

Chapter II.

THE LIQUIDITY POLICY OF DEPOSIT BANKS, OCTOBER 1967 TO FEBRUARY 1973

Before examining the liquidity policy of commercial banks after the creation of a central bank in Kenya¹, it will be useful first to consider what changes took place in the structure of the banking system and in what manner the monetary authorities curtailed the banks' freedom of choice.

1. CHANGES IN THE BANKING SYSTEM

Apart from one bank incorporated in Kenya, but whose equity was owned by foreign banks (the Commercial Bank of Africa), the banking system of Kenya consisted at the end of 1967 of eight branches of foreign banks, as follows:

The Bank of Baroda Ltd.

The Bank of India Ltd.

Barclays Bank D.C.O.

The General Bank of the Netherlands

Habib Bank (Overseas) Ltd.

¹ The starting date of October 1967 has been chosen because this was when the central bank effectively began its operations. There is the added convenience that as of that date the monetary authorities adopted new statistical criteria, so that the new series are not strictly comparable with the earlier ones.

National and Grindlays Bank Ltd.

Ottoman Bank

The Standard Bank Ltd.¹

In addition, the central bank's statistics include figures for the African Banking Corporation (E.A.), a subsidiary of the Standard Bank, even though during the period under consideration it never exercised any credit business.

In January 1968 the Co-operative Bank of Kenya Ltd. opened its doors for business. This had been set up by virtue of the Co-operative Societies Act and was registered as a bank, but cannot really be considered a deposit bank in the true sense; it deals mainly with co-operative unions, which finance individual co-operative societies, and it is only these latter which extend credit to farmers². In any event, the Co-operative Bank gives credit only to its shareholders.

In June 1968 the National Bank of Kenya Ltd. was set up, entirely with government funds.

In March 1969 the Ottoman Bank branches in British East Africa were taken over by National and Grindlays, which left 11 banks in the field.

Their number seemed destined to fall again when a merger project between the Standard Bank and Barclays D.C.O. was announced in June 1970. The plan was to set up one new bank instead, the Union Bank of Kenya, with a capital of 4.5 million pounds, of which half was to be subscribed by the Kenya government and one quarter each by Standard and by Barclays.

¹ During the period under consideration, the Standard Bank was a subsidiary of the Chase Manhattan Bank.

² The bank charges 7 per cent on its credits to co-operative unions, and these, as well as co-operative societies, add an extra 0.5 per cent each, so that farmers pay 8 per cent.

But then, in December 1970, came a step in the opposite direction, when National and Grindlays divided up into two banks, the Kenya Commercial Bank Ltd. and Grindlays Bank International (Kenya) Ltd. The first of these had a capital of 2.1 million pounds, of which 60 per cent were owned by the government of Kenya and the rest by National and Grindlays; it took over all but three of the existing 81 offices, and thus inherited the parent bank's market share of commercial credit. The second turned itself into a merchant bank; National and Grindlays provided 60 per cent of its capital of 0.4 million pounds, and the government the rest (see Table 33).

In 1971 Barclays Bank of London acquired the entire share capital of Barclays Bank D.C.O., whose name was thereupon changed to Barclays Bank International Ltd.

Finally, in July 1972, the Minister of Finance made it known that the government was opposed to the merger project of the Standard Bank and Barclays Bank International. The government decided, instead, to acquire a 50 per cent shareholding in both banks, as soon as they were registering subsidiaries in Kenya. The two banks applied for, and obtained, registration as branches of foreign banks operating in Kenya, but with head offices in London.

This is how the banking system remained until the end of the period under consideration, February 1973.

Figures indicative of the size of banks are given in Tables 33-42 in the Statistical Appendix; nevertheless it will be useful briefly to discuss the market shares of the three groups of large, medium and small banks¹. Looking at Tables 34 and 35, a number of observations can be made, as follows.

¹ The size class "large banks" includes the Standard Bank, the Kenya Commercial Bank and Barclays Bank International; the group "medium banks"

(a) The loan/deposit ratio has been tending to decline in all three groups, and its range as between size classes has become much narrower than it was in the first two years.

(b) The securities/deposits ratio and the net interbank balances/deposits ratio were negatively correlated in all three groups, and their range of variations eventually became fairly narrow.

(c) All three groups became, at least tendentially, less willing to finance trade, especially imports, and towards the end of the period the figures settled down at levels not very far apart (Table 38)¹.

(d) The movements of the securities/deposits ratio were substantially the same for all three groups.

(e) The liquid assets/deposits ratios of the three groups followed no uniform course, but ended up at levels much closer to each other than at the beginning.

The figures certainly suggest that the behaviour of the three groups of banks has become steadily more uniform as time went on.

consists of Grindlays Bank International (K), the Bank of Baroda, the National Bank of Kenya and the Ottoman Bank; the Habib Bank, *Algemene Bank Nederland N.V.*, the Bank of India, the Co-operative Bank of Kenya and the African Banking Corporation (E.A.) are counted as "small banks". Unfortunately, all the size-class series have had their significance much impaired by the break-up of National and Grindlays into one large and one medium bank.

¹ Both the propensity to finance trade and the propensity to finance imports were lowest for the large banks, and highest for the small ones. For example, the large banks' propensity to finance trade dropped from 43.78 to 29.41 per cent of their total credits to the private sector; the corresponding figures for medium banks are 55.16 and 29.54 per cent, and for small banks 68.70 and 39.55 per cent. Much the same can be said of the three groups' propensity to finance imports; it dropped from 13.53 to 4.81 per cent for large banks, from 30.81 to 13.15 per cent for medium ones, and from 28.52 to 17.57 per cent for small ones (See Table 38).

When we now come to look at their respective market shares, it must be made clear that there are certain inaccuracies in the underlying data. First of all the final total, Total 6, in Table 36 (security investments) includes under "Private securities" those labelled "Others" elsewhere (Table 21). These "Others" consist at least in part of demand deposits which the banks, on instructions of the public authorities, keep with the Cereals and Sugar Finance Corporation, and therefore ought rightly to be classified as liquid assets of banks.

Furthermore, the time series of deposits and advances include what is known as the bank float. That means, in practice, cheques paid by a bank but for which notice of accreditation is still pending, cheques in course of collection from other banks in Kenya, and all net debit items in transit between banks or among branches of one and the same bank, net of credits conceded to a bank for which it has not yet received advice of debit. Unless an adjustment is made for such transit items, certain economic magnitudes pertaining to a banking system can easily be over- or undervalued. For instance, the value of a cheque may have been credited to the beneficiary's current account with one bank, but not yet debited to the drawer's current account with another bank or with another branch of the same bank; if neither account is overdrawn, the value of that cheque figures twice in bank deposits.

But the float may also have a bearing on advances on current account, or on loans or other creditor accounts, and it would not be right, therefore, to make the relevant adjustment only in the deposit accounts. Nor is anything to be gained from the expedient of attributing transit items to deposits or loans and advances according as the accounts concerned are in debit or in credit.

And in Kenya, especially, it would be completely arbitrary to adopt the doubtful enough British practice of deducting from deposits 60 per cent of the net balance of debit and credit items in transit¹ and to add 40 per cent of it to total net advances.

Since there are no adequate statistics in Kenya about cheques in circulation, any correction to the time series of deposits and credits would seem quite arbitrary. But that inevitably means duplications in both series, and the size classification of banks as well as the calculation of their liquidity ratio therefore suffer from an approximation by default—as, incidentally, do the loan/deposit ratios².

With these reservations, it should be possible to arrive at a more correct interpretation of the market shares of the three size classes of banks. It will be best, perhaps, to start with deposits and credits (Table 35).

The large banks' share of deposits dropped continuously from 88.38 per cent in 1967 to 78.03 per cent in 1972, and their share of demand deposits from 91.88 to 91.12 per cent³. The credit series is less continuous, but again there was a downward trend which lowered the large banks' market share from slightly above to slightly below 80 per cent⁴.

¹ If the debit items in transit are smaller than the credit items, 60 per cent of the net balance should be added to deposit. See on this point Bank of England *Quarterly Bulletin*, December 1971, p. 482-86.

² To the extent that the time series of deposits are affected by accounting duplications, the same duplications naturally reappear in the series of money supply M_1 and M_3 .

³ The figures for 1969 and 1970 are particularly interesting in so far as they reflect the break-up of National and Grindlays Bank into two separate units belonging to different size classes.

⁴ Losses on loan assets are not apparent from the balance sheets, but some indication may be gathered from the provisions for bad debts shown by the Kenya

Much the same applies to the share of security investments held by the large banks; this went down from 98.93 to 79.28 per cent.

But while the large banks lost some of their market share during the period 1967 to 1972, they did not for all that lose their dominating influence on the key magnitudes of the banking system—if only because all banks, at that time, were adopting a more uniform pattern of behaviour¹.

However, if we look at the cash and free reserve holdings of banks of different size, it becomes apparent that the characteristics and the degree of efficiency of the circuits of loan-deposit financial flows were still significantly influenced by size², notwithstanding the more uniform behaviour pattern of banks of all size. This can be deduced from Table 42 as well as from the tabulation below, which shows the cash ratio of banks in different size classes, that is, the ratio of their holdings of notes and coin plus their free balances at the central bank to their total deposits.

Commercial Bank and Barclays Bank International. In 1972, for instance, the Kenya Commercial Bank raised this reserve fund by 2,196 million K£, a sum equivalent to 6.65 per cent of credits outstanding at the time, while Barclays made an allocation equivalent to 0.90 per cent of its loan assets.

¹ Cf. what has been said above in connection with financial ratios.

² One reason for the high cash holdings of large banks is no doubt their greater network coverage; the speed and efficiency with which information travels between head office and the periphery are most probably not very good, and demand for cash is higher among rural clients, so that the large banks keep a lot of cash at their outlets — enough, on past experience, to meet unforeseen requirements. Generalized simulation models designed to forecast the cash requirements of outlying agencies cannot be used for lack of the necessary hardware. On the possibilities of reducing the demand for monetary base on the part of large banks with extensive networks, in conditions of uncertainty, see Lorenzo Frediani, *La ricerca operativa*, Milan, 1973.

CASH RATIO, BY SIZE CLASSES OF BANKS

| Year | Large | Medium | Small |
|------|-------|--------|-------|
| 1967 | 8.24 | 8.70 | 6.33 |
| 1968 | 7.41 | 6.89 | 5.89 |
| 1969 | 7.43 | 5.58 | 3.75 |
| 1970 | 8.21 | 7.59 | 5.32 |
| 1971 | 7.99 | 9.35 | 5.70 |
| 1972 | 7.96 | 11.17 | 3.58 |

There seems to be a clear relationship between a bank's size and its demand for currency¹. This suggests that it should be

¹ The size factor certainly helps to explain the behaviour of banks in matters of liquidity reserves, but it is not the only relevant one. Other factors, such as the cost of reserve adjustments and transactions costs, significantly affect the banks' liquidity management. It must be remembered, too, that up to a point these costs vary inversely with the amount of adjustments. The large banks, with their much greater volume of financial assets compared with small and medium banks, have, in otherwise equal conditions, the benefit of lower average adjustment costs, and therefore adjustments become profitable for them at a lower level. It follows that large banks should be able to work with relatively lower levels of desired reserves and with more disinclination to borrow from the central bank. On the other hand, growing adjustments also increase the risk of capital losses. The following papers will be found interesting on this point: J.A. Cacy, "Determinants of Member-Bank Borrowing", Federal Reserve Bank of Kansas City *Monthly Review*, February 1971, p. 13; William F. Derwald and Richard G. Dreese, "Bank Behavior with Respect to Deposit Variability", *Journal of Finance*, September 1970, p. 871; Sam Peltz, "The Banking Structure and the Transmission of Monetary Policy", *Journal of Finance*, June 1969, p. 327-411. In addition, large banks have the benefit of more stability both of deposits and credits, thanks to better geographical and asset spread; *ceteris paribus*, therefore, they can go for a lower liquidity ratio. The desired level of this ratio, finally, is crucially influenced by the structure of interbank financial flows. The above considerations cease to be valid, for instance, if these flows regularly go in the direction from small to large banks. On this point see, e.g., John A. Galbraith and Anna L. Guthrie, "Cash Reserve Ratios and Banking Reserve Behavior", *Journal of Political Economy*, January/February 1970, p. 82-83, and William R. Bryan and W.T. Carleton, "Short-run Adjustments of an Individual Bank", *Econometrica*, April 1967, p. 321.

interesting to look jointly at the movements of the banks' demand for free reserves and at those of the net balances of interbank accounts at home¹ and abroad. To elucidate the relevant relationships, it was thought advisable to calculate the percentage of demand for free reserves by size classes of banks for the entire period (Table 42) by the so-called gross method (that is, not counting net interbank debit balances in the computation of bank liquidity)². From the three series so obtained, it seems legitimate to conclude that the marginal demand for free reserves is negatively correlated with the size of banks. Furthermore, if we look at the liquidity ratios, whether calculated by the gross or the net method³, and at net balances with other banks at home and abroad, it appears not only that small and medium banks relied on the interbank market for making good any disparities between the level of reserves they wanted and those actually at hand, but also that the principles on which the liquidity position is calculated (and which will be explained presently) may have a significant influence on the circuit of financial flows in an economy and, in the last analysis, on the choices of the banks' liquidity policy⁴.

¹ These should, of course, be nil in principle, but never are — partly for reasons of time lags in accounting, and to some extent deliberately.

² See explanation in footnote (2) to Table 29.

³ This method takes account also of net debit balances. If, for instance, a bank has net balances due both to foreign banks and to Kenya banks, these must be deducted, in the computation of liquidity reserves, from the total of liquid assets held by that bank or, as the case may be, by a size class of banks or the banking system as a whole.

⁴ See Robert E. Knight, "The Impact of Changing Check Clearing Arrangements on the Correspondent Banking System", Federal Reserve Bank of Kansas City *Monthly Review*, December 1972, p. 14 and 15. In nearly all countries where banks are subject to compulsory reserve requirements, deposit banks are allowed to count net interbank credit balances among the eligible financial assets. Because correspondent banks immediately register any advice of

But their freedom of choice is in any case hemmed in by institutional constraints, and these will need to be examined before we can go any further.

2. INSTITUTIONAL CONSTRAINTS ON THE BANKS' FREEDOM OF CHOICE

Two of the measures which most affected the liquidity policy of deposit banks in Kenya during the period under consideration were the introduction of centralized foreign exchange management by the central bank in July 1967, and the simultaneous instruction to banks to keep their net credit balances with their head office or foreign correspondents within a certain ceiling, which was fixed for each bank separately in relation to its size¹.

In an effort to minimize the effect of these measures on the earnings and liquidity management of the banks, the central bank decided to issue interest-bearing demand liabilities. A few months later, in December 1967, there followed a prohibition for banks to assume new net debit positions on the domestic interbank market; but banks were allowed to borrow from foreign correspondents, since it was assumed that they would not take on the risks of a high debit position abroad without forward cover. At the same time it was announced that crop finance bills would be eligible for refinancing by the central bank only subject to a net debit position abroad. Both these restrictions were abolished in July 1968.

accreditation they receive, they can often cover sizeable portions of the reserve requirement by assets not yet actually at hand and with clearing balances kept with correspondents for other purposes.

¹ In 1968, the upper limit was fixed for each of the three large banks at 300,000 Kenya pounds; this was subsequently raised to K£ 500,000 in 1971. For other banks, the ceiling was lower; the Commercial Bank of Africa, for instance, was allowed a working balance of 50,000 pounds in 1971.

In 1969, the first Treasury Bill issues were made. In order to endow these financial assets with a high degree of liquidity, the monetary authorities undertook to rediscount the deposit banks' Treasury Bill holdings at a rate $\frac{1}{2}$ per cent above the average rate of allotment at the last tender.

Finally, in June 1969, the new Banking Act entered into force¹. It states, in Part IV, Section 18, that "every licensed bank shall maintain such minimum holding of liquid assets as the Central Bank may from time to time determine." Liquid assets are, for purposes of this section, defined as meaning all or any of the following:

- "(a) notes and coins which are legal tender in Kenya;
- (b) balances held at the central bank;
- (c) balances at other banks in Kenya after deducting therefrom balances owed to those other banks;
- (d) balances at banks abroad withdrawable on demand, and money at call abroad after deducting therefrom balances owed to banks abroad...;
- (e) Kenya treasury bills of a maturity not exceeding ninety-one days which are freely marketable and rediscountable at the Central Bank;
- (f) such other assets as the Minister [of Finance] may specify."

¹ In pursuance of section 7 of that law any bank incorporated outside Kenya has to keep at all times in Kenya an assigned capital of not less than 5 per cent of its total deposit liabilities, with a minimum of 100,000 Kenya pounds. Under section 10, moreover, no bank may grant to any one person credit in excess of 5 per cent of that bank's deposit liabilities or of 100 per cent of its paid-up or assigned capital and unimpaired reserves, whichever is the greater. This provision does not apply to transactions with a public entity, to transactions between banks or to advances against documents representing goods.

Reserve requirements were actually first introduced as from 1 December 1969. According to Section 18, any bank's net debit balances with other banks in Kenya or abroad were to be deducted from its liquid assets, but as this text was originally interpreted, such of a bank's liabilities to foreign correspondents as had a maturity of more than 90 days were not counted as part of its net interbank balance abroad. Nor did refinancing obtained from the central bank count as liabilities to be deducted from liquid assets.

Banks were instructed to establish their liquidity position on three different days each month; if on any one day liquid assets fell short of 12.50 per cent of total deposits¹, this could be offset by an excess on another day of the same month.

In an effort to induce banks to invest in Treasury Bills, the central bank more than once reduced the rate it paid on deposits from banks, until, in June 1970, it finally stopped paying any interest at all on these deposits².

Since 1 June 1972 Section 18 of the Banking Act has been interpreted in somewhat different fashion. The monetary authorities made it clear that net interbank balances were henceforth to be considered in the computation of the liquidity position of an individual bank only if they were credit balances owed to it. At the same time, deposit banks were told that in computing net deposits subject to the reserve requirements, they were to deduct cheques in clearing from their total deposit liabilities. The reserve ratio itself

¹ Seeing that in 1969 the liquidity ratio of banks varied between 24.88 and 40.14 per cent, according as they were large or small, the monetary authorities clearly did not introduce this measure for restrictive purposes; rather, they seem to have wished to equip themselves with an instrument of credit control.

² At first, the central bank paid 4 per cent; then the rate was reduced in successive stages to 3.75, 3.5, 3.4 and finally, in February 1970, to 3 per cent.

was raised to 15 per cent in October 1972. Almost certainly the purpose of raising the ratio and redefining liquid assets was to foster the development of the interbank market.

Another interesting instrument used by the central bank is that of special deposits¹, which were first introduced in December 1971, but abolished again shortly thereafter, on 1 February 1972. Under the terms of Section 38 of the Central Bank of Kenya Act, the monetary authorities required banks to maintain with the central bank a minimum cash balance equal to 5 per cent of their net deposit liabilities. But some banks found it difficult to meet this requirement, and in any event new import credit restrictions² were being planned at the time, and this is why the central bank abolished the special deposits so soon.

One last institutional constraint must be mentioned, namely an agreement among the major commercial banks which governed their lending and borrowing rates, a matter of paramount importance

¹ Special deposits and, for that matter, the structure and working of the reserve ratio, closely follow the British pattern. Details will be found in the Bank of England's *Quarterly Bulletin* of September 1971, "Reserve Ratios and Special Deposits", and also in its *Quarterly Bulletin* of June 1968, "Control of Bank Lending: the Cash Deposits Scheme". See also Hamish McRae, "The New Credit Control", *The Banker*, October 1971, and Pierluigi Fabrizi, *L'evoluzione del controllo del credito in Gran Bretagna*, Milan, 1973, p. 93 ff.

² Commercial bank as well as non-bank lending had been subject to specified restrictions already since 26 July 1971. These were imposed under the terms of Section 40 of the Central Bank of Kenya Act, and can be summarized as follows:

- (a) Credits for the purchase of imported consumer durables were subject to import deposits of 40 per cent of the price of the goods;
- (b) hire-purchase credit was not to exceed the volume outstanding on 26 July 1971;
- (c) advances to importers of motor vehicles and consumer durables were to be reduced by 30 and 5 per cent, respectively, by 31 October 1971;
- (d) all factoring debts were to be eliminated by 31 December 1971;
- (e) during the period February 1972 to February 1973 total loans, advances and discounts were not to expand by more than 12 per cent.

for their liquidity management. Partners to these so-called *Banking Arrangements* were the Bank of Baroda, the Bank of India, Barclays Bank International, the Commercial Bank of Africa, the Habib Bank (Overseas), the Standard Bank and the General Bank of the Netherlands; they were strictly observed by all of them throughout the period under consideration¹.

The rates laid down in this agreement were as follows:

| DEPOSITS | Rate per cent |
|--|---------------|
| (1) Time: | |
| (a) minimum 30 days (7 days' notice): | |
| KShs. 200,000 up to KShs. 500,000 | 3.00 |
| KShs. 500,000 and over | 3.125 |
| (b) three to less than six months | 3.50 |
| (c) six to less than nine months | 3.75 |
| (d) nine to less than eighteen months | |
| (beginning 1 September 1968) | 4.00 |
| (e) eighteen to less than twenty-four months | |
| (minimum KShs. 300,000) | |
| (beginning 1 September 1968) | 4.50 |
| (2) Savings | 3.00 |
| LOANS AND ADVANCES (minimum rate) | 7.00 |

(Source: Central Bank of Kenya, *Economic and Financial Review*)

After this brief survey of institutional constraints upon the liquidity policy of deposit banks in Kenya during the period 1967-1972, it remains to look at the public's demand for cash. Given the existence of a liquidity ratio structured as described above, we

¹ Recommended reading on this point is Giordano Dell'Amore, *Economia dei saggi attivi bancari*, Milan, 1971, p. 280 ff.

can then proceed to a first attempt at identifying the chief economic magnitudes which influenced the deposit banks' demand for liquid assets.

3. PRIVATE DEMAND FOR LIQUID FINANCIAL ASSETS

In analysing private demand for liquid financial assets in Kenya during the years 1967 to 1972, we shall proceed by successive approximations. To this end we make an "as if" assumption: we shall examine the demand for currency as if there were within the economic system two separate circuits, each with autonomous flows of monetary and financial assets originating in the desire of holders of one type of asset to exchange it for another having different characteristics; the difference between the two circuits is that in one case this exchange involves negligible, and in the other fairly high costs.

Let us first consider asset holders for whom transaction costs are low. At given levels of transactions, they will determine their average cash holdings in the light of the relation which, at equivalent certainty¹, exists between the rates of return on financial

¹ The assumption of equivalent certainty makes it possible, in the process of capitalization of income flows in conditions of uncertainty, to avoid indeterminate solutions such as may result if one works with internal rates of return or present values, unless the degree of risk in prospective earnings rises at a constant rate over the time of their expected accrual. The method is to determine a so-called coefficient of equivalent certainty, which enables uncertain income flows within a given time horizon to be transformed into certain ones. This coefficient may be regarded as the market price of unit risk, measured by the sum of the variance of absolute return on the financial asset concerned and the total covariance between this return and the return on other financial assets of the same kind in circulation. See Alexander Robichek and Stewart J. Myers, *Optimal Financing Decisions*, Prentice Hall, 1965, p. 79-92 and 176-204, and John Lintner, "Dividends, Earnings, Leverage, Stock Prices and the Supply of Capital to Corporations", *Review of Economics and Statistics*, August 1962.

assets other than currency and the costs of acquiring, selling and managing such other assets¹. If these costs are higher than expected rates of return, it would not be profitable for a hypothetical individual to exchange his cash holdings for other financial assets². In that case the volume of cash outside banks would be relatively large.

In the contrary case of rates of return higher than transactions costs, it becomes profitable to reduce cash holdings. It seems reasonable to assume, therefore, that the average size of cash balances is negatively correlated with the existing difference between expected rates of return in conditions of equivalent certainty, and directly correlated with transactions costs.

If the volume of transactions is assumed to vary, then of course the demand for money will vary in the same direction, but

¹ Applying inventory theory to the demand for cash, transactions demand for cash is directly proportional to the square root of the expected volume of payments (transactions) and to the cost of converting financial assets into cash, and inversely proportional to the square root of the opportunity cost of the desired cash holding. At a constant level of transactions, therefore, the quantity of money which people wish to hold will be an inverse function of the rates of return on financial assets, and a direct function of the cost of their acquisition, sale and management. Assuming a variable level of transactions, the demand for money varies in the same direction, though by less than proportional amounts. See James Tobin, "The Interest-Elasticity of Transactions Demand for Cash", *Review of Economics and Statistics*, August 1956, and William J. Baumol, "The Transactions Demand for Cash: An Inventory Theoretic Approach", *Quarterly Journal of Economics*, November 1952.

² If the individual in question is a risk-averter and he takes the long view, then he may, in the case of negative correlation between the covariance of the expected income flow from a financial asset and that of his portfolio, choose to acquire financial assets whose rates of return fall short of transactions costs, provided that the lower degree of risk affecting his portfolio raises its value. In this connection it should be noted that, given definite time horizons, transactions costs expressed in absolute value can easily be transformed into economic magnitudes homogeneous with rates of return.

at decreasing speed¹. In these circumstances, liquidity management will be designed to minimize the sum of two cost components, to wit,

- (a) the opportunity cost of holding money as against interest-bearing financial assets, and
- (b) the costs of conversion (brokerage fees, handling charges, loss of time and other inconvenience) of money into other assets and vice versa.

Persons with a short time horizon are likely to convert their financial assets quite often into money, and almost certainly the connected transactions costs will be high in relation to opportunity costs—the more so the less it is possible to diversify the income flows from financial assets in circulation in the system at a given moment, and the lower is the efficiency of financial intermediaries, especially banks. To the extent that this analysis can in fact explain investment behaviour, it may be concluded that the efficiency of the loan-deposit circuit depends, among other things, upon the existing margin between the average unit rate of return on deposits and average unit costs of transaction.

All this applies with even greater force to people whose transactions costs are high². It follows that in such conditions an interest rate policy for purposes of the mobilization of savings is likely to be rather ineffective unless it is combined with a change

¹ This statement can easily be derived from the so-called square root formula of inventory theory, recalled above.

² That is people with rather low incomes — generally those working either in the traditional sector of the economy or as unskilled labour in towns. Such people have little over from their income after they have paid their expenses, and for this reason have a short time horizon; even the briefest time lag between the incoming and outgoing flows can provoke an urgent need for cash. To enable such people to reconvert their savings into cash without delay is, therefore, a matter of the utmost importance in the mobilization of savings.

in the composition and the characteristics of financial assets in circulation; this should make it easier to diversify holdings and thereby should reduce the degree of risk for each separate portfolio and, ultimately, widen the time horizon of private individuals and also the margin between opportunity costs (or average rate of return) and transactions costs.

Given the shape of the credit network in Kenya¹, the behaviour of the Post Office Savings Bank and the *per caput* distribution of income, it seems possible to identify two market sections within the country, according to the incidence of transactions costs. From what has been said so far it follows that any policy for the mobilization of domestic savings should try to reduce transactions costs, especially in the less efficient section of the market.

But the monetary authorities did not, in fact, exercise any significant influence on the margin in question. People were therefore almost forced to expand their demand for desired cash balances, even though at diminishing rates of increase. To the extent, therefore, that the monetary authorities tried to neutralize hoarded domestic savings, either by direct measures or through deposit banks, and possibly only for anti-deflationary reasons, they did in effect cause a transfer of real resources from individuals using the circuit of high transactions costs to those operating within the low-cost circuit.

Even at best, this must have led to a transfer of wealth within the country; given the high propensity to import of the industrial

¹ In certain parts of the country there were no bank outlets at all, and even where people did have access to a local bank, they had to have certain minimum amounts before they could make a deposit, and also had to give rather long notice before they could withdraw any of their money. See *Banking Arrangements*, p. 12 and 20. The same applies to the Post Office Savings Bank, which, while accepting smaller deposits than banks, required longer notice.

sector and its inelastic response to domestic demand, it most probably also drained real resources away from the country. If, furthermore, the monetary authorities decided to let prices take the brunt of domestic or external inflationary pressures, matters got even worse because any individual's demand for desired cash balances was directly correlated with the value of his planned transactions¹.

To sum up, three statements can now be made:

(a) Conditions in Kenya are such that it is possible to distinguish two circuits of financial flows of different efficiency.

(b) Mobilization of private domestic savings cannot be achieved by the mere manipulation of the yields of financial assets in circulation on the credit market.

(c) The monetary authorities are responsible for having favoured an undue enrichment of part of the population at the expense of another, and for a drain of the country's real resources.

There is a case, therefore, for the monetary authorities to urge financial intermediaries to adopt policies based not so much on diversification of financial assets, which certainly cannot be used by persons in the less efficient circuit, but rather on the issue of financial liabilities possessing a high degree of liquidity. In addition, the monetary authorities definitely need to promote changes in the structure and behaviour of financial intermediaries in order to

¹ Reference is made again to the so-called square root formula of inventory theory (William J. Baumol, *op. cit.*, and James Tobin, "The Interest-Elasticity of Transactions Demand for Cash", *op. cit.*). On demand for money, see also Don Patinkin, "Keynesian Monetary Theory and the Cambridge School", *Banca Nazionale del Lavoro Quarterly Review*, June 1972; Ronald L. Teigen, "The Demand for and Supply of Money", in: Warren L. Smith and Ronald L. Teigen, eds., *Readings in Money, National Income and Stabilization Policy*, Homewood, Ill., 2nd revised edition, 1970, p. 74-92; and the classic paper by John R. Hicks, "A Suggestion for Simplifying the Theory of Money", *Economica*, February 1935.

make their liabilities attractive even for individuals operating in the less favoured financial circuit. The way to do this is to widen the margin between transactions costs and the rates of return expected in conditions of equivalent certainty.

If we drop our simplifying assumptions and consider the financial flows of both circuits together, other inferences can be drawn.

(a) The efficiency of the commercial banks' loan-deposit circuit depends in large part upon their spread of rates.

(b) The demand for cash by the public will be directly correlated with the deposit banks' spread of rates, and inversely with the degree of liquidity of financial assets.

(c) Divergences between yields at home and abroad may lead some members of the public, even in contravention of exchange controls, to transfer part of the credit granted to the Treasury of Kenya to the monetary authorities of other countries.

In these circumstances both M_1 and M_3 will, *ceteris paribus*, come to depend more and more upon the Treasury's and the banking system's borrowing capacity abroad¹, upon the budgetary policy of the public sector, the propensity to save of those individuals who operate within the advanced financial circuit, and the liquidity policies of private firms.

Having identified the economic magnitudes which most strongly influence the circuits of financial flows in Kenya, the next important question, for the purposes of our enquiry, is to find out whether demand for currency, M_1 and M_3 , is seasonal. To this

¹ There is indeed evidence of this in the balance of payments of successive years (Table 50). Credit obtained from the rest of the world rose from 20.6 million K£ in 1967 to 25 million in 1972. Net public-sector borrowing, too, increased sharply during the same years, from 3.2 to 16.5 million K£.

end we make use of spectral analysis¹ of the time series of end-month, trend-adjusted figures². The calculations show peaks every three months (See Table 68). Comparison of these results with those of the spectral analysis of public deposits suggests that the Treasury did not manipulate the coefficient t so as to offset the seasonal component of individual and corporate deposits.

Unfortunately, in the absence of a long enough series of gross domestic product, it was not possible to determine—with the help of co-spectral analysis—either the amplitude of any lags between the peaks and/or troughs of the two series, nor the pertinent coherence and gain.

All that can be deduced from the results—given the existence of fairly significant seasonal peaks in the series for currency, M_1 and M_3 , and given the openness of the economic system—is that the chances of applying the Cambridge cash balance approach to the financial flows of Kenya are altogether negligible³. To the extent, therefore, that our conclusions are valid, the public's

¹ For an explanation of the concepts of spectral and co-spectral analysis, lags, coherence and gain, see footnote 1 on p. 93 below.

² The trend was eliminated by the method of first differences.

³ It will be remembered that according to the cash balance theory of the Cambridge School the decisions of individuals concerning the amount of money they wish to hold rest on the real purchasing power rather than on the nominal value of their cash balances. For the purchasing power of cash balances to remain unchanged, therefore, the price level would have to vary in direct proportion with the nominal supply of money. But this means leaving out of account the influence of a number of other important factors, such as the opportunity costs connected with the holding of cash, in terms of the interest rate structure not only at home, but, especially for firms, also abroad. The Cambridge School thus neglected the advantages an individual might gain, depending on the levels of opportunity costs, from converting part of his cash balances into other financial assets. Nor did it take account of how portfolios might be influenced by their owners' expectations regarding changes in the yields of certain financial assets.

marginal preference for holding cash and the take-up of the deposit banks' financial liabilities and hence their liquidity management, are influenced by the following factors:

- (a) the expected rates of return on the deposit banks' financial liabilities and their degree of liquidity;
- (b) transactions costs;
- (c) the time horizon of individuals;
- (d) the expected rates of return and the degree of liquidity of similar financial assets obtainable abroad.

4. LIQUIDITY MANAGEMENT OF DEPOSIT BANKS IN KENYA

Having identified the factors which have a bearing on the public's demand for money, and hence also on the liquidity reserves of deposit banks, we know more about some of the economic magnitudes which most affect their financial flows and can return with more confidence to an examination of their liquidity policy.

It will help once more to start with a simplified model of reality. In looking for the influences of the liquidity ratio on the deposit banks' demand for liquid assets, therefore, we assume that the interdependence between the yields of the financial liabilities of banks and of non-bank financial intermediaries is almost negligible.

Let us start with the fundamental characteristics of the demand and supply curves for bank credit in Kenya. The essential function of financial intermediaries, including deposit banks, is to satisfy simultaneously the portfolio preferences of two categories of economic units. There are, first, the deficit units, who want to hold real assets in excess of their net wealth; and there are, secondly, the surplus units, who wish to keep part or all of their wealth in financial assets involving no more than negligible risks

of capital loss and holding out the prospect of yields sufficiently higher than transactions costs. It would seem, therefore, that a financial intermediary can discharge his tasks only by narrowing the spread between lending and borrowing rates. We recall that the public's supply of money is influenced by the expected margin, in conditions of equivalent certainty, between the rates of return on the banks' financial liabilities and average unit transactions costs. Conversely, the margin between the expected rate of return on new investments, still at equivalent certainty, and the average unit cost of capital will determine the deficit units' propensity to invest. Now, in a financial system so structured that it consists largely of divisions or subsidiaries of foreign firms, funds are typically raised on international markets by the parent firm; it follows that the internal rate of return of investments—in conditions of equivalent certainty—must be higher than the average unit cost of capital for the group as a whole. Therefore, the firms' decisions to invest will depend on the margin between expected rates of return, at equivalent certainty, on the new investments and the average unit cost of total outside funds, and this in turn is a weighted arithmetic mean of the average unit costs of finance from all separate sources¹.

¹ No account is taken here of the influence of self-financing on the capital costs of local establishments, nor of the effect of a new investment project in diversifying the parent firm's income streams (diminution of co-variance). John Lintner did take account of these factors on several occasions, and came to some interesting conclusions. First of all he maintains that the current earnings yield can serve to indicate the expediency of continued expansion financed by retained earnings only in conditions of complete certainty or of constant uncertainty (as measured by the profit-rate variance). With less restrictive assumptions the marginal cost of capital will necessarily be higher than the current earnings yield on the equity capital; the amount of the excess, both in relative and in absolute terms, varies directly with the relative size of the capital budget and its associated expected rate of growth. Under generalized uncertainty, the marginal cost of

Given that in Kenya investment approval is obtainable only on condition that at least 75 per cent of total finance requirements are imported, in the form either of venture capital or credit, it is obvious that the domestic rate of return does not affect the decision to invest. It is of considerable importance, though, for another decision, namely, the subsidiary companies' choice whether to borrow from local banks or from other firms in the group. According as the rate of transfer and the risk of assuming a net debit position on the exchange market are higher, or lower, than the cost of credit on the local market¹, the subsidiary firms will find it to their advantage to choose either domestic or foreign sources of finance². It seems reasonable to think, therefore, that in the case of expatriate firms, too, demand for credit will be inversely correlated

capital is not only greater than the current earnings yield, but necessarily rising at the optimum point, where the marginal cost curve intersects the curve of marginal expected rate of return. Lintner suggests that the weighted average of earnings yield and interest cost is erroneous, because

- (a) the marginal cost of retained earnings and of new equity capital is higher than the earnings yield, and
- (b) the marginal cost of borrowing is higher than the marginal interest rate, because of the effect of gearing on the variance of the profit rate net of interest and, hence, on the variance of the growth rate.

John Lintner has developed these ideas in a number of articles, e.g. "Optimal Dividends and Corporate Growth under Uncertainty", *Quarterly Journal of Economics*, February 1964; "The Cost of Capital and Optimal Financing of Corporate Growth", *Journal of Finance*, May 1963; "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets", *Review of Economics and Statistics*, February 1965. See also Giordano Dell'Amore, *Economia dei saggi attivi bancari*, *op. cit.*, p. 371-72.

¹ Other factors relevant for the choice between sources of finance are the possibility of being caught by double taxation, and, of course, the fact that expatriate firms are entitled to re-export in full such funds as they have borrowed abroad, together with interest payable thereon.

² The whole argument, of course, rests on the assumption of equal quantitative availability of credit at home and abroad.

with the existing margin between internal transfer rates and the cost of forward exchange cover, on the one hand, and the cost of credit on the domestic market, on the other. Other things being equal, therefore, it can be assumed that banks operate in markets where the demand functions have a negative slope with respect to capital cost or interest rate, and the supply functions a positive slope with respect to the difference between opportunity costs and transactions costs.

Since banks can only partly control their financial flows, in so far as these latter largely depend upon long-range decisions, they have to keep voluntary liquidity reserves. If these could take no form other than legal tender money, they would decline, *ceteris paribus*, as a function of opportunity cost and of the banker's propensity to take risks. Assuming that desired voluntary reserves consist only of currency, their opportunity cost is given by the rate of return that can be obtained by investing in other liquid financial assets and by the loss of efficiency—measured in terms of income—in the circuit of loan-deposit financial flows. However, no banker can avoid holding some cash balances, if only because future incomings and outgoings cannot be predicted with certainty¹. In this assumed situation there should, for example, be a positive correlation between Treasury Bill yields and the loan/deposit ratio. If we remove the restrictive assumption of currency being the

¹ These flows, of course, are affected by other factors like, for instance, network coverage, size, the fluctuations of cash flows, the speed with which the central bank makes refinancing available, the level and fluctuations of the yields of financial assets in circulation at home and abroad, the margins and the degree of correlation between domestic and foreign rates of return, the upper limits imposed by the monetary authorities on net interbank balances, exchange rate fluctuations, etc. Nevertheless it can be taken for granted that a bank does need to have some cash as a working balance in the normal course of its business; this should really be regarded not as a liquid but as a fixed asset.

only financial asset suitable for reserve holdings and suppose instead that this role can be played just as well by other assets such as free balances at the central bank and Treasury Bills, two problems arise: how big should the reserve be, and what is the optimum composition of reserve assets?

Clearly, these are problems which each separate bank has to solve in the light of its own aims, organizational structure, size and network, and with reference to the policies adopted for achieving the targets set by top management. Adequate information on all these points is a necessary condition for arriving at choices which meet the bank's real operational requirements; but it is not a sufficient condition.

A bank's management has to reckon also with a good many exogenous factors. Examples are the basic balance of payments, the government's public debt policy, instructions by the monetary authorities (e.g. to cover the bank's debit position with correspondents abroad), the marginal propensity to import both in the private and public sector, the growth rate of gross domestic product, changes in the structure of yields on financial assets in circulation on the domestic credit market, etc. The determination of some of these factors, as well as of the economic magnitudes listed above, requires long-range forecasting and long-term decisions. Very often, too, it involves structural changes which rule out frequent revisions of plans, and hence in the medium run govern all aspects of bank management. Supposing a bank is organized in geographical divisions and its management sets itself a profit target, which it thinks it can best achieve by improving the working of the loan-deposit circuit; to do this, in the economic context described, the bank will need to be reorganized to fit the pattern of homogeneous market sections, so that specialists can be assigned

to any given sector in accordance with its predominant activity. But this needs time—time to train staff, to alter the composition of the loan and securities portfolio, to devise and issue new financial liabilities possessing high liquidity and margins between opportunity and transactions cost wide enough to make it rational for private investors to switch from Treasury paper to interest-bearing bank liabilities¹.

It is obvious that such changes are bound to affect the structure, the movements and the efficiency of a bank's financial flows. At given risk aversion, therefore, they represent a long-term influence on a bank's management and liquidity policy. It follows that one needs to know what a bank's aims are and by what strategy it means to achieve them, in what market sections it intends to operate, and what to expect in the future of the chief economic magnitudes which have a bearing on its liquidity management, before one can begin to outline a long-term liquidity policy. This involves specifying not only what financial assets to hold in the portfolio, but also what credit lines to arrange by the choice of refinancing channels on the domestic and foreign interbank market and, so far as the latter is concerned, how and where to cover spot and forward positions. It involves, in addition, thinking ahead about what arrangements to make with the central bank about advances on current account, and about the type of financial assets the monetary authorities are likely to be most willing to rediscount. Then there is the question of what services to take on with a view to ensuring a supply of cash—such as, for instance, collecting

¹ See Robert J. McMahon, "A More Efficient Organization for Chain Banking", *Banking*, March 1969, p. 47-68, and *Developing Future Bank Management*, New York, Association of Reserve City Bankers, 1968, Chapter III; Alexander Robichek and Alan B. Coleman, *Management of Financial Institutions, Notes and Cases*, New York, 1967, p. 217-20.

payments on behalf of public agencies or accepting bills for collection. Finally, thought will need to be given to the conditions in which it might be of advantage to set up financial intermediaries in sections of the credit market likely to be receptive for financial liabilities other than those of the bank itself, or else not subject, under current laws and regulations, to central bank control or restrictions. In planning a long-term liquidity policy it would be well, too, to consider the expediency or otherwise of setting up operational units abroad, in the form of branch offices or subsidiaries.

Within these long-term plans short-term policy then takes over for the choice of the size and qualitative composition of desired liquidity reserves¹, in the light of the expected movements and fluctuations of incoming and outgoing money flows, of the rates of return on financial assets and of transactions costs.

As regards the amount of desired free reserves, it seems safe to say that a bank will want to have enough money at hand to be able to cope, at a given level of uncertainty, with foreseen and unforeseen seasonal or cyclical cash drains.

¹ It should be made clear that in our reasoning so far working cash balances at branch offices and minimum balances with correspondents at home and abroad are not regarded as financial assets available for use in case cash flows diverge from expectations; rather, they are needed for the bank's very survival. Strictly speaking their amount should be deducted from the total of liquid assets. It should be stressed, too, that if one considers solely the amount of reserves at a bank's disposal it is impossible to arrive at any conclusions about its liquidity situation, unless one looks also at the relationship between desired and free reserves. See Milton Friedman, "Vault Cash and Free Reserves", *Journal of Political Economy*, April 1961.

By contrast, Karl Brunner and Allan H. Meltzer ("The Federal Reserve's Attachment to Free Reserves", in: Alan D. Entine, ed., *Monetary Economics*, Belmont, Wadsworth, 1968, p. 218) argue that the level of disposable reserves directly influences liquidity management and, in the last analysis, also the dynamics and composition of a bank's financial flows.

The risks which a bank's top management are prepared to take depends, *ceteris paribus*, on investment opportunities and on present and expected rates of return. Supposing a bank is pursuing a profit target, it is reasonable to assume in first approximation that its credit intermediation comes up against definite limits in the rates of return of loan and investment opportunities¹. If, therefore, the amount of free reserves differs from the desired level, the bank has to turn to one of its sources of liquid assets. If it does, this will eventually affect the entire yield structure, to an extent depending on the size of the market and of the amount of the bank's adjustment². It is very likely, therefore, that the operations designed to achieve the desired level of free reserves set off a series of interactions on the credit market which sooner or later lead to new equilibrium positions among separate banks and to a different pattern of yields. But this process of adjustment naturally involves a cost.

If a bank wishes to expand its free reserves, it will have to adopt policies of assets management³ or liabilities management which, other conditions being equal, are bound to raise rates of return and hence borrowing costs, and vice versa.

It needs pointing out, however, that such adjustments may be provoked by a change in the management's risk aversion, and not only by expectations of future market conditions⁴. This is

¹ See the demand and supply curves of credit previously described.

² See Albert E. Burger, "The Implementation Problem of Monetary Policy", *Federal Reserve Bank of St. Louis Review*, March 1971, p. 26-27.

³ See Roland I. Robinson, *The Management of Bank Funds*, London, 1962, p. 352 ff., and Howard D. Crosse and George H. Hempel, *Management Policies for Commercial Banks*, Prentice Hall, second edition, 1973, p. 125-30.

⁴ In Kenya, the yields of Treasury Bills, which can be counted as monetary base, fluctuate widely. In this connection the interpretation of yield curves is most helpful in determining expectations. See Roland I. Robinson, *ibid.*, p. 352 ff.

an important point which deserves more detailed discussion. Reserves are held in order to be able to meet expected future outflows of cash. Whether, and what, reserve adjustments are needed should be decided, therefore, in the light not of the present yield structure, but of the yield structure which would presumably exist in the future without adjustments. More accurate predictions—and that means more efficient and quicker internal and external channels of information—therefore mean that smaller amounts of reserves need to be held to cover unforeseen flows. Correspondingly, the necessary adjustments will, *ceteris paribus*, be smaller and hence lead to lighter repercussions on the yield structure.

Now, banks have to operate within a certain time horizon, which, for their *tactical* decisions, is likely to be short. Yet the profitability of altering the issue terms of their financial liabilities and the terms of their credit supply cannot be assessed on the basis of the current situation, but must take account of the effects of the assumed initial changes on the economic magnitudes which affect their own management and the future yield structure. In other words, each bank must judge the profitability of such changes in the light of the capitalization—in conditions of equivalent certainty—of its expected income streams over the period in question, and in the light of its own presumed future bargaining strength and earnings capacity.

The implication is that there is no such thing as a short-term liquidity policy apart from a cyclical or long-term one. Once a bank's targets have been set and it has defined the strategy by which to achieve them, and with it also its long-term liquidity policy, short-term liquidity policies will have to be determined and, in their light, the long-term policy will have to be revised, not only at the moment of initial planning but subsequently whenever the market in which the bank operates displays unforeseen conditions

which reveal either new opportunities or new obstacles. The point bears repetition: profitability cannot be assessed solely with reference to the initial situation. It cannot be maintained, therefore, that when interest rates are low it is to the advantage of banks "to hold excess reserves because the cost associated with constantly adjusting reserve positions is greater than the interest earned on short-term securities. The profitability of holding excess reserves when interest rates are very low makes the banks' demand for excess reserves kinked at a low rate of interest and explains why banks hold large amounts of reserves during periods of very low interest rates."¹

Nor is it possible to agree with Meigs, when he says: "The gist of the modified reserve position theory is that banks seek to maintain certain desired ratios of excess reserves and borrowing, or free reserves to total deposits. These desired ratios are related to market interest rates, the discount rate, expected deposit movements, and possibly other variables, such as the relative proportions of assets of varying yields and riskiness in bank portfolios. When actual free-reserve ratios differ from the desired reserve ratios, because of changes in the stock of unborrowed reserves or in any of the variables influencing the desired reserve ratios, the banks attempt to adjust by buying or selling assets and borrowing or repaying indebtedness at the Federal Reserve banks, thus causing total deposits to change."²

It will not do to neglect the size of the bank concerned and the market regime in which it operates. These factors govern the behaviour of its competitors, and in predicting movements in

¹ Peter A. Frost, "Banks' Demand For Excess Reserves", *Journal of Political Economy*, July/August 1971, p. 805-25.

² James A. Meigs, *Free Reserves and the Money Supply*, *op. cit.*, p. 92-93.

economic magnitudes and in the flows of funds it is therefore necessary (within the bank's time horizon) to assess the profitability of altering the amount and composition of reserve holdings. There is yet another point. If the monetary authorities aim at controlling the structure of interest rates, and if it can be assumed that this policy will persist for a period longer than the banks' time horizon¹, then it is likely that the banks' demand curve for liquidity will be kinked, especially if the cheap money policy is accompanied, for reasons exogenous to the central bank, by an easy money policy.

It is time, now, to look at the problem of the composition of reserve assets. Once more it is hard to agree with Meigs, who maintains that "bank demand for free reserves should be considered as part of the general problem of bank portfolio management. Some of the variables ... which are in effect impounded in u above, are expected alternative net yields of various bank assets, and the relative amounts of these assets in bank portfolios, and the relative riskiness of various assets."² In effect, the portfolio approach leads to a diversification of bank credits and debts such as to maximize at a given risk level the value of the mathematical income expectation³. But this means neglecting the fundamental character-

¹ Which will be the shorter, the more uncertainty surrounds their predictions.

² James A. Meigs, *ibid.*, p. 57. One of the basic assumptions in this study is that the banks' desired free-reserve ratio is a function of market rates of interest and the Federal Reserve System's discount rate: $\left(\frac{FR}{D}\right) = f(r_m, r_d, u)$, where u is a collection of other variables which influence demand for free reserves. The variables included in u fluctuate, by hypothesis, only slightly.

³ See Edward J. Kane and Burton G. Malkiel, "Bank Portfolio Allocation, Deposit Variability and the Availability Doctrine", *Quarterly Journal of Economics*, February 1965; Leonall Andersen and Albert E. Burger, "Asset Management and Commercial Bank Portfolio Behavior: Theory and Practice", *Journal of Finance*, May 1969; Richard C. Porter, "A Model of Bank Portfolio Selection", *Yale*

istic of bank management, namely, that a bank's loans, investments, guarantees and deposits give rise to financial flows which, by the mere fact of having been generated, alter the conditions in which the bank will have to operate in the future. To make a rational choice with respect to liquidity, and more generally to bank management, one has to work with well-defined time horizons and to take account of the repercussions any one manipulation of an economic variable is likely to have on all the others and on the circuit of financial flows.

How, then, will free reserves be allocated? As explained earlier, cash needed to meet the liquidity requirements of bank branches should not really be counted as free reserves. The desired amount of disposable currency—all other assets having a lower opportunity cost in terms not only of forgone immediate returns but also of a reduction in the efficiency of a bank's financial circuit—tends to be kept to the minimum necessary for running the business, unless the resulting opportunity cost for some bank within a given time horizon is lower than the transactions costs involved in speedy adjustment of desired cash levels.

But any one bank can make no more than an informed guess about its cash requirements, and therefore the range of currency requirements can at best only be determined with a certain degree of probability. *Ceteris paribus*, the higher is the desired degree of certainty, the wider will be the range, and the less significant for operational purposes will be the results obtained. There will always

Economic Essays, February 1961; William Poole, "Commercial Bank Reserve Management in an Uncertain World: Implications for Monetary Policy", *Journal of Finance*, December 1968; K.A. Lifson and Brian Blackmarr, "Simulation and Optimisation Models for Asset Deployment and Fund Sources Balancing Profit, Liquidity and Growth", *Journal of Bank Research*, Autumn 1973; William F. Sharpe, "A Simplified Model of Portfolio Analysis", *Management Science*, January 1963.

be some margin of uncertainty which, depending on the risk aversion of management, will cause cash requirements to be determined at higher or lower levels ¹.

In order to reduce the amount of opportunity costs connected with excess cash holdings, banks may find it expedient to transform part of their excess cash into highly liquid financial assets, like Treasury Bills, free deposits ² and freely disposable foreign exchange ³, and/or establish unused credit lines with the central bank. How much of each to hold in reserve, and what changes to make, will be decided on the criteria previously outlined.

So far we have mentioned a few of the typical liquid assets which under the Banking Act (Section 18) are admissible as reserve holdings ⁴. It remains to discuss an item of fundamental importance,

¹ Of course, a bank's cash requirements are not constant over the course of a year. On the contrary, they are likely to fluctuate very considerably, and if reserves are tailored to peak periods, the bank will have excess reserves for much of the year. There is a case, therefore, for adopting a much shorter time horizon for assessing cash requirements.

² The higher or lower rate paid on such deposits may, of course, modify the choices of bankers, who must, however, keep some balances in order to take advantage of the central bank's clearing. But banks in any case prefer to keep their balances low, if only to avoid giving the central bank a chance to control their liquidity management. But these clearing house balances, too, should strictly speaking be deducted from net liquid assets for purposes of computing the liquidity position.

³ In principle, foreign exchange too can be used to meet a bank's requirements of liquidity reserves only to the extent that it is not needed in the normal course of business. But there is a lot of uncertainty in these assessments, and to make such a distinction would probably involve the risk of arbitrariness in some of them.

⁴ In the balance sheets of Kenya banks the item "Others" under security investments includes deposits made, on central bank instructions, with the Cereals and Sugar Finance Corporation; the central bank counts these as liquid assets for purposes of reserve requirements and special deposits, but it has proved impossible to take account of them in any of our compilations.

namely, net balances on current account with other banks in Kenya and abroad.

First let us look at how these current accounts work. They are used for cheque settlement among banks¹ and as such are of primary importance for the efficiency of the deposit banks' financial circuits. For the banking system as a whole, the net balance on these accounts should be zero. But accounting duplications arise from the practice by which banks, as soon as they receive a cheque, immediately debit the appropriate correspondent account, while the correspondents themselves receive advice of the debit only a few days later. Because of this bank float and also because of "window dressing" (for instance, in order to avoid overstepping the credit expansion ceilings set by the central bank), the net balances on these accounts are often artificially overstated, especially on the days when bank liquidity positions are made up. To obtain more accurate figures on the banks' loan/deposit and liquidity ratio one would need to know more about the circuit of financial flows so as to be able to allow for items in transit, deducting part of their value from deposits and adding the rest to the credit total.

The terms and conditions of interbank current accounts are specified in an appropriate separate agreement between each bank and its correspondents. Depending on the size and bargaining power of the various correspondent banks, and according as the accounts

¹ Domestic interbank accounts are a consolidation of the following:

- (a) current accounts with banks and non-bank financial intermediaries, kept for services which may be reciprocal or not;
- (b) current accounts for credits to banks and credit institutes and open credits on current account;
- (c) current deposit accounts with other institutes, for deposits in the true sense.

See Banca d'Italia, *Bollettino*, November/December 1973, Introductory Note and Table 19-20, and the *Banking Arrangements* agreed by several Kenya deposit banks.

concerned originate in reciprocal or non-reciprocal services, conditions may vary considerably as regards both (debit and credit) interest rates and exchange rates (one for inpayments and one for withdrawals). It is established practice for banks to send cheques back directly to the bank on which they are drawn¹, but it would surely be better to arrange cheque traffic in such a way as to avoid some correspondent accounts accumulating high debit or credit balances and to allow for the differing conditions governing these accounts; this would definitely make the management of interbank accounts cheaper.

If ever a bank's current correspondence accounts do show high net balances, it may, especially at a time of liquidity squeeze, come under considerable pressure from the creditor banks to redress the situation, and may have to pay high interest rates on its debit balances. In order to reduce the risk of such an occurrence, a bank performing services for others may ask for a minimum balance to be kept with it by its correspondents. A beneficiary bank will have advantage to keep this balance as low as possible², while its counterpart will have to make sure by frequent revisions that it is getting adequate remuneration for its correspondents' minimum balances³.

¹ See George Horwich, "Elements of Timing and Response in the Balance Sheet of Banking 1953-55", *Journal of Finance*, May 1957, and Stephen L. McDonald, "The Internal Drain and Bank Credit Expansion", *Journal of Finance*, December 1953. It should be mentioned, perhaps, that if some bank finds on receipt of a settlement advice that it is overdrawn on another bank and cannot meet the request to cover the outstanding balance, it is established practice to send to the creditor bank all the cheques cashed in the next few days, so that most probably the shortfall will be covered by other correspondents.

² Note that no interest may be paid in Kenya on demand deposits.

³ See Robert E. Knight, "Correspondent Banking, Part III, Account Analysis", Federal Reserve Bank of Kansas City *Monthly Review*, December 1971, p. 3-17.

In addition to current correspondence accounts, which are needed for operational purposes, there are others which are a source of interbank lending, in so far as they are used for interbank deposits or loans. The two categories are distinguished by the type of financial requirements they tend to satisfy. Interbank deposit accounts¹ tend to be drawn on for flexible requirements, loan accounts for rather long-term requirements generally connected with a pathological loss of deposits.

However, the interbank market is fluid enough for interbank deposit accounts to offer a sure and fast means of turning over debit positions. This flexibility is further enhanced by the banks' custom of not rigidly enforcing the agreed time limits. In the light of the reasons which may have led a bank to choose one or the other of these technical facilities, it is easier to understand why there are only slight differences in the rates of interest paid on interbank deposit accounts, but very considerable ones in those charged on loan accounts. Recourse to the first presupposes fairly equal bargaining strength on both sides, but nothing can be said *a priori* about interbank loans, given the wide range of motives for which banks may decide to draw on them. Looking at the figures for the net interbank balances of large, medium and small banks in Table 41, there is no sign of any of the three groups of banks having adopted a liquidity policy aiming at systematic integration of debit and credit balances². This statement is confirmed by the spectral

¹ Technically, interbank deposit accounts in Kenya are usually in the form of time deposits.

² On current interbank accounts see Alberto Bertoni, *La gestione della tesoreria delle banche di deposito. La situazione italiana e gli insegnamenti stranieri*, Milan, 1974, p. 198-201. In addition, see Robert E. Knight, "The Impact of Changing Check Clearing Arrangements on the Correspondent Banking System", *op. cit.*, and Arnold Dill, "Liability Management Banking. Its Growth and Impact", Federal Reserve Bank of Atlanta *Monthly Review*, February 1971.

analysis of the time series of domestic interbank balances (Table 68), which display rather marked variations.

In addition to this direct influence, interbank accounts may affect the liquidity of deposit banks in other ways. If net interbank balances are allowed to be counted as liquid assets for purposes of reserve requirements, the creditor bank can use its net balances, which yet are not always disposable funds, to satisfy its obligations in connection not only with the liquidity ratio but also with special deposits. The stickiness of interbank channels can therefore lead to temporary monetary base creation¹, via the manipulation of net correspondent balances. Much the same applies to the net balances on interbank deposit accounts. The latter, however, while being a source of potentially higher monetary base creation², may also be a source which, unless there are banking groups in the credit system, may dry up just when the volume of monetary base in

¹ In countries where there exist banking associations or banking groups (as in Germany and Italy, for instance), the fictitious expansion of interbank balances may be much more blatant. A bank may, say, issue banker's drafts to some fictitious name and have them accredited to its correspondent account, thus covering its debit position without immediate loss of cash, since the central institutes usually allow a delay for the settlement of correspondent accounts. Members of a banking group can, by issuing cheques to each other, do very much to expand net interbank balances artificially, and thereby, in countries where they are admissible as liquid assets for purposes of meeting reserve requirements, also to expand the monetary base. It should perhaps be made clear that financial assets susceptible of being regarded as monetary base are here defined by the so-called empirical method. See Charles W. Hall, "Defining Money: Problems and Issues", Federal Reserve Bank of Cleveland *Economic Review*, October 1971, p. 11, and Francesco Masera, *La riserva obbligatoria nel sistema istituzionale italiano*, *op. cit.*, p. 30.

² These accounts constitute a mechanism of credit creation similar to that of the Euro-currency market. See Geoffrey Bell, "Credit Creation through Euro-dollars", in: Eric Chalmers, ed., *Readings in the Eurodollar*, London, 1969, p. 38-50; Michele Fratianni and Paolo Savona, *La liquidità internazionale - Proposta per la ridefinizione del problema*, Bologna, 1972; Fritz Machlup, "Crea-

circulation is less than desired¹. Sometimes, as there has been occasion to note, the deposit banks' circuit of financial flows is rather inefficient, and therefore their capacity of credit creation is not likely to be much above unity. But then, in case the liquidity position of banks is computed gross of net interbank debit balances, the transfer of balances will give rise to creation of monetary base and, at the same time, to its more large-scale use. If, on the contrary, the liquidity position is computed net of net debit balances, then the transfer of a deposit from one bank to another will improve the use of monetary base and ultimately also the liquidity position of individual banks².

In these circumstances it may be assumed that when the monetary authorities decided in June 1972 to count net interbank balances as liquid assets only if they were positive, they meant—despite their simultaneous raising of the liquidity ratio from 12.5 to 15 per cent—to increase the domestic supply of financial assets other than currency. If this is so, the idea must have been to

zione di eurodollari: una storia misteriosa", *Moneta e Credito*, September 1971, p. 267 and (in English) *Banca Nazionale del Lavoro Quarterly Review*, September 1970; Gastone Lacca, "La creazione creditizia nel mercato dell'eurodollaro: un dibattito ancora aperto", *Il Risparmio*, July 1973, and the bibliography listed therein.

¹ If these accounts are not with banks of the same group and if they are used in different and geographically distant market sections, they can give rise to transfers of monetary base from one market section to another. If, then, the net credit balances on these accounts come to account for a growing portion of the system's liquidity, this can reasonably be interpreted as a result of lower liquidity preference on the part of deposit banks, unless their circuit of financial flows is equally efficient in all market sections.

² See J.A. Cacy, "Reserve Adjustments: Some Empirical Findings", Federal Reserve Bank of Kansas City *Monthly Review*, June 1971, p. 13-14, and Robert E. Knight, "Reserve Requirements: An Analysis of the Case for Uniform Reserve Requirements", Federal Reserve Bank of Kansas City *Monthly Review*, May 1974, p. 15-16.

isolate the structure of domestic interest rates from those abroad, and to improve the efficiency of the banks' financial circuits. It would seem that in handing the deposit banks an instrument of potential money creation¹ (an instrument the more powerful, the more efficient are the banks' financial circuits), the monetary authorities reckoned that the opportunity of higher earnings thus offered to the banks would induce them, at equal unit profit margins, to alter the composition of their loan portfolio². In the new circumstances it should indeed be to the advantage of the banks to cut down on their lending to importers, thus reducing the marginal propensity to import of private business, and to increase the proportion of credit going to Kenya firms. Such a policy should suit especially the three large banks, because, by reason of their very size, they can more easily reduce the cash drain in the loan-deposit circuit. But this is not so for medium and small banks. But unless the new provision is accompanied by specific restrictions on bank activities (such as a reduction of working balances on current account with correspondents abroad to actual operational requirements, and a prohibition to cover spot debit positions on the forward exchange market), medium and small banks are likely to react to an attempt to modify the existing equilibrium in an oligopolistic market by stepping into the place of large banks in financing domestic and import trade. If this happened it would seriously compromise the chances of success of the large banks'

¹ The scarcity of admissible reserve assets has its ultimate limit in the volume of currency, and therefore the problem of reserve types must be solved with reference to their influence on bank liquidity and on the spread between lending and borrowing rates, in so far as the latter affect the preferences of depositors and the banks' loan and investment opportunities.

² See Edward J. Kane and Burton G. Malkiel, "Bank Portfolio Allocation, Deposit Variability and the Availability Doctrine", *op. cit.*

policy, because the resulting large-scale destruction of monetary base would make it hard to improve the efficiency of the loan-deposit circuit.

Before going any further, we must now look at interbank accounts with abroad. A distinction must here be made between accounts for transfers between Kenya banks and their head offices abroad as well as other subsidiaries of the same group, and accounts with foreign correspondents. In either case, they may be correspondence accounts, or else deposit or loan accounts. The first serve for the settlement of debits and credits between correspondents following services performed. In international banking relations it is usual that one partner renders more services than the other and balances on each account should therefore vary in accordance with the value of services used. The more one-way is the flow of services which a bank asks a correspondent abroad to perform, therefore, the more quickly it should, *ceteris paribus*, reconstitute its credit balances, for otherwise it risks having to pay the high interest rates applicable in case the account is temporarily in the red. But a fair amount of time may pass between the opening entry of a transaction and its final confirmation by receipt of the advice of debit, and therefore it is hard to know just how big a balance is available at any moment on the various correspondence accounts. In these circumstances deposit banks are inclined to put up with quite considerable opportunity costs for the sake of more certainty in covering their accounts with correspondents abroad¹.

¹ The opportunity cost incurred for reducing the risk of imbalance has to be calculated in the light of the foreign exchange locked up in these accounts and of the income streams obtainable from an investment of equal riskiness. See Sergio Paci, "Aspetti della gestione dei rapporti con i corrispondenti esteri", *Il Risparmio*, February 1975.

For Kenya subsidiaries of British banks there is an undoubted advantage in opening current accounts with their head office and with other foreign branches¹, if only for the sake of the greater flexibility they enjoy in the use of the account and because the contribution of local bank managers to the group's profits is computed with reference to local costs and taxes, which are hardly ever penal. Much the same applies to the other banks, except the Kenya Commercial Bank². In addition to these correspondence accounts, there are others typically used for opening credit lines. The foreign exchange flows generated by the use of these credits are channelled to the service accounts through which debit and credit positions are settled. Credit lines from correspondents help to increase the flexibility not only of foreign exchange management³, but also of domestic liquidity management. Supposing that the central bank places no quantitative limits on foreign indebtedness and that the banking system is in equilibrium conditions, far greater obstacles to the use of such credit may of course arise from expected rates of interest at home being lower than those abroad. A liquidity reserve of this kind can be exceedingly useful to banks in

¹ There are fiscal reasons, too, which make this advisable. When the government of Kenya decided to tax interest paid on foreign debts, it became advantageous for multinational firms to show their foreign debts as due to British banks, because, thanks to a double taxation agreement, interest taxed in Kenya is deductible from taxable earnings of banks in the United Kingdom.

² The British National and Grindlays Bank Ltd., it will be remembered, now holds only 40 per cent of Kenya Commercial's equity, and although it acts as the latter's London correspondent, it probably applies market terms. It may be worth mentioning that the Co-operative Bank of Kenya and the African Banking Corporation (E.A.) Ltd. have no correspondents abroad.

³ To the extent that banks use this form of credit, they can cover previous operations and the connected exchange risks. In deciding whether or not to draw on credit lines, one therefore has to allow for the savings — in terms of costs or risks — obtainable from this manner of exchange risk cover.

attenuating the effects of the Treasury's manipulation of the coefficient t (ratio of total public demand deposits to total private demand deposits) on bank management and liquidity policy. It follows that such a reserve of credit can help to make a country's banking system more independent from its monetary authorities, especially when the balance of payments on current account is in deficit. In the context of the economic and credit conditions described, therefore, it seems that the only instrument the central bank can rely on is interest rates, control of which enables it to influence at least part of the country's financial flows¹.

It remains to mention one final technical form by which banks lend to each other, namely, the transfer of title to a deposit. Uncontrolled transfers of this kind on the domestic credit market may set off an expansion of aggregate national demand and of the volume of imports such as to cause a cumulative loss of foreign exchange reserves², which will dwindle all the faster the higher are the rates that have to be paid on such debts.

The implication is that the use of the last two channels of interbank borrowing cannot be left to the discretion of the banks themselves, because in their pursuit of profit maximization they might adopt policies conflicting with the aims of the government.

But looking at the sources of monetary base creation in Kenya, the overwhelming importance of the exogenous factors³ Treasury

¹ See Karl Brunner and Allan H. Meltzer, "The Federal Reserve's Attachment to Free Reserves", *op. cit.*, p. 218, and Jack M. Guttentag and Robert Lindsay, "The Uniqueness of Commercial Banks", *Journal of Political Economy*, September/October 1968, p. 933 and 1012.

² This means ultimately a cumulative drain of real resources which may eventually force the monetary authorities to introduce import restrictions.

³ See Albert E. Burger, "The Implementation Problem of Monetary Policy", *op. cit.*, p. 25-26, note 7, and J.L. Jordan, "Elements of Money Stock Determination", *Federal Reserve Bank of St. Louis Review*, October 1969, p. 10-29.

and Rest of the World is obvious (See Tables 50 and 52). It follows that the monetary authorities can influence the liquidity policy of banks only by controlling the structure of the rates of interest. Most probably, the introduction of special deposits¹ alongside the liquidity ratio must have been dictated by just such a purpose.

But in Kenya special deposits might well produce untoward effects. They raise the banks' demand for currency, and thereby affect the structure of yields from financial assets in circulation on the credit market. The changes in the yield structure in turn will give rise to a series of adjustments in the financial asset portfolios of the public and the banks, to the benefit of bank deposits. Their rise, finally, will induce banks, bound as they are by the special deposits ratio, to acquire other financial assets on the market.

What use deposit banks make of the liquidity reserves made available to the system depends largely on loan and investment opportunities, on interest rates and on expected yield changes. Supposing credit expansion is possible only at risks so much higher as to make it uneconomic, much of the reserves will remain unused, since the deposit banks, in a situation of barely differentiated oligopoly, will put off price competition as long as possible, because of the uncertainties surrounding the reactions of rivals². When, therefore, the banking system has liquidity reserves in excess of

¹ Special deposits have been used rather sporadically in Kenya, as in Great Britain, for that matter. See S.E. Maycock, "Monetary Policy and the Clearing Banks", in: David R. Croome and Harry G. Johnson, *Money in Britain 1959-1969*, OUP 1970. Unlike the minimum reserve assets ratio, which allows banks in a liquidity squeeze to use the assets earmarked for reserve, special deposits with the central bank are not disposable.

² It is implicitly assumed that the position of the banks vis-a-vis abroad cannot be positive.

the desired level, it will be to the advantage of banks to raise the proportion of credits for imports, because thereby they can destroy monetary base which they do not want, which cannot be used profitably in other ways and which would otherwise simply end up unproductive in the banks' tills and depress their earnings. All that the monetary authorities can then do to forestall a vigorous expansion of import credits is to introduce not only import restrictions but also much tighter exchange controls, so as to keep capital exports within tolerable limits¹. However, even supposing that the central bank succeeds in controlling a flight of capital, there is still the problem of not allowing large parts of reserves to lie unproductive; to prevent this, the marginal attraction of loans and/or investments must be higher than that of cash.

If banks find themselves with undesired reserves, they will probably adopt more generous credit policies and raise the transactions costs of deposits, thus pushing up the public's demand for currency. Even if the banks did set in motion such a process of credit disintermediation, which in the market conditions of Kenya might be most hazardous, the monetary authorities can still wipe out the hard-won results by the mere alteration of the coefficient t . In these circumstances the banks may well come to the conclusion that the best liquidity policy is to hoard money².

¹ In the circumstances described capital exports are inevitably promoted by the banking system.

² See D.B. Christelow, "Britain's New Monetary Control System", Federal Reserve Bank of New York *Monthly Review*, January 1974, p. 15; James Tobin, "A General Equilibrium Approach to Monetary Theory", *Journal of Money, Credit and Banking*, February 1969; D.J. Coppock and N.J. Gibson, "The Volume of Deposits and the Cash and Liquid Assets Ratios", *The Manchester School*, September 1963; and N.J. Gibson, "Special Deposits as an Instrument of Monetary Policy", *The Manchester School*, September 1964.

This seems to be what actually happened, to judge by the figures of Tables 34, 36, 37, 40 and 42. From 1971 to 1972 the loan/deposit ratio (Table 34) of both large and small banks declined, from 76.43 to 67.29 per cent in the first case, and from 74.45 to 64.63 per cent in the second, but for medium banks it rose from 69.47 to 76.80 per cent. The ratio of securities to deposits behaved more uniformly; it rose for all three categories of banks, from 8.32 to 21.59 per cent for large ones, from 10.63 to 13.15 per cent for medium ones, and from 16.21 to 33.31 per cent for small ones. The liquid assets/deposits ratio, too, fitted into the model: it rose in all three cases, from 2.26 to 3.10 per cent, from 3.62 to 10.16 per cent, and from 16.22 to 18.95 per cent, respectively. Further evidence can be found in the figures for Treasury Bill holdings by large, medium and small banks (Table 36), with values up, respectively, from 2.350 to 12.280 million pounds, from 0.450 to 1.487 and from 1 to 1.996 million, while the average annual rate of discount of allotted Bills declined from 3.5015 to 3.4043 per cent, through a low of 3.1923 per cent. The coefficient t similarly dropped for all three groups of banks, from 15.48 to 13.74, from 34.71 to 34.69, and from 6.44 to 0.75 per cent, respectively. Even the current balance of payments was compatible with the behaviour pattern outlined, with the current deficit dropping from 54.2 to 25 million pounds (Table 50). Throughout the period the structure of interest rates in the bank market¹ remained unaltered.

¹ James Tobin, in an extremely interesting article ("Deposit Interest Ceilings as a Monetary Control", *Journal of Money, Credit and Banking*, February 1970), states (p. 8): "In principle, the same degree of effective monetary restraint can be maintained with low ceilings, with high ceilings, or, for that matter, with no ceilings. Higher deposit interest rates would mean more time deposits, less demand deposits, probably more total deposits, higher money market rates, and

5. ANALYSIS OF THE LIQUIDITY POLICY OF DEPOSIT BANKS IN KENYA: METHODOLOGY

We are now in a position to examine the liquidity policy of deposit banks in Kenya during the period 1967 to 1972. We do so with the help of spectral and co-spectral analysis¹. These techniques are useful in economic research because they make it possible to decompose time series into statistically independent components characterized by different frequencies of oscillation. They should prove particularly helpful for the purposes of this study, in so far

more intermediation. But these differences in simple monetary indicators are all consistent with zero macroeconomic impact."

Milton Friedman holds a similar view ("Controls on Interest Rates Paid by Banks", *Journal of Money, Credit and Banking*, February 1970, p. 32): "Control of interest rates by commercial banks is not a useful or effective instrument of monetary policy. It has unpredictable effects on aggregate demand, complicates the interpretation and operation of the effects of other policy actions, and has many undesirable side effects. The sooner it is terminated as an instrument of monetary policy the better."

However, as Karl Brunner notes ("Two Major Issues in Recent Monetary Policy", Introduction to a Symposium, *Journal of Money, Credit and Banking*, February 1970, p. 2): "Tobin develops his results by linking the real return on real capital with the ceiling rate and using the return on real capital as an index of the impulses emitted by the ceiling rate on the pace of economic activity. Friedman, on the other side, stresses the loss in information value associated with monetary aggregates, particularly the money stock, suffered by the use of ceiling rates. There still remains, consequently, an important issue to be examined ... the index quality of the real return on real capital and growth rates of monetary aggregates for evaluations of monetary policy in terms of their effects on economic activity." Another paper which repays reading in this context is Jack M. Guttentag and Robert Lindsay, *op. cit.*

¹ The spectral density of a series of data gives the proportion of the common variance at each of the numerous frequency classes.

The existence of a maximum in the graph of spectral density, against frequencies, indicates that an important component of that particular frequency is present in the series. Similarly, co-spectral analysis between two time series provides an estimate of the common covariance in each frequency class.

The cross-spectrum values are complex numbers, and the latter are therefore generally summarized in one or more of the following statistics: coherence, phase

as they enable us to determine the intensity of certain statistical relations (phase, coherence and gain) between the financial assets forming part of the liquidity reserve, and between them and the typical assets and liabilities of deposit bank business.

The usefulness of spectral techniques is even more obvious in the light of the fact that, taking account of given cyclic components and neglecting the underlying trend of the various time series under consideration, they provide an estimate of the reaction speed (phase coefficient) of banks to changes that have occurred, or have been made, in economic variables susceptible of influencing the movements of others. Given the importance of the method for purposes of the present study, it may be useful to give a precise example of what we can expect from it. Co-spectral analysis can specify not only the reaction time of, say, loans to an increase in deposits, but also the correlation between the variations which, by virtue of given cyclic components, take place in the loans and

and gain. Coherence is conceptually akin to the coefficient of determination R^2 in correlation analysis. The coefficient R^2 is the square of covariance between two series, divided by the product of variances of the two series. A measure of covariance between the two series, for each frequency class, is given by the amplitude of the cross-spectrum. Amplitude equals the sum of covariances in phase and quadrature. By dividing the square of amplitude by the product of estimated spectral densities, one obtains a measure (coherence) of the variance ratio of each series with respect to a given frequency, in terms of the similar frequency components of the other series, apart from possible differences of phase. The analogy with the coefficient R^2 is obvious. Both coefficients vary between 0 and 1. The phase coefficient provides an estimation of the lag of any one series with respect to another, for each frequency class considered. It is, for each frequency, equal to the argument of the respective cross-spectrum. The gain indicates the vector by which the amplitude of a series, at a given frequency, must be multiplied in order to produce a component of amplitude equal to that with which that frequency appears in another series.

The gain is analogous to the simple regression coefficient, and is given, for each frequency, by the ratio between the cross-spectrum amplitude and the value of the spectral density of the independent variable.

deposits of a bank, as well as the portion of these variations explained by variations in the same bank's demand liabilities outstanding¹.

¹ In submitting the data of two series to co-spectral analysis, one obtains three parameters of fundamental importance, namely, phase (or alignment), gain and coherence. The phase coefficient has a + or a - sign. If it has a plus sign, this means one has to consider the right-hand column of the cross-variance, if a minus sign, the left-hand column. In the column so indicated one has to look at the row corresponding to the alignment. For example, for alignment = 4, one has to look at the fourth row. The parameter so identified is, in its turn, preceded by a + or a - sign. If it has a plus sign, the peak points of the right-hand column should re-appear, four months later, in the left-hand column. If it has a minus sign, the peaks of the left-hand column are followed, four months later, by troughs in the right-hand one. If the alignment parameter is preceded by a minus sign, this means one has to consider the left-hand column. Successively, results should be interpreted in a similar way. As regards the determination of the coefficients of gain and coherence, the procedure is as follows. In the columns of all gain and coherence coefficients, respectively, one chooses the entries in the row corresponding to the parameter of alignment, and interprets them, respectively, as coefficients of regression and of correlation. Note that these coefficients are followed by the letter E, by a plus or minus sign, and by two figures, e.g. 00 or 01 or -03. These symbols have to be interpreted as a power of base 10, with sign and index equal to those by which the latter is followed. For instance, if the gain is 0.333014 E 00, its value equals $0.333014 \cdot 10^{00}$. Or, if the gain is 0.279055 E -01, its value equals $0.279055 \cdot 10^{-01}$. To illustrate this description, it may be useful to retrace, by way of example, the process of interpretation of the results obtained by co-spectral analysis of the time series of the trend-adjusted flows of interbank balances due to correspondents abroad and of total credits (Table 85). The results are shown in the table on p. 111.

Looking at the three fundamental coefficients, it will be seen that the lag between the two series is 1 month. The minus sign preceding the phase coefficient means one has to look at the left-hand column, row 1. The coefficient so found has a plus sign, and therefore it can be stated that when there is a peak in the left-hand column (interbank balances due to correspondents abroad), there will, a month later, be a peak in the series of total credits. Having ascertained the value and significance of the first parameter, it remains to determine the gain and the coherence. In the first row of the coherence and the gain column we find, respectively, the coefficients 0.305546 E 00 and 0.194453 E 00, from which it may be concluded that the correlation index and the regression index between the cyclic components of the economic magnitudes under consideration are altogether negligible.

In Kenya the sources of money creation were almost entirely exogenous to the central bank, as can be seen from the tabulation below (million Kenya pounds).

| | 1968 | 1969 | 1970 | 1971 | 1972 |
|--|-------|-------|-------|-------|------|
| Balance of payments: balance of monetary movements (Table 50) | +10.2 | +22.8 | +16.0 | -27.8 | +9.5 |
| Money creation by the Treasury ¹ | - 8.3 | -18.1 | - 8.9 | +30.6 | -1.0 |
| Change in currency stock (Tables 32 and 48) | + 1.9 | + 4.7 | + 7.1 | + 2.8 | +8.5 |

Furthermore, both the Treasury cash requirements and those of foreign trade can be taken to be subject to strong seasonal fluctuations². For these reasons, it should be most interesting, from the point of view of the mobilization of domestic savings and, ultimately, of the economic system's capacity of balanced growth, to examine the seasonal liquidity policies of the deposit banks.

To this end figures obtained from the monthly returns of banks operating in Kenya, during the period October 1967 to February 1973, were consolidated, and then the trend component was removed by the method of first differences. This yields flow values on which to base further research, in preference to stock values³. But the stock data from which the flow data were derived

¹ Money creation by the Treasury was calculated as the difference — with opposite sign — between the time series of Table 50 and those of Tables 32 and 48.

² On this point see W.T. Newlyn, *Finance for Development*, *op. cit.*, Chapter II.

³ For a discussion of some problems in the adjustment of seasonal data see Stephen M. Goldfeld and Edward J. Kane, "The Determinants of Member-Bank Borrowing: An Econometric Study", *Journal of Finance*, September 1966; Dennis

are flawed by certain duplications and errors, and these must be pointed out before going any further.

First of all it was not possible to eliminate duplications due to transit items and net balances with branches, because not enough is known about the actual amounts involved and no reasonable distribution key can be estimated. These duplications involve an overstatement of deposits and an understatement of advances and credit lines on current account. Next, working balances needed for normal banking business were not deducted either from currency in circulation or from interbank correspondence accounts, with or without reciprocity of services. Finally, the amount of minimum liquidity reserves was calculated with reference to deposits not adjusted for duplications, and, again for lack of information, it was not possible to calculate the arithmetic mean of reserves to be held in accordance with the computations which the central bank requires to be carried out on three days in any one month.

For the reasons listed below, it seemed preferable to study liquidity policies with reference to the banking system as a whole rather than for different size classes of banks.

(1) Throughout, the large banks accounted for close to 80 per cent both of total credits and total deposits of the banking system;

(2) leaving aside a few of the small banks, the liquidity policies and liquidity management of the large banks was probably not much more refined than those of medium and small ones;

(3) in a credit market like that of Kenya the large banks probably in effect determine the behaviour of the others. There is

Aigner Jr. and William R. Bryan, "The Determinants of Member-Bank Borrowing: A Critique", *Journal of Finance*, December 1968; Peter A. Frost and Thomas J. Sargent, "Money-Market Rates, the Discount Rate, and Borrowing from the Federal Reserve", *Journal of Money, Credit and Banking*, February 1970.

indeed evidence that in recent years medium and small banks have been aligning their management policies and behaviour to those of the large banks.

After these reservations and explanations, we are ready to begin the analysis of our research.

Given that a bank's liquidity depends, at least in large part, upon the efficiency and the characteristics of the loan-deposit circuit, it seemed right to look first at the intensity and periodicity of the cyclic components in the time series of the economic variables whose movements create that circuit. We began with credits by categories of borrowers. The results definitely show the presence of cyclic forces, though not of strong intensity¹.

Peak points were found as follows²:

| | |
|---------------------------------|---|
| Loans and advances | |
| Public sector | 5 |
| Private sector | 0 |
| Total | 3 |
| Bills discounted | 0 |
| Total loans, advances and bills | 3 |
| Total credits to private sector | 3 |

The spectrum estimates for the credit flows from banks to the public sector display a sinusoid of different period and amplitude than that for total credit to the private sector. Since the intervals between peaks are longer and the differences between peaks and troughs larger in the public than in the private sector, it is likely

¹ Tables 54 to 67 show the results obtained from spectral analysis of the time series of the economic variables here discussed.

² The periods between peak points are expressed in months. For instance, the figure 5 for loans and advances to the public sector means that in the pertinent time series a peak point occurred every five months. The same applies to all the other figures.

that the average duration of loans to the public sector is longer, and that the speed of turnover of credits is higher in the private sector.

If this is so, it is reasonable to conclude, in first approximation and *ceteris paribus*, that an expansion of credit to the public sector leads to higher requirements of voluntary liquidity reserves. This would make public sector loans more costly than private sector ones¹. The advantages banks can obtain by modifying the composition of their loan portfolio can therefore be expressed in terms of expected rates of return and of quicker repayment of credits.

Abandoning the hypothesis of short time horizons and looking at the rapid expansion of the public debt at home and abroad (Tables 50, 51 and 52), the strongest doubts arise about the chances of Kenya's monetary authorities to raise—at current rates—further foreign exchange funds on international capital markets. If we accept, for explanatory purposes only, David Kern's model² of the repercussions of a public sector deficit on the money supply, in a closed economic system, we see that deposit banks come to be the

¹ The degree of risk of private sector loans is very low, especially since banks in Kenya are in the habit of granting credit to expatriate firms only on presentation of a letter of guarantee by the parent firm to the bank's own head office.

² David Kern, "Public Sector Deficits", *op. cit.*, p. 20-22. The model is outlined as follows:

Change in bank lending to the public sector:

Public sector borrowing requirement

minus

overseas financing of the public sector

minus

change in currency in circulation

minus

other private sector financing of the public sector (that is, net acquisition of

main source of finance for the public sector. To the extent that this model is applicable to Kenya, the implication is that any public borrowing requirement that is not met by the foreign sector or by the purchase of Treasury paper by the public or by non-bank financial intermediaries, must be financed by the banks. This process would cause an increase in deposits (closed system) and in the money supply (M_3). If, on the other hand, private individuals finance the public deficit by an increase in their cash holdings, this will lead to an automatic expansion of the money supply (M_3).

Generally speaking, it is reasonable to think that the expansionary effect of the public deficit on the money supply will vary according to the type of Treasury liabilities acquired by the banks and by the public. In any event, leaving aside special deposits

public sector debt such as gilts and National Savings by UK residents other than banks)

equals

change in bank lending to the public sector.

Change in net bank deposits of United Kingdom residents:

Change in bank lending to the public sector

plus

change in bank lending to the private sector

minus

minor adjustments (change in overseas deposits and non-deposit liabilities)

equals

change in bank deposits of UK residents.

Change in the money supply (M_3):

Change in bank deposits of UK residents

plus

change in currency in circulation

equals

change in money supply (M_3).

The assumptions of the model are that

- (a) it is most unlikely that individuals and private financial institutions finance the whole of the public sector deficit; and
- (b) an expansion of bank lending to the public sector will hardly ever be offset by a corresponding reduction in bank lending to the private sector.

which may cause a reduction in other forms of bank lending, an increase in bank credits leads to an increase in the money supply.

In the economic conditions of Kenya such a budgetary policy would probably generate, at least initially, strong pressures on the central bank's foreign exchange reserves, if only because the desired increase in the domestic stock of money (domestic supply) will almost certainly be less than the expansion of domestic credit¹.

As a result, the borrowing capacity of the Kenya Treasury on foreign markets would rapidly dwindle away, not least because of the time lags in the growth of Kenya's gross domestic product. Holders of domestic currency would then adjust their demand by introducing into the cost of holding money elements connected with expected changes in the price level, which should lead to a change in the domestic yield structure².

¹ See Robert A. Mundell, "Real Gold, Dollars and Paper Gold", *American Economic Review*, May 1969, and the following statement by Milton Friedman ("The Lag in Effect of Monetary Policy", *Journal of Political Economy*, October 1961, p. 454): "The percentage rate of change in prices itself is the opportunity cost of holding money rather than goods, so that a constant percentage rate of change in the stock of money corresponds to a constant opportunity cost of holding money rather than goods. An unanticipated change in the rate of change of the stock of money would then produce a deviation of the actual from the desired stock of money for two reasons; initially, it would make the actual stock deviate from the expected stock and therefore from the desired stock; subsequently, by altering the cost of holding money, it would change the desired stock itself."

² See Milton Friedman, "The Quantity Theory of Money — A Restatement", in: M. Friedman, ed., *Studies in the Quantity Theory of Money*, University of Chicago Press 1956, and James Tobin, "Money, Capital and Other Stores of Value", *American Economic Review*, May 1963. In another paper ("Money and Economic Growth", *Econometrica*, October 1965), Tobin too explicitly takes account of uncertain and variable money rates, but it should be recalled that in Tobin's view the link between the activities of financial and monetary institutions and the real economy is represented by the rates of return on financial assets and credit availability rather than by the quantity of money. See James Tobin, "Commercial Banks as Creators of Money", *op. cit.*

In such conditions the volume of imports is bound to rise, not least in consequence of higher national expenditure¹. The balance of payments on current account deteriorates, and with it the country's credit standing abroad. Unless the Treasury then revises its borrowing policy, it will have to cover more and more of its requirements by turning to the deposit banks and the central bank, thus creating inflationary pressures and causing a rise of rates which, at the limit, may lead to disintermediation by the banking system.

Apart from these factors, the attraction of lending to the Treasury should, *ceteris paribus*, vary according to the size of banks. But in Kenya, what probably matters more than the cash drain due to private hoarding or to imports induced by government expenditure, is the cash management of public institutions, and in particular changes in the coefficient t ². It is the manipulation of these variables, therefore, which makes lending to the public sector more, or less, attractive to individual banks.

Against the background of these explanations, let us examine the spectrum of credits to the private and the public sector. We find a sinusoidal curve whose period (a peak every three months)

¹ On the assumption of fully anticipated inflation, Robert A. Mundell ("Inflation and Real Interest", *Journal of Political Economy*, June 1963, p. 282-83) states: "The discrepancy between the real rate of interest and the money rate of interest [...] is] the rate of inflation. The inflation itself is generated by monetary expansion in excess of growth. The money rate of interest rises by less than the rate of inflation and therefore the real rate of interest falls during inflation. The conclusion is based on the fact that inflation reduces real money balances and that the resulting decline in wealth stimulates increased saving. Real conditions in the economy are altered by the purely monetary phenomenon. When prices are expected to rise, the money rate of interest rises by less than the rate of inflation, giving impetus to an investment boom and an acceleration of growth. Conversely, when a rise in prices is expected to end, there occurs a stock market slump, a rise in the real rate of interest and a deceleration of growth."

² As defined on p. 25, footnote 1.

is almost certainly influenced by seasonal patterns of private credit demand and lending to the private sector (which has always absorbed the great bulk of bank credit — see Table 17).

Given the importance of credits to the private sector, it seemed interesting to proceed to a spectral analysis of the time series for private credits by recipient sectors, in the hope of discovering the influence of cyclic components, if any, on the occurrence of peak points. The periods were as follows (months)¹:

| | |
|------------------------|---|
| Agriculture | — |
| Primary sector | 5 |
| Industry | 3 |
| Trade (12) | 3 |
| Export trade | 2 |
| Import trade (6) | 3 |
| Domestic trade | — |
| Financial institutions | 4 |
| Others | 2 |
| Households (12) | 4 |

The most marked peaks occur in credits to industry and to trade. Since data for credits to sub-sectors of trade happened to be available, the time series for each of them was subjected to separate spectral analysis. The results show well-defined peaks in credits to import trade, but much less marked ones in the other two series.

This suggests that in the real system there is a seasonal demand for consumer goods and stocks. This assumption is confirmed by the results of spectral analysis of the flows of credit to households,

¹ The figures in parentheses indicate that in the spectrum of the series concerned, other peaks additional to the main one were found. The figures in parentheses indicate the number of months after which the main peak recurs in the spectrum.

which display a sinusoidal course with well-defined peaks every four months.

It seems reasonable to suppose, therefore, that in the short term the liquidity management of deposit banks is, at least in part, conditioned by credits to industry, import trade and households (See Table 18).

So much for the credit side of the loan-deposit circuit. On the deposit side, a first distinction was made between categories of depositors, and then for each of these a second distinction between categories of deposits: demand, time at 7 days' notice, other time, and savings deposits. For public deposits, peaks occurred at the following intervals (in months):

| | |
|--|---|
| Public demand deposits | 3 |
| Public time deposits at 7 days' notice | — |
| Other public time deposits | 3 |
| Public savings deposits | 3 |
| Total public deposits | 3 |

It will be seen that almost all the public sector's financial assets display a quarterly pattern. The same results were obtained for private deposits, except for "other time deposits", for which no peak points were found¹. The periods for the aggregates of private and public deposits were the same as for public deposits.

But the most important item still to be examined is the periodicity of total deposits, for it is their movements which in

¹ The results are further confirmed by the movements of currency and M_1 in private hands, for which peak points were found every three months. Spectral analysis of the time series for M_3 , on the other hand, yields results more difficult to interpret. Total private and public deposits show a peak point every three months, but no cyclic component can be discovered in the M_3 series. The explanation may lie in the relations between individuals and non-bank financial intermediaries as well as the Post Office Savings Bank. Measuring the quantity

effect govern bank liquidity. Spectral analysis revealed peak points as follows (in months):

| | |
|---------------------------------------|---|
| Total demand deposits | — |
| Total time deposits at 7 days' notice | 4 |
| Total other time deposits | 3 |
| Total savings deposits | 3 |
| Total deposits ¹ | — |

Comparing these results with those obtained from spectral analysis of the series of public and private deposits, one can conclude that, thanks to recourse to non-bank financial intermediaries, the deposit banks succeeded in offsetting the influences of cyclic components on their typical source of funds.

After the availability of deposits (by categories of depositors and types of deposits) and the speed of turnover of credits, the next thing to analyse is the loan/deposit ratio.

With a view to identifying the influence of the private and the public sector on the time pattern of the relevant flows, the ratio was determined first with reference to private-sector loans and deposits, and then to total loans and deposits. Spectral analysis of the first series yielded no significant results, but for the second series a peak was found every three months.

Comparison of the results obtained with the two time series suggests that the seasonal component in the loan-deposit circuit must be due to the public sector—which may be manipulating

of money in circulation by M_3 , it follows that the money supply does not depend on seasonal factors. It would be most interesting, in this connection, to have access to monthly data of the gross domestic product, so as to be able to discover more about the nature and intensity of the links between these economic magnitudes, and the intervening time lags.

¹ The symbol (—) indicates that no significant peak points were found in the time series concerned.

both its borrowing and its deposits intentionally with a view to creating favourable conditions for the ready absorption of Treasury Bills. Because of the uncertainties surrounding variations in the loan-deposit flows, banks will be induced to hold liquidity reserves and to manage their financial assets in such wise as to raise the revenue flows generated by them and to minimize the expenditure flows due to transactions costs.

There is, then, proof of the existence of a seasonal component in the financial flows of the loan-deposit circuit; it remains to see whether it influences the banks' liquidity management and whether bankers take steps to offset seasonal variations. To this end, spectral analysis was applied to the cash ratio of the banks and to their demand for domestic and foreign currency. Peak points were found as follows (in months):

| | |
|----------------------------|---|
| Cash ratio | 4 |
| Domestic currency holdings | 3 |
| Foreign currency holdings | 8 |
| Total currency holdings | 3 |

The most noteworthy aspect of these figures is how long it takes to bring deposits at the central bank into line with fluctuations in the flows of the loan-deposit circuit. This suggests that there may be frictions in the operations of liquidity management, which delay the adjustment of liquid assets to new conditions of credit demand and supply. To shed more light on this matter, it seemed useful to determine the recurrence of peaks in liquidity reserves, both total and by component assets. Spectral analysis of the pertinent time series ¹ revealed the following periods (in months):

| | |
|--|---|
| Free liquidity reserves | 4 |
| Liquid assets (calculated by mixed method) | 4 |

¹ For notes on the content of separate items see Table 29.

| | |
|--|---|
| Liquid assets (calculated by net method) | 4 |
| Liquid assets (calculated by gross method) | 4 |
| Cash + Treasury Bills + free deposits at the central bank | 4 |
| Free (gross) liquidity reserves/deposits | 4 |

For separate types of assets forming part of liquidity reserves, peak points were found in the time series at the following intervals (in months):

| | |
|---|-----|
| Free deposits at the central bank | 4 |
| Net domestic interbank balances | 0 |
| Net foreign interbank balances | 0 |
| Free deposits at the central bank + net interbank balances | 3 |
| Treasury Bills ¹ | 2-3 |
| Cash (total) | 3 |

Comparison of the last two tabulations suggests that the time lags in the adjustment of the banking system's liquidity to seasonal fluctuations in the financial flows of the loan-deposit circuit are attributable to free deposits at the central bank, which seem to be the slowest to come into line. However, before drawing any conclusions, one still has to look for seasonal influences on interbank balances. The peak points found in the pertinent time series were as follows (interval in months):

| | |
|--------------------------------|---|
| Domestic interbank balances: | |
| Balances due by banks in Kenya | 3 |
| Balances due to bank in Kenya | 3 |
| Net | — |

¹ In this case the period is not well defined, and actually occurs between two and three months.

Foreign interbank balances:

| | |
|------------------------------|---|
| Balances due by banks abroad | 3 |
|------------------------------|---|

| | |
|------------------------------|---|
| Balances due to banks abroad | 3 |
|------------------------------|---|

| | |
|-----|---|
| Net | — |
|-----|---|

| | |
|--------------------------|--|
| Balances due by banks in | |
|--------------------------|--|

| | |
|----------|---|
| Tanzania | 2 |
|----------|---|

| | |
|--------|---|
| Uganda | 2 |
|--------|---|

| | |
|---------------------|---|
| other sterling area | 3 |
|---------------------|---|

| | |
|-------------------|---|
| non-sterling area | 8 |
|-------------------|---|

| | |
|------------|---|
| Total (12) | 3 |
|------------|---|

| | |
|--------------------------|--|
| Balances due to banks in | |
|--------------------------|--|

| | |
|----------|---|
| Tanzania | 3 |
|----------|---|

| | |
|--------|-----|
| Uganda | 3-4 |
|--------|-----|

| | |
|--------------------------|---|
| other sterling area (12) | 3 |
|--------------------------|---|

| | |
|-------------------|---|
| non-sterling area | 3 |
|-------------------|---|

| | |
|------------|---|
| Total (12) | 3 |
|------------|---|

Balances with head office or foreign branches:

| | |
|--------------------------|--|
| Balances due to banks in | |
|--------------------------|--|

| | |
|--------|---|
| Uganda | 3 |
|--------|---|

| | |
|---------------------|---|
| other sterling area | 3 |
|---------------------|---|

| | |
|-------------------|---|
| non-sterling area | — |
|-------------------|---|

| | |
|-------|---|
| Total | 3 |
|-------|---|

| | |
|--------------------------|--|
| Balances due by banks in | |
|--------------------------|--|

| | |
|--------|---|
| Uganda | 2 |
|--------|---|

| | |
|---------------------|---|
| other sterling area | 3 |
|---------------------|---|

| | |
|-------------------|---|
| non-sterling area | — |
|-------------------|---|

| | |
|-------|---|
| Total | 3 |
|-------|---|

It appears that, although particular balances follow a seasonal pattern and peaks occur at three-month intervals in many of the separate time series, net interbank balances are not used as channels

by which to make liquid funds flow in or flow out according to cyclic phases.

The assets examined so far are those most suitable for inclusion in liquidity reserves. It remains to look for seasonal influences in the financial flows generated by changes in the security holdings. Given the widely differing degree of liquidity of the financial assets forming part of the security portfolio, separate items and groups of items were examined separately, with the following results (period in months):

| | |
|---|-----|
| Treasury Bills (12) | 2-3 |
| Public securities | — |
| Total 1 (Treasury Bills + public securities) (12) | 2-3 |
| Private sector bonds (12) | 2-3 |
| Total 2 (total 1 + private sector bonds) (6) | 2-3 |
| Others (5) | 2-3 |
| Total 3 (total 2 + others) | 2-3 |
| Shares (8) | 2-3 |
| Total 4 (total 3 + shares) (8) | 2-3 |
| Grand total (total 4 = foreign securities) ¹ | — |

It seems clear that Treasury Bills, which have monetary base characteristics, are the financial assets most frequently used by commercial banks for purposes of liquidity management. The influence of cyclic components on the grand total shows no significant peaks. Further confirmation was found in the results obtained on the basis of the correlation and regression coefficients²—equal, respectively, to 0.09995 and 22.5985—between Treasury Bill yields (Table 47) and the loan/deposit ratio (Table 30).

¹ This corresponds to Total 6 in Table 21.

² The trend was removed with the help of a moving arithmetic average of three monthly data.

Having now assembled the necessary information about the influences of seasonal and cyclic components on the time series of interest for our purposes, we can proceed to co-spectral analysis with a view to determining the intensity, the significance and the nature of relations between changes in two economic variables and the reaction speed of one given variable to variations in another.

6. CO-SPECTRAL ANALYSIS

As explained earlier, the statistical technique of co-spectral analysis has been applied in this study for the purpose of identifying the relations between variations in certain economic variables and those in others. The economic variables concerned are regarded as fundamental for the behaviour of deposit banks and, therefore, for their liquidity policy.

In order to facilitate interpretation of the results, the latter are, in the tabulation below, summarized and grouped together.

Given that a deposit bank's liquidity management is conditioned by the movements of those economic magnitudes whose changes generate the financial flows characteristic of bank management as such, it seemed logical to start with the time series of deposits and credits, taking the respective totals first. An important point here is the four-month time lag between the peaks of deposits and credits, even though the coefficient of coherence between the individual cyclic components of the two series does not assume significant values.

While these results do furnish some very important information, such as the existence of an open circuit between credits and deposits, they also raise some problems which make it advisable to take a closer look at some of the components of total deposits and total credits. So co-spectral analysis was applied to the series

of private demand deposits and advances to the private sector, and those of the monthly totals of private deposits and private-sector credits. Some of the results were unexpected. Peaks in private deposits were generally followed after four months by troughs in credits to private borrowers. This time pattern, together with the value of the coherence and gain coefficients, suggests that private deposits originate in temporary cash holdings of private firms, which withdraw them quickly as soon as they perceive wider investment opportunities or need more cash in their tills¹. This empirical verification is of the greatest interest to those responsible for the liquidity policy of deposit banks. It appears in effect, in line with what was previously stated, that the deposit banks act only in part as intermediaries between units structurally in surplus and units structurally in deficit².

A banking system so structured limits itself to the occasional mobilization, at very high transactions costs, of savings from the top slices of income, while mobilization of savings is not, as such, one of its specific purposes. Since our research suggests that most probably a rather broad band of savings is not mobilized, it follows that the central monetary authorities themselves must assume responsibility for action to neutralize currency hoarding and, more generally, to mobilize savings.

However, a warning is in order. If the Treasury does assume such tasks, it may easily be tempted to expand the domestic money

¹ Note that under the *Banking Arrangements* no interest is paid on demand deposits. But banks may make an annual charge under the heading reimbursement of expenditure incurred for keeping deposits on current accounts or for services rendered. Demand deposit account management thus recalls the practices in the management of interbank service accounts with foreign correspondents.

² On this point see Giancarlo Forestieri, *Le operazioni a medio termine nell'evoluzione delle banche di deposito*, Milan, 1974, p. 34-37.

| Series I | Series II | Align- ment | Gain | Coherence | Relations between series |
|---|-----------|----------------|----------|-----------|-----------------------------|
| Deposits | | | | | |
| Total deposits | | | | | |
| Private demand deposits | | 4 | 11.0204 | 0.184224 | max I max II |
| Total private deposits | | 4 | 0.442064 | 0.251781 | max II min I |
| Private + intermediaries' demand deposits | | 4 | 0.310621 | 0.982523 | max II min I |
| Total deposits + bills payable + loan liabilities | | 4 | 5.34689 | 0.219954 | max II min I |
| | | 4 | 10.9959 | 0.183151 | max I max II |
| Liquid assets | | | | | |
| Acceptances, etc. + total credits | | | | | |
| Acceptances, etc. + total credits | | 2 | 485.517 | 0.302348 | max II min I |
| Liquid assets (mixed) | | 2 | 711.125 | 0.433817 | max I min II |
| Liquid assets (gross) | | 0 | 0.000911 | 0.752868 | max II min I |
| Liquid assets (net) | | 0 | 0.000865 | 0.742498 | max II min I |
| Free liquid asset holdings | | 0 | 0.000902 | 0.749558 | max II min I |
| | | 0 | 0.000990 | 0.637908 | max II min I |
| Deposits | | | | | |
| Free liquid asset holdings | | | | | |
| Liquid assets (mixed) | | 4 | 0.000018 | 0.108732 | max I min II |
| Liquid assets (gross) | | 4 | 0.000041 | 0.266586 | max I min II |
| Liquid assets (net) | | 4 | 0.000018 | 0.125421 | max I min II |
| | | 4 | 0.000018 | 0.114303 | max I min II |

| Series I | Series II | Align- ment | Gain | Coherence | Relations between series |
|--|----------------------------|----------------|-----------|-----------|-----------------------------|
| Interbank balances | | | | | |
| Deposits and credits | | | | | |
| Due to banks abroad | Total deposits | 3 | 0.0005970 | 0.050019 | max I min II |
| Due to banks abroad | Total credits | 1 | 0.0194453 | 0.305546 | max II max I |
| Net interbank balance + free deposits at central bank | Total deposits | 4 | 0.016020 | 0.07105 | max I min II |
| Net interbank balance + free deposits at central bank | Total credits | 0 | 0.811240 | 0.614397 | max I max II |
| Interbank balances | | | | | |
| Securities and credits | | | | | |
| Due by banks abroad | Total security investments | 2 | 0.204463 | 0.365983 | max I min II |
| Due by banks abroad | Total credits | 2 | 0.018364 | 0.002460 | max II min I |
| Due to banks abroad | Total security investments | 4 | 0.089641 | 0.071222 | max I min II |
| Net interbank balance + free deposits at central bank | Total security investments | 0 | 0.146018 | 0.0131374 | max II max I |
| Security investments | | | | | |
| Credits | | | | | |
| Total security investments | Total credits | 3 | 0.454015 | 0.093125 | max II min I |
| Total security investments | Private-sector credits | 3 | 0.542321 | 0.115038 | max II min I |
| Treasury Bills + public securities + private sector bonds | Total credits | 3 | 0.273138 | 0.072748 | max I min II |
| Treasury Bills + public securities | Total credits | 3 | 0.27428 | 0.074036 | max I min II |
| Treasury Bills + public securities + public credits | Public deposits | 2 | 0.191913 | 0.0148533 | max II max I |
| Treasury Bills + public securities + public credits | Total deposits | 0 | 0.026523 | 0.068927 | max II max I |
| Credits to trade | | | | | |
| | Net interbank balance | 3 | 0.292177 | 0.0833539 | max I max II |

supply faster than the real system can increase the gross domestic product.

Should the public borrowing requirement become rigid, the monetary authorities will probably take steps to control the domestic yield structure so as to contain excessive increases in the volume of bank credit and aggregate domestic demand, and, in the last analysis, undue pressures on the balance of payments. But there are dangers in this sort of development policy. If people allow in their expected rates of nominal return for elements of anticipated inflation, then the movements of nominal and effective rates may well generate ill effects likely to cause undue transfers of wealth from units less able to react to those in a position to take advantage of inflation.

Be that as it may, these considerations had best be left aside here. Returning to the results of co-spectral analysis of the time series of deposits and credits, it seems reasonable to assume that in the economic context of Kenya neither price policies nor improved services are likely to have much effect. Apart from savings deposits of considerable amount, demand for other liabilities of deposit banks almost certainly has a low elasticity with respect to changes in price or performance. Theoretically, the banks could alter the composition of their loan portfolio; this would have an effect on the degree of risk of outstanding credits, but, given the behaviour of the public, would still fail to close the loan-deposit circuit.

These conclusions find additional confirmation in the results of the cross-covariance and the cross-spectrum of the following pairs of series:

- (a) total private + non-bank intermediaries' demand deposits, and total private-sector credits;
- (b) total deposits + bills payable + loan liabilities and total credits.

At a four-month time lag and with non-significant coefficients of coherence, the peaks of the second series (credits) coincide with one trough and one peak of the first series. It looks as though banks prefer to meet their liquidity requirements from indirect sources.

At this point it may be well to summarize the conclusions reached so far.

- (1) The cost of borrowing has no more than negligible influence on the public's propensity to invest and on aggregate national demand.
- (2) The Treasury has adopted no stabilizing policy. It behaves just like the public, and in effect accentuates the sinusoidal movement of bank credit.
- (3) Deposit banks act only in part as intermediaries between units structurally in surplus and units structurally in deficit, they operate with open circuits of financial flows and prefer to borrow from other banks.
- (4) The monetary authorities' ceiling on credit expansion does not seem to meet the purpose for which it was introduced; perhaps it would have been better to specify an upper limit to lending rates.
- (5) The banks' liquidity policy and management are more responsive to medium-run than to short-run cyclic fluctuations, and more responsive, too, to changes in credits than in deposits.
- (6) Banks have two reliable advance indicators for predicting future liquid assets requirements, as appears from the output data of the tabulation above; these are the ratio of private deposits to private advances, and the ratio of M_1 to total private-sector credits (see the parameter of alignment and the cross-covariance and cross-spectrum coefficients shown in the above tabulation and in Table 71).

- (7) In the conditions of Kenya's economic and credit system, it would seem that certain instruments which are supposed to work on a sort of widow's cruse principle¹, like special deposits and the statutory minimum liquid assets requirement, are applied not so much with a view to controlling aggregate domestic demand, as in the intention of helping to meet the Treasury's financial requirements. This interpretation also sheds new light on the monetary authorities' policy of controlling the structure of domestic rates of interest; this policy, too, can be seen as a helpmate in the overriding purpose of financing the deficit of the public sector.

The first conclusions of our analysis, and especially those showing a nil lag between credits and liquidity (see again the tabulation a few pages earlier), the coincidence of peaks in credit with troughs in liquidity, the openness of the loan-deposit circuit and the cash drain deriving simultaneously from the private and the public sector, suggest that a closer look needs to be taken at the policy of raising funds from sources other than the characteristic supply of deposit banks.

It seemed convenient to start with the potentially most productive sources, if only because of the chances they offer of expanding the system's monetary base by the endogenous decisions

¹ I have in mind the possibility of controlling the deposit banks' credits to the economy via variations in the demand for certain financial assets. In this connection it may be interesting to quote what James Tobin says, with reference to an assumed institutional context in which no interest is paid on demand deposits: "Given the wealth and asset preferences of the community, the demand for bank deposits can increase only if the yields of other assets fall. The fall in these yields is bound to restrict the profitable lending and investment opportunities available to the banks themselves. Eventually the marginal returns on lending, and investing, account taken of the risks and administrative costs involved, will not exceed the marginal cost to the banks of attracting and holding additional deposits." (James Tobin, "Commercial Banks as Creators of Money", *op. cit.*, p. 404).

of bankers. Co-spectral analysis was applied, therefore, to the time series of interbank balances due to banks abroad, total credits and total deposits. It was found that a peak in the first of these series corresponds to a peak in credits, and a trough in the first series to a peak in deposits. This is clear proof of the banks' recourse to external sources as a typical instrument of liquidity management.

Additional proof was found in the results of co-spectral analysis of three other pairs of series:

- (a) Net interbank balance + free deposits at the central bank, and total credits;
- (b) net interbank balance + free deposits at the central bank, and total deposits;
- (c) net interbank balance, and credits to trade.

For the first and the third of these pairs it was found that peak points coincide, whereas for the second a peak corresponds to a trough.

The deposit banks' preference for interbank borrowing is also apparent in the comparative movements of interbank balances and investments. Taking the pair of series interbank balances due to banks abroad and total security investments (see tabulation above), and looking at the pertinent cross-covariance, cross-spectrum and parameter of alignment, it will be seen that peak indebtedness on the foreign interbank market generally occurs four months ahead of maximum recourse to asset management.

This behaviour may perhaps be explained by the following factors, among others.

(1) The securities portfolio was, in effect, only partially disposable, because part of the Treasury Bills and the whole category classified as "Others" had to be kept to satisfy the statutory minimum liquid assets requirement. Furthermore, Treasury Bills were, especially after the central bank stopped paying interest on

the banks' free deposits, the only financial asset which made it possible to earn something on liquid reserves and, at the same time, to expand the supply of M_3 from the system's private and public sector.

(2) For the reasons explained under (1), and probably also because of expectations of future yields, the banks preferred to liquidate their long-term securities first, notwithstanding higher transactions costs.

(3) Recourse to foreign interbank markets made it possible, *ceteris paribus*, to keep more domestic currency in circulation.

(4) In a cyclical upturn and boom, lending was more attractive than security investments, and vice versa. In this connection see the results of co-spectral analysis between the security investments and the credits series, and between those of public securities + public credits, and deposits (tabulation above). At the height of a boom, when demand became more pressing, it might have been profitable to liquidate part of the securities portfolio. At the beginning of a recovery phase, by contrast, liquid assets were used first to reconstitute working balances with correspondent banks abroad, and only later to acquire securities; this is apparent from the results of co-spectral analysis of the series of interbank balances due by banks abroad and total security investments, and those of interbank balances due by banks abroad and total credits (tabulation above).

However, these conclusions need to be qualified somewhat in the light of the coherence and gain coefficients for the series in which the intervals between peaks coincide, or of the values of these coefficients corresponding to the peaks in each of the two series simultaneously submitted to spectral analysis.

Nearly all these coefficients do not assume significant values, which suggests the presence of forces extraneous to banking and

susceptible of influencing the banks' management policies and especially their liquidity policies.

These forces probably are the constraints imposed by the monetary authorities upon the deposit banks' freedom of choice with a view to satisfying the financial requirements of the public sector.

7. TENTATIVE INTERPRETATION OF THE UNDERLYING REASONS FOR THE LIQUIDITY POLICY OF DEPOSIT BANKS

The coefficients obtained by spectral and co-spectral analysis have allowed us to draw certain conclusions about the policies of deposit banks. But they tell us nothing about the motives which may have led them to adopt any given behaviour in their liquidity management. Let us try to identify the factors which may be assumed to have influenced the banks' choices most strongly.

It is not to the advantage of any bank to keep changing its reserves continuously so as to adjust them at every moment to the desired level, because of the costs of such adjustments. A bank will adjust its reserves only when the change promises yields in excess of its cost. It is most likely, therefore, that bankers think in terms of a range within which they put up with occasional fluctuations in the actual level of reserves.

Because bankers dislike borrowing from the central bank¹, this range of fluctuations will probably be so defined as to require an adjustment in the liquidity position as soon as the latter threatens to assume negative values. The width of the adjustment range will

¹ See Stephen M. Goldfeld, *Commercial Bank Behaviour and Economic Activity*, *op. cit.*, p. 11-13; James A. Meigs, *Free Reserves and the Money Supply*, *op. cit.*, p. 83; Murray E. Polakoff and William L. Silber, "Reluctance and Member Bank Borrowing: Additional Evidence", *Journal of Finance*, March 1967, p. 88-92.

vary directly with average adjustment costs and with the variance of a bank's financial flows, and indirectly with the opportunity cost of expected yields on liquid financial assets.

When a bank decides to alter the level or composition of its reserves, it will not necessarily achieve the position it regards as optimal in the case of disturbing factors of no more than negligible strength¹. It may be assumed, therefore, that the stronger are these disturbing elements, especially variable costs, the less closely, *ceteris paribus*, will actual reserves match the theoretical optimum. Of course, other factors which have a bearing on the expediency of altering the composition or amount of reserves are the level and the fluctuations of yields on various financial assets, as well as the frequency of unexpected financial flows which may widen the gap between the desired and the actual position.

The failure of deposit banks in Kenya to adopt seasonal liquidity policies would seem, therefore, to have been due to the following factors:

- (a) adjustment costs;
- (b) the structure and rigidity of yields;
- (c) economies of scale²;
- (d) the rate of expansion of domestic money supply;
- (e) the possibility of freely acquiring monetary base.

¹ Disturbing factors, in this case, are two cost components:

- (a) the fixed costs largely arising from the salaries of staff responsible for devising and carrying out liquidity policies;
- (b) the variable costs due to the spread between the purchase price and the sales price of any given financial asset, to commissions and other handling charges varying with the amount of funds obtained.

² On the speed with which average unit adjustment costs diminish as a function of size see Peter A. Frost, "Banks' Demand for Excess Reserves", *op. cit.*, and Roberto Ruozi, "Le economie di scala nelle aziende di credito", *Il Risparmio*, July 1968.

The monetary authorities in Kenya require banks to determine the amount of their liquidity reserves at short intervals. Nevertheless, the inefficiency and small size of the credit market, the level and rigidity¹ of the yield structure, the characteristics of the circuit of the banks' financial flows and the small size of most banks have done much to make the liquidity policy of deposit banks in Kenya more responsive to medium-term than to short-term fluctuations.

In addition to all these factors, there is evidence of the incisive effect of the constraints placed upon the deposit banks' management and liquidity policy by the monetary authorities with a view to making sure that the public sector's financial requirements are met. But the conditions in which these policies are pursued magnify their dangers. In the circumstances of the real and the monetary sector in Kenya there is little manoeuvring space, and once the limits are overstepped privileged positions are inevitably reinforced. For these reasons there is a strong case for the monetary authorities of Kenya to adopt as soon as possible new policies for economic development.

¹ Treasury Bill yields alone fluctuate fairly strongly (See Table 47).

