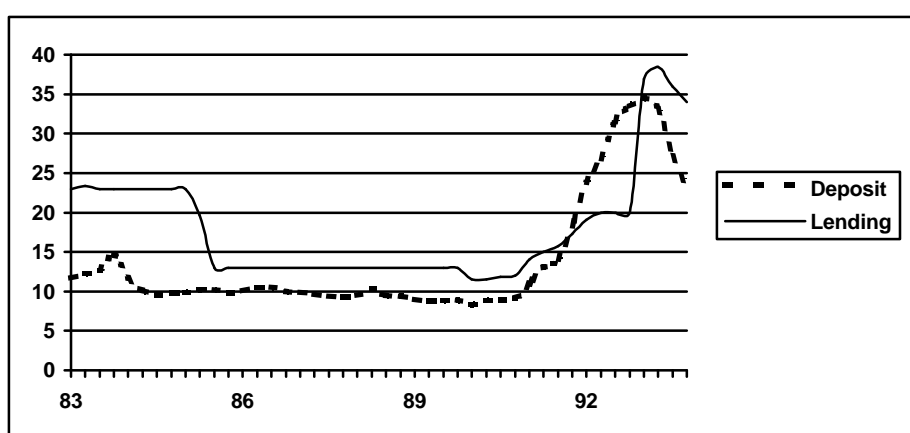
The balance sheets of Ghana's commercial banks (who owns 70 percent of the assets of the banking sector) have been analysed by Nissanke's (1991a : 142-3). He points out that (i) commercial banks are holding excess liquidity above the level required by the Central Bank and that (ii) their loan portfolios are concentrated on the short end of the market. The reason for these preferences appear to be the absence of viable projects to which to lend, as well as the nonexistence of an effective interbank market. With excess liquidity and limited lending opportunities there is little incentive for banks to attract deposits and engage in maturity transformation. Currently in Ethiopia for example, the commercial banks refuse deposits above a certain amount. When interest rates are simultaneously expected to fall, banks will have even less incentive to attract longer-term deposits, and this will be reflected in a negative spread (yield curve) between deposit rates of different maturities. This seems to be currently the case in Kenya, South Africa and Zimbabwe. An implication is that financial liberalisation could be ineffective to increase savings in the presence of excess bank liquidity (Nissanke, 1991a:143).

(iii) Zimbabwe

Zimbabwe's Economic Structural Adjustment Programme (ESAP) was initiated at the end of 1990 with a relaxation of price controls and the scrapping of the foreign exchange allocation mechanism and import control. An aim of the ESAP is to shift resources into export production by making that sector profitable. An increase in exports requires higher working capital for firms, since there are post-and pre-shipment lags involved between production and receipt of payment. Firms obtain the majority of their working capital by borrowing from banks. However, banks need to assess the risks involved, and when this is perceived as too high, they will ration credit. Also, adverse selection and moral hazard problems, as discussed in the previous section, apply (i) when firms expand into new markets there is an inherent uncertainty involved and (ii) banks have difficulty in screening applications for credit, and in distinguishing between good and bad borrowers. Before the current liberalised exchange rate system, Zimbabwean banks did not need an own screening procedure, since those firms which had a quota of foreign exchange allocated, or possessed an import licence, in effect signalled that they would be good borrowers, since by implication they had already been screened. Higher interest rates would not clear the market, since higher interest rates might lead borrowers to undertake more riskier investment decisions. Furthermore, due to the liberalisation of the capital account, a re-allocation of portfolios took place in the financial sector,

away from loans to other assets. The higher incidence of bankruptcy associated with high interest rates also requires of banks to divert a greater proportion of their loanable funds to the accumulation of reserves. The consequence of all these factors is to reduce the supply of loanable funds exactly when export-manufacturing needs to have access to those for working capital purposes (Adam & Ncube, 1994).

Figure 3
Average Deposit and Lending Rates, Zimbabwe, 1983- 1993



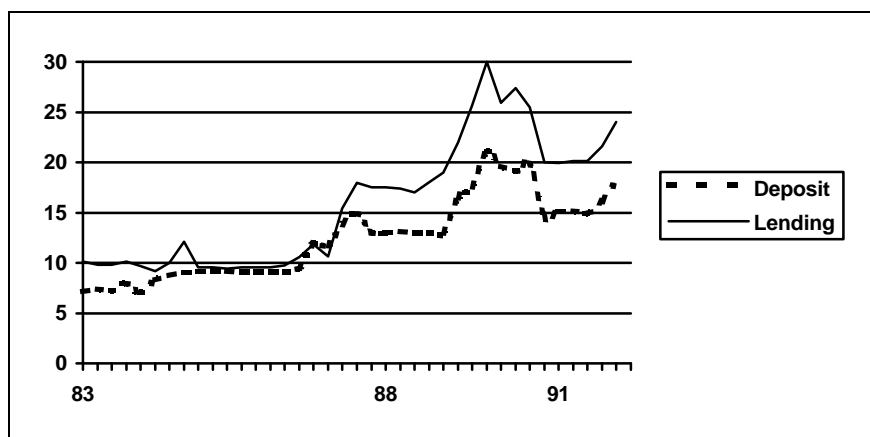
(Source of data : IMF International Financial Statistics)

Figure 3 suggests that after interest rate liberalisation in early 1990, both lending and deposit rates increased dramatically. It is noticeable from Figure 3 that from mid 1991 to end 1992, average deposit rates exceeded average lending rates, a phenomenon also described in the case of The Gambia. Burundi's experience with financial and trade liberalisation seem to be similar in a number of aspects to that of Zimbabwe. In 1988, interest rate deregulation took place, while simultaneously, as in The Gambia, an (auction) market for Treasury Bills was established. Interest rate deregulation fairly quickly established positive real interest rates. Dercon (1994:2) points to margins between deposit and lending rates in Burundi rising from 5 Percent in 1988 to 9 percent in 1992, and suspects that this reflects "oligopolistic powers". He further reports that a RPED survey of manufacturing firms after these measures were implemented pointed to credit constraints as the most binding problem for expansion. Interestingly, small firms complained more. This is broadly similar to problems experienced by firms in Zimbabwe.

(iv) Nigeria

Nigeria implemented its SAP in July 1986. Prior to August 1986 interest rates in Nigeria were generally fixed by the Central Bank of Nigeria with periodic adjustments depending on the government's sectoral priorities (see Ucendu, 1993). With the implementation of the SAP, which focused on trade liberalisation in order to stimulate exports and correct price distortions, the need for financial liberalisation was also realised. The steps that were taken in this regard were interest rate deregulation, the introduction of an auction market for treasury bills, the identification of insolvent banks for restructuring, the introduction of more stringent prudential guidelines for banks, increases in banks' minimum capital requirement, and the upgrading and standardisation of accounting procedures. Not all of these measures were implemented simultaneously, however. Interest rate deregulation was the first step. As figure 4 show, interest rates increased significantly from August 1986.

Figure 4
Average Deposit and Lending Rates, Nigeria, 1983 - 1993



(Source of data : IMF International Financial Statistics)

Figure 4 shows that average deposit rates exceeded lending rates for a very short period in 1987, after which the levels of interest rates increased significantly, and the gap between lending and deposit rates widened. In November 1989, the Nigerian government reversed its initial policy by re-imposing controls on interest rates. Maximum spreads between deposit and landing rates (of 7 %) and between prime and highest lending rates (4%) were imposed.

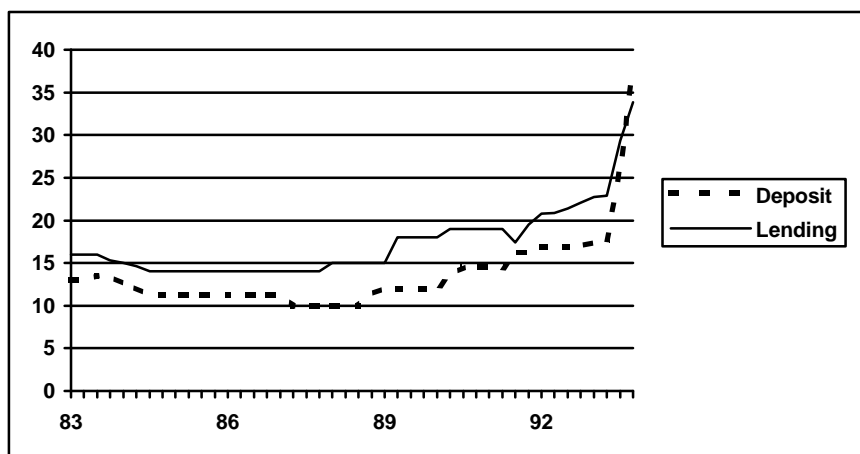
As part of the financial liberalisation, the entry procedure for new banks was eased. This resulted in a total of 46 new commercial and merchant banks being established between 1986 and 1990, and another 25 being granted licences. Only towards the end of 1990 were a set of prudential guidelines and accounting standards introduced. By that time some bank insolvencies, due to an extent to non-performing loans, had occurred. To restore confidence in the banking system the Nigeria Deposit Insurance Corporation (NDIC) was created in 1988. Early in 1990 the Basle Accord's risk-weighted capital guidelines were implemented

(v) Kenya

Previous to the implementation of its Structural Adjustment Programme (SAP) in 1983, the financial sector in Kenya suffered from severe repression. Interest rates were maintained below market-clearing levels, and direct control of credit was the primary monetary control instrument of the authorities. Accompanying the SAP, interest rate deregulation took place. In September 1991 the maximum lending rate was increased from 10 to 14 %. The rediscounting rate for crop finance paper was raised to 11.25 %, while the minimum savings deposit rate was raised to 12.5 %. Between 1983 and 1987, the differentials between the interest rates of banks and non-bank

financial institutions were narrowed. This improved the competitiveness of commercial banks. One of the first steps towards freeing interest rates was taken in 1989, when the government started selling Treasury Bonds through an auction. In 1991, interest rates were completely freed.

Figure 5
Average Deposit and Lending Rates, Kenya, 1983 - 1993



(Source of data : IMF International Financial Statistics)

Figure 5 shows that interest rates in Kenya have been fairly stable and that a relatively constant gap had been maintained between lending and deposit rates for most of the period. However, it must be borne in mind that, although Kenya was one of the first African countries to implement a SAP, it was only in 1991 that full interest rate liberalisation took place. Since then, interest rates have been following a steep upward ascent, with the gap between loan deposit rates shrinking, very similar to Ghana's initial experience after interest rate liberalisation.

(vi) Generalisations and Empirical Results

Visual inspection of the figures presented in the previous paragraphs suggested that (i) lending rates initially adjusted more slowly than deposit rates, creating initial periods during which the gap between lending and deposit rates narrowed, and even became negative in the case of The Gambia and Zimbabwe and (ii) the level and volatility of interest rates increased after liberalisation.

To evaluate the extent of (ii) empirically, simple regressions of the change in interest rates on a constant were estimated and the standard error of the regressions analysed for the period after liberalisation (which differs from country to country) as well as for two sub-sample periods.

Interest rates that were used, were short-term (less than 3 months) deposit rates and long-term deposit rates (longer than 12 months). Monthly data pertaining to the following countries were used : Ghana, Kenya, Zimbabwe and Nigeria. Reliable monthly data for The Gambia could not be obtained. The results are reported in Tables 1 and 2. For the sake of brevity, only the estimate of the constant (the average change in the interest rate) as well as the standard error (a measure of variability) of the equation is reported. Chow-tests for parameter stability (not reported) verified the choice of subsamples.

Table 1
Variability of Short-term Deposit Rates in Various African Countries

Country	Whole Period	First Subsample	Second Subsample
Ghana 89(1)-94(3)	-0.016 (1.899)	-0.065 (2.096)	0.013 (1.802)
Kenya 91(7)-93(12)	0.736 (2.18)	0.067 (0.279)	1.68 (3.21)
Nigeria 87(1)-90(12)	0.16 (0.957)	0.05 (0.717)	0.28 (1.15)
Zimbabwe 89(1)-94(6)	0.394 (2.38)	0.417 (1.21)	0.367 (3.29)

(Standard errors of the equations are in parentheses)

Table 2
Variability of Long-term Deposit Rates in Various African Countries

Country	Whole Period	First Subsample	Second Subsample
Ghana 89(1)-94(3)	0.089 (1.468)	-0.043 (1.189)	0.167 (1.62)

Kenya 91(7)-93(12)	0.13 (1.02)	0.003 (0.338)	0.31 (1.57)
Nigeria 87(1)-90(12)	0.22 (0.974)	0.082 (0.69)	0.35 (1.18)
Zimbabwe 89(1)-94(6)	0.181 (1.89)	0.292 (1.195)	0.05 (2.48)

(Standard errors of the equations are in parentheses)

Tables 1 and 2 indicates that the variability of deposit rates had increased in all countries after financial liberalisation, with the exception of Ghana, where the variability of short-term deposit rates dampened down somewhat during the later phases of the liberalisation. The largest increases in the volatility of interest rates occurred in Kenya (from 0.279 to 3.21 in case of short-term rates). Except for Nigeria, short-term deposit rates seems to be more volatile than long-term rates.

As far as the absolute magnitudes of interest rate changes are concerned, Tables 1 and 2 indicates significant increases in Kenya and Nigeria, while the magnitude of changes seems to have been dampened down in Zimbabwe. Ghana presents a case where changes in deposits rates were negative initially, after which they turned positive. In Kenya and Zimbabwe, the changes in short-term deposit rates are substantially larger than the changes in long-term deposit rates. These are also the two countries where the yield curve⁵ (as measured by the spread between short and long-run deposit rates) is negative during the second sub-sample. This is confirmed by the analysis summarised in Table 3. Table 3 shows the average yield gap between long and short rates for the different countries in Tables 1 and 2. These were calculated by regressing the yield gap on a constant. The standard errors of these equations show the variability in the yield gap around the average.

⁵ Yield curve theory in the African context is discussed in Naude and Styger (1995).

Table 3
Variability of Yield Gap in Various African Countries

Country	Whole Period	First Subsample	Second Subsample
Ghana 89(1)-94(3)	3.96 (3.05)	5.54 (2.76)	3.10 (2.91)
Kenya 91(7)-93(12)	-6.13 (6.23)	-2.68 (0.58)	-11.01 (7.35)
Nigeria 87(1)-90(12)	1.70 (0.89)	1.17 (0.36)	2.24 (0.96)
Zimbabwe 89(1)-94(6)	-2.43 (4.04)	0.704 (1.14)	-6.08 (2.96)

(Standard errors of the equations are in parentheses)

Table 3 shows that, without exception, the variance of the gap between short and long-term interest rates in African countries had increased after liberalisation, i.e. the slope of the yield curve had become more variable. In the case of Kenya and Zimbabwe, the yield curve has a negative slope, most pronounced in Kenya (-11.01). In all countries, except Ghana, the absolute magnitude of the gap had increased, i.e. the slope of the yield curve had become steeper. Together with the evidence from Tables 1 and 2, Table 3 suggests that short-term interest rates in Kenya and Zimbabwe are overshooting their long-run equilibrium level by a significant margin, and that market expectations are for these rates to eventually converge to a lower rate in the future. In Ghana, the gap between the two is narrowing, and might reflect only a risk premium still. In Nigeria, the gap has increased, perhaps suggesting a rise in future short-term interest rates.

To further assess changes in the yield curves of the countries, the relationship between long and short rates were estimated. This makes allowance for the way in which the past history of short-rates might influence the yield curve.

Early work on yield curves, eg. Meiselman (1962), Modigliani and Shiller (1973) and Modigliani and Sutch (1966) assumed that the pure expectations hypothesis is valid, and posited

that expectations of future short-term interest rates depend only on the recent path of short-term rates. Following more recent work (e.g. Miles, 1989), it can be assumed that the current level of long-term interest rates depends on past values of both long-rates as well as current and past changes of short-term interest rates. Thus, equations of the following form were estimated for each country for the complete sample period as well as for the two sub-samples:

$$(1) \quad RL_t = \mathbf{a} + \mathbf{b}_1 \nabla RL_{t-1} + \dots + \mathbf{b}_n \nabla RL_{t-n} + \mathbf{g}_0 \nabla RS_t + \dots + \mathbf{g}_m \nabla RS_{t-m} + \mathbf{e}_t$$

Where RL_t = the interest rate on deposits with maturity of longer than 12 months.

RS_t = the interest rate on deposits with a maturity of less than 3 months.

\mathbf{e}_t = a random disturbance term with zero mean and constant variance.

$m = n = 4$ (which ensured the random disturbance term is white noise).

The following restrictions were tested for each of the four countries and three estimation periods : $\beta_1 < 1$, $\gamma_0 = -\gamma_1$, $\beta_2, \dots, \beta_n = 0$; $\gamma_2, \dots, \gamma_m = 0$; $\alpha > 0$ and $0 < \gamma_0 < 1$.

If the data will allow these restrictions, the equation has the property that over the short-term, changes in the short-term rate cause changes in long-term rates, although the long-term rates move by less than the change in the short-term rate.

The results from an OLS regression for Ghana, Kenya, Nigeria and Zimbabwe are summarised in the Appendix. T-ratios are in parentheses, and an asterisk indicates significance at the 5 % level. The results suggests that not all the restrictions could be accepted for all countries. For Ghana, only the restriction $\beta_1 < 1$ could be accepted for the first sub-sample, while the restrictions that $\Sigma \beta_i$'s and $\Sigma \gamma_i$'s = 0 could be accepted for all sub-samples. For more recent periods, changes in short-rates or past levels of long-rates do not seem to have an influence on long-rates at all. In the case of Kenya, only changes in contemporaneous short-term interest rates seem to have any effect on long-term interest rates, but the value of this parameter is smaller than 1 (0.69) and suggest a less than perfect correspondence between short and long rates. Furthermore, the acceptance that lags of short-term interest rates are insignificant, suggests that long-run interest rates do not adjust sluggishly to short-term rates. For Nigeria, lagged long-term interest rates, as

well as lagged short-term interest rates influence levels of long-term interest rates, suggesting a more gradual and sluggish response of long-term interest rates to changes in short-term interest rates. In Zimbabwe only contemporaneous changes in short-term interest rates and lagged long-term rates seems to affect current long-term rates. The negative value for b_1 indicates that long-term rates are declining, while the fact that $\gamma_0 = 0.4$ implies a less than perfect correspondence between short-term and long-term interest rates.

In sum, the results seems to suggest that in all cases, except Nigeria, financial liberalisation has resulted in a declining influence of changes in short-rates on long-rates. As far as deposit rates are concerned, long rates tend to adjust instantaneously to changes in short-term rates, although by a factor of less than one. This seem to indicate that the authorities in these countries have achieved a high level of credibility in curbing inflation (i.e. in bringing government spending under control) - with the exception of Nigeria (during 1990, the inflation rate averaged around 50 %). If this conclusion can be accepted, it bodes well for the sustainability of trade liberalisation in these countries. It should be noted that this conclusion also implies that long-term rates should become less variable, both absolutely and relatively to short-term interest rates. In this regard the results obtained in Table 3 corroborate the conclusion, as it indicates that in Ghana, Kenya and Zimbabwe the absolute and relative variability of long-term deposit rates did indeed decline. Only in the case of Nigeria does the evidence suggest that long-term interest rates has become more variable.

The most commonly accepted ways of handling interest rate volatility and the accompanying risks, are duration analyses and ensuring capital adequacy. The appropriateness of these for banks in Sub-Saharan Africa will be discussed in the next section.

5. Managing Interest Rate Risk in Africa

African banks avoid the risks inherent in maturity-transformation by reverting to a pure brokerage function. In developed countries, sophisticated techniques have been created through which the risk inherent in maturity-transformation can be minimised, such as duration analysis. In this regard, a bank's exposure to changes in interest rates is described as its duration gap. It can be measured either (i) in terms of its impact on the the market value of the bank or (ii) the net interest income a bank earns over a specified time period, or (iii) the impact of changes in interest rates on the amount of a bank's capital. Option (i) has led recently to the

suggestion that banks should adopt market valuations for their assets and liabilities in order to give investors and depositors an accurate measure of the bank's break-up value. The problem with this suggestion is that it could cause increased volatility in bank earnings due to the possibility of cycles in interest rate and economic conditions (Valentine, 1995:3-4). A problem with (ii) is that it will not generally find the same level of interest rate exposure as would be indicated by (i) (see Valentine, 1995). The basic shortcoming of (iii) is that should banks use it to immunise themselves against their interest rate exposure, they will only be immunising themselves against parallel shifts in the yield curve (Valentine, 1995:5). As was shown in the previous section, a characteristic of yield curve movements in Africa is that the slope of the yield curve itself changes, and moreover that the sign of the slope is likely to switch. The implication is that duration analysis is not the most appropriate mechanism against interest rate volatility in Africa. Traditionally, the first line of defence against banking risks is bank capital. Table 4 contains the average percentages of equity capital of total assets of deposit money banks in the countries under scrutiny, for the period 1970-1993.

Table 4 suggests that, compared to developed countries' banks, African banks hold much higher ratios of equity capital to total assets; In the present sample, the average ratio in 1992 was 12.8 percent. This might be explained with reference to the underdeveloped state of interbank markets in general. However, there is a trend observable in the data not explained by this : from the late 1970s onward (after the second oil shock and the slowdown in world economic growth) ratio's started to increase markedly, with those in most countries continuing to rise following trade liberalisation. This would suggest that banks' perceived the risks in the general economic environment to have increased. The general tendency for capital:asset ratios in Africa to exceed those in the developed countries may also be ascribed to this general perception of heightened risks in the business environment. An exception to the generally observed pattern of increasing capital:asset ratios is the case of Nigeria. From the analysis in the previous section, a conclusion is that capital requirements, and perhaps banking supervision, might not be adequate in Nigeria.

Table 4
Ratio's of Equity Capital to Total Assets

Year	The Gambia	Ghana	Nigeria	Kenya	Zimbabwe
1970	4.5	6.4	6.4	6.4	n/a
1971	5.5	65.3	8.1	7.0	n/a
1972	6.3	5.5	7.3	7.6	n/a
1973	3.7	5.0	6.5	6.6	n/a
1974	1.5	4.4	4.4	6.9	n/a
1975	3.4	5.4	3.8	7.3	n/a
1976	10.1	3.9	3.3	7.2	n/a
1977	14.0	2.7	3.3	6.9	n/a
1978	14.6	2.4	4.2	7.9	n/a
1979	14.5	2.9	4.1	7.2	n/a
1980	10.7	3.1	3.4	8.7	15.5
1981	10.9	3.4	4.0	9.9	18.0
1982	11.0	4.5	4.3	9.6	16.3
1983	7.1	6.0	4.4	9.9	18.7
1984	7.4	6.3	4.2	11.5	11.4
1985	4.9	7.6	4.5	10.3	10.4
1986	9.5	10	5.2	9.7	11.4
1987	14.3	8.3	4.9	13.8	11.3
1988	12.3	10.9	5.1	14.7	10.7
1989	12.2	n/a	6.9	16.4	10.6
1990	22.4	17.9	7.4	16.9	13.6
1991	19.1	19.8	6.2	16.9	12.7
1992	8.4	17.9	8.0	17.7	12.1
1993	10.5	16.7	n/a	12.9	13.6

As far as bank capital adequacy in general is concerned, the recent proposals of the Basle Accord may have a number of implications for bank management in Africa, especially during trade and financial liberalisations. Concerning risk management by commercial banks,

a number of African countries have already subscribed to the Basle Accord (e.g. Zimbabwe, South Africa, Namibia, Nigeria, Kenya, Ghana). Based on his experiences as president of the Central Bank of Chile, Roberto Zahler recently recommended the Basle Accord's proposals, stating that

"I believe it would be beneficial for developing countries to ask themselves if their standards of minimum capital requirements are adequate, using as a basis of comparison the Basle agreement" (Zahler, 1993:52).

The Basle Accord came into being in July 1988 when the central bank governors of the G-10 countries endorsed a system of risk-based capital guidelines for banking institutions under their jurisdiction. The primary purposes of the Basle Accord's risk-based capital guidelines (Basle Committee, 1993 : 2-5) are to (i) make regulatory capital requirements sensitive to differences in risk profiles among banking institutions; (ii) take off-balance sheet exposures explicitly into account in assessing capital adequacy; (iii) minimise disincentives to hold low-risk liquid assets; (iv) foster co-ordination among supervising authorities from major industrial countries; (v) reduce international competitive inequities due to differences in capital policy.

The Accord established two types of qualifying capital and defines minimum capital for risk-weighted asset ratios. Tier one capital (or core capital) is pure tangible equity available to absorb unexpected losses. Tier two (or supplementary) capital consists mainly of reserves.

The risk-based capital guidelines assign each on- and off - balance sheet asset item to one of four risk categories, namely 0, 20, 50 or 100 percent, depending on the perceived risk of that item. The currency value of each item is multiplied by its risk weight. The sum of all these weighted items is the risk-weighted assets. The minimum risk-based capital standard is equal to 8 percent (Tier one plus Tier two) of the risk-weighted assets.

To the extent that banks cannot meet capital standards, one option would be to have slower asset growth. The other option would be a rights issue. However, given the thinness and underdeveloped nature of capital markets in Sub-Saharan Africa, it is not feasible in most cases. Therefore, to generate the additional capital internally will imply pressures for higher operational efficiency and lower dividends. A more medium to long-term solution is for banks to move more of their assets into less risky assets. In the context of trade liberalisation in Sub-Saharan Africa, this may have adverse effects on the trade liberalisation programme, since export industries may be perceived as more risky.

Before Basle, many African countries measured capital adequacy with reference to the ratio of equity to liabilities (deposits), and not equity to assets. This practice is based on the assumption that liquidity is the fundamental problem facing banks. This is not particularly valid in the African case since banks in many African countries suffer from excess liquidity and a danger of insolvency due to the deteriorating quality of loans. The Basle proposals are in this regard thus, appropriate for African economies. However, the acceptance of Basle Accord will require a switch in procedure which could leave banks with inadequate levels of current capital, so that they might have incentives to increase the spread between deposit and loan rates, and to make less risky loans.

Another shortcoming of the Basle Accord's proposals in the African context, is that "the internationally agreed system of risk-weighted capital adequacy assessment is already too complicated for most developing economies to implement effectively" (Fry, 1995a:18). The Basle proposals have also been criticised in the African context by Caprio *et al* (1993:76) who are of the opinion that the 8% risk-adjusted Basle ratio might not be high enough for countries whose economies are not well diversified. Polizatto (1991:177) shares this view by stating that a 8% capital to asset ratio should be seen as the "absolute floor", and that it should be increased on a case-by-case basis, especially where a bank has substantial off-balance sheet risks. The conclusion concerning Nigeria from Table 4 supports this view.

Finally, although capital requirements are widely believed to reduce a bank's incentive to choose riskier assets, Kahane (1977) argued that capital requirements by themselves may be ineffective in controlling bank risk, and may even induce a bank to choose riskier assets (see also Koehn & Santomero, 1980). Also, Besanko and Kanatas (1993) show that higher capital requirements may lead to greater outside equity, which could increase moral hazard because managers (insiders) have a reduced stake in the bank. This is also suggested by Gennotte and Pyle (1991). Besanko and Thakor (1992) illustrate that an increase in capital requirements increases the equilibrium loan size and decreases the equilibrium loan interest rate, but also decreases the equilibrium deposit rate. In this sense a higher capital requirement acts as a tax on depositors.

6. Summary and Conclusions

This paper pointed out that financial liberalisation creates a significant interest rate risk, which might negatively affect the supply of credit by banks. From the Southern Cone's experiences with financial liberalisation it was concluded that inappropriate bank management resulted in exceptionally high levels of interest rates as well as diverging spreads between deposit and loan rates. The main reasons for inappropriate bank management were inadequate supervision

and regulation. These created moral hazard, adverse selection and principal-agent problems, and gave rise to high operating, transactions and default costs. A number of common elements between the experiences of the Southern Cone and African countries were identified, such as (i) the preference of banks to grant short-term loans, (ii) an increase in banking crises and financial restructuring accompanying financial liberalisation and the (iii) generally late recognition by the authorities of existing financial distress. In contrast to the current situation facing African countries, the Southern Cone countries faced favourable external circumstances at the time of their reforms. Bank supervision and bank management therefore takes on a doubly important dimension in the current African context. The nature and structure of banking in Africa should be taken into account when deriving lessons from the Southern Cone. It was noted that financial systems in Africa are dominated by commercial banks and that banking firms in Africa are predominantly pure brokerage firms. Liquidity creation, especially on the long side of the market might be facilitated if banks became asset-transforming firms. This would necessitate that banks become more involved in maturity transformation. However, when engaged in maturity transformation, banks have to "ride the yield curve" to make a profit. The risk attached to this is that a sudden change in its slope could adversely affect profits if liabilities are repriced faster than assets. Under oligopolistic banking structures, such as found in most African countries, this might cause banks to adjust deposit rates more sluggishly following financial liberalisation than market forces would dictate. Empirical evidence showed that this actually occurred in all five countries in the sample : The Gambia, Ghana, Nigeria, Kenya and Zimbabwe. In Kenya and Zimbabwe average deposit rates actually exceeded average loan rates for a period of time. Empirical analysis of a sample of five African countries also suggested that both the level and the volatility of interest rates increased following financial liberalisation, and that the spread between deposit and loans rates increased over time.

Methods to manage interest rate risks were discussed. It was found that duration analysis might not be appropriate in the African case. Capital adequacy as a defence against interest rate risk and possible interest rate mismanagement were discussed and it was pointed out that the Basle Accord might be relevant for the African case, but that its major shortcomings were that the acceptance of the Accord's proposals for capital adequacy might create incentives for banks (i) to increase the spread between loan and deposit rates to earn more profit, and (ii) to make less risky loans. Both responses imply a reduction in credit available to firms. Furthermore, an 8% risk-adjusted ratio of capital to assets might not be enough for a situation in which significant off-balance sheet risks exists. Finally, Basle might be too complicated to implement effectively in many African countries, although this might be a short-term problem - experiences of other developing countries with the establishment of

off-shore banking centra (e.g. Indonesia and Malta) have shown that foreign expertise and technology can be successfully bought.

Although bank capital requirements might alleviate problems associated with moral hazard and adverse selection, it still remains predominantly a way for a bank to avoid rather than manage interest rate risk. The main point is that avoidance of interest rate risk is likely to lead to a contraction in credit supply. Therefore, banks should be encouraged to engage in interest rate management, by creating liquidity through maturity. In Asia, separate banking institutions, in the form of Development Banks, were created to engage specifically in maturity mismatch mismatch, often through directed credit programmes. The viability of such institutions in the African context remains to be investigated. Perhaps a first step in the African context would be the aquisition of new technologies, and the development of appropriate indicators of interest rate risk. At the same time supervision and regulation need to be tightened. A necessary condition for the latter is the improvement of bankers' management skills. Since these solutions are of a long-term nature, the dismal conclusion is that a lack of credit availability is likely to remain a factor constraining successful structural adjustment in Africa.

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APPENDIX

Regression Results of Relationship between Short and Long Rates in Ghana

Parameter	Value (89:1-94:3)	Value(89:1-90:12)	Value(91:1-94:3)
α	0.43 (0.33)	7.62 (0.51)	-0.30 (-0.15)
β_1	-0.10 (-0.74)	-0.81 (-2.29)*	-0.03 (-0.16)
β_2	0.07 (0.39)	0.08 (0.28)	-0.15 (-0.53)
β_3	-0.03 (-0.151)	0.01 (0.04)	0.13 (0.43)
β_4	-0.04 (-0.28)	0.34 (1.13)	-0.14 (-0.66)
γ_0	0.21 (-1.808)	-0.02 (-0.14)	0.31 (1.58)
γ_1	-0.16 (-1.12)	-0.22 (-1.28)	-0.20 (-0.85)
γ_2	0.03 (0.19)	0.01 (0.08)	0.11 (0.44)
γ_3	0.03 (0.22)	0.08 (0.56)	0.02 (0.09)
γ_4	-0.01 (-0.04)	0.07 (0.55)	0.03 (0.15)

(5% Critical Value = 1.67)

Regression Results of Relationship between Short and Long Rates in Kenya

Parameter	Value (91:7-93:12)	Value(91:7-92:12)	Value(93:1-93:12)
α	13.02 (2.72)	9.27 (0.39)	27.4 (1.53)
β_1	0.36 (1.39)	0.91 (1.86)	-0.15 (-0.23)
β_2	-0.91 (-2.25)*	-0.56 (-0.95)	-1.19 (-1.03)
β_3	0.99 (1.66)	0.54 (0.65)	0.76 (0.36)
β_4	-0.79 (-1.53)	-0.47 (-0.65)	-1.48 (-1.09)
γ_0	0.54 (4.33)*	0.17 (0.25)	0.69 (2.01)*
γ_1	-0.005 (-0.03)	-0.19 (-0.29)	0.18 (0.43)
γ_2	-0.29 (-1.43)	0.18 (0.27)	-0.18 (-0.32)
γ_3	-0.18 (-0.71)	-0.39 (-0.53)	-0.13 (-0.16)
γ_4	0.28 (1.21)	0.18 (0.31)	0.31 (0.58)

(5% Critical Value = 1.699)

Regression Results of Relationship between Short and Long Rates in Nigeria

Parameter	Value (87:1-90:12)	Value(87:1-88:12)	Value(89:1-90:12)
α	0.60 (0.303)	4.6 (2.12)*	2.09 (1.91)*
β_1	0.12 (0.39)	-0.65 (-1.98)*	0.02 (0.08)
β_2	-0.77 (-2.9)*	0.45 (2.69)*	-0.94 (-3.5)*
β_3	0.04 (-0.76)	0.11 (0.47)	-0.18 (-0.52)
β_4	-0.21 (-0.76)	0.26 (1.18)	-0.66 (-2.03)*
γ_0	1.2 (5.41)*	0.50 (3.7)*	1.08 (5.89)*
γ_1	0.67 (1.5)	0.8 (2.9)*	0.92 (2.46)*
γ_2	-0.07 (-0.15)	-0.14 (-0.6)	0.44 (0.99)
γ_3	0.09 (0.24)	-0.17 (-0.17)	0.01 (0.03)
γ_4	0.08 (0.21)	-0.66 (-2.83)*	0.81 (1.8)*

(5% Critical Value = 1.68)

Regression Results for Relationship between Short and Long Rates in Zimbabwe

Parameter	Value (89:1-94:6)	Value(89:1-91:2)	Value(92:1-94:6)
α	1.07 (1.29)	1.11 (1.14)	1.74 (0.69)
β_1	-0.57 (-4.09)*	-0.6 (-2.60)*	-0.58 (2.56)*
β_2	0.35 (2.28)*	0.20 (0.71)	0.36 (1.52)
β_3	0.17 (1.068)	0.05 (0.13)	0.17 (0.71)
β_4	-0.13 (-0.84)	-0.18 (-0.58)	-0.13 (-0.55)
γ_0	0.46 (5.71)*	0.71 (4.84)*	0.40 (3.07)*
γ_1	-0.09 (-0.64)	-0.31 (-1.04)	-0.06 (-0.28)
γ_2	-0.23 (-1.59)	-0.16 (-0.55)	-0.22 (-1.03)
γ_3	0.11 (0.76)	0.108 (0.33)	0.11 (0.53)
γ_4	-0.13 (-1.1)*	0.154 (0.55)	-0.15 (-0.82)

(5% Critical Value = 1.671)

