

AN ECONOMETRIC ANALYSIS OF THE  
DEMAND FOR MONEY IN ZAMBIA  
1965-1984

BY

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APPROVAL

This dissertation of DAVID TUSHELENI MUSONA is approved as fulfilling part of the requirements for the award of the Master of Arts Degree in Economics at the University of Zambia.

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### DEDICATION

This work is dedicated to my parents who never tired of saving their meagre earnings for my foundation education and to my elder sister Bana Muzimu.

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## PREFACE

In Zambia, one area of principal concern for economists and policy makers is the monetary subsector. Little is known of this subsector apart from studies by Ng'andwe (1980), and Mutale (1982). This study differs from previous studies in that it will be the first econometric analysis of the demand for money in Zambia. The demand for money function occupies a central role in most theories of aggregate economic activity, especially in the formulation and execution of effective monetary policy. An attempt is made to estimate an appropriate demand for money function and to identify the variables that exert the most significant influence on the demand for money in the Zambia Economy.

The descriptive work in this study is based largely on data published by the Zambian Government and its agencies and general information available to residents in Zambia. The theoretical discussion draws heavily on published literature on supply and demand for money. The technical concepts used in this study are discussed in the context of received literature on monetary theory and practice and these include:

- a) The definition of money: a representative

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sample of definitions of money is examined and an appropriate definition of money for the Zambia economy chosen;

- b) The variables that enter the demand for money function;
- c) The various functional forms of demand for money are examined with a view to identifying its most appropriate functional form for Zambia; and
- d) The statistical stability of the demand for money function over time.

The scope of the study is confined to the post-independence era because pre-independence data are not readily available. The study period encompasses the beginning of sweeping changes in people's socio-economic expectations, in government philosophy and policies and in economic activities and institutional arrangements.

The views expressed in this dissertation and the conclusions arrived at, while they may reflect those of older scholars, are mine and I take full responsibility for them.

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Finally my wife Eunice for her patience and my sons Michael and David Jr. who never understood why I had to stay in the study-room for long hours.



ABSTRACT

The past several decades have witnessed considerable empirical research on the demand for money function due to the vital role this function plays in macroeconomic analysis especially in regard to the formation and transmission of monetary policy. Consequently demand for money functions have been empirically estimated by many researchers for a number of developed and developing countries. For example Baumol (1952), Teigen (1964), Adekunle (1968), Bhattacharya (1974) and Darrat (1985). However, the demand for money function for Zambia has not been estimated before. It is the aim of this study, therefore, to estimate an appropriate demand for money function for Zambia using annual data over the period 1965 to 1984. One of the central issues that this study addresses is whether the Zambian demand for money relationship has shifted during the period of estimation. This is important because demand for money stability is a prerequisite for an effective monetary policy. As Darrat (1985) pointed out, to predict adequately the impact of money supply changes upon real output, interest rates, and prices the underlying demand for money relationship must be temporarily stable.

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The paper is organised as follows: Chapter I is a brief review of the Zambian Economy. While Chapter II is an overview of the literature on demand for money it also lays down the theoretical foundation of our study. In Chapter III we discuss the determinants of the aggregate demand for money in Zambia. Also included in this Chapter is the specification of an appropriate demand for money function for Zambia, the empirical results and the examination of the stability property of the demand for money function.

The principal conclusions of this study are as follows:-

1. The appropriate empirical definition for money in Zambia is the M2;
2. The explanatory variables that significantly influence real demand for money in Zambia are real GDP (excluding subsistence agriculture) and real treasury bill rate;
3. Elasticity of real demand for money with respect to real GDP is greater than unity because of the upward bias induced by monetization; and
4. There is evidence that the estimated demand for money function is structurally unstable over time.

## CHAPTER I

### THE ECONOMY

#### Historical

European interest in Central Africa was first aroused by Dr. Livingstone's journeys. The extension of British influence to the areas later named Northern and Southern Rhodesia was mainly due to Cecil Rhodes, whose emissaries obtained from the Chief of the Matebele in Southern Rhodesia a mining concession which resulted in the formation of British South Africa (B.S.A) company.

In 1889 the B.S.A. Company was granted a Royal Charter, under the supervision of the British High Commissioner for South Africa, to promote trade, commerce, civilisation and good governance in the area lying immediately to the north of British Bechuanaland and to the North and West of the South Africa Republic and to the West of the Portuguese Dominions.

In 1891, in response to a request from Lewanika, the Paramount Chief of the Lozi, formal British protection was extended to the area under his rule and in 1899 the Barotseland North-Western Rhodesia Order in Council placed the B.S.A. Company's administration of the whole of the Western part of the country on a firm basis; in 1900 the North-Eastern Rhodesia Order in Council did the same for the Eastern part.

cont/.....

The establishment of the administration of the B.S.A. Company brought an end to the slave trade. Northern Rhodesia became a British Protectorate in 1924 when the charter given to the B.S.A. Company expired . In 1953, Northern Rhodesia was merged with Southern Rhodesia (now Zimbabwe) and Nyasaland (now known as Malawi) into the Central African Federation of the Rhodesia and Nyasaland, which lasted until 1963. On 24th October, 1964, Northern Rhodesia became independent as the Republic of Zambia.

#### Monetization

Before the arrival of the European and the Arab traders, the barter system was the most predominant mode of payment. However, some communities are reported to have used some form of currency. E.W. Smith and A.N. Dale (1920) in their study of the Ila speaking peoples of Zambia, then Northern Rhodesia, have reported cattle being used as a store of value and as a medium of exchange for large transactions. In some communities salt served as currency. Gouldsbury and Sheane (1911) in their study of the Great Plateau of Northern Rhodesia, have reported Calico cloth as the main medium of exchange. They noted that "... calico is to the plateau what cowrie shells are to the South Sea Islanders.....".

The British Colonial rulers introduced modern money in Zambia

cont/.....

The colonial government established the Southern Rhodesia Currency Board in 1938 to issue notes and coins for use in the three territories of Southern Rhodesia, Northern Rhodesia and Nyasaland, now Zimbabwe, Zambia and Malawi respectively.

There was a 100 per cent pound sterling backing for currency issued by the Southern Rhodesia Currency Board. The sterling counterpart of outstanding Southern Rhodesia Currency was paid into a Currency Fund which was managed by the Board in accordance with the provisions of the law, which required that a proportion of the Currency Fund, to be determined from time to time by the Board, was to be held in London in liquid form. The remainder was to be invested in:

- a) United Kingdom government securities;
- b) Securities guaranteed by the United Kingdom Government;
- c) 'Trustee investment' securities, within the meaning of the United Kingdom Trustee Act of 1925 as amended. The amount invested in these trustee securities issued by any one borrower was not to exceed 10 per cent of the value of the Currency Fund excluding the part held in a liquid form; and
- d) Gold.

cont/.....

Under an amendment in 1942, it was further specified that of the 'trustee securities' mentioned above ' the total of amounts invested in bonds and stocks issued by any of the **governments** represented on the Board, shall not exceed 10 per cent of the remainder of the Fund, that is after deducting the portion held in liquid form. (Sowelem, 1967).

From these regulations the Board, apart from gold, was not allowed to hold as cover against outstanding currency any but sterling securities issued and payable in London. This limitation was removed in 1947, when an amendment to the original Act provided that the Board, if required by any of the three governments concerned, was to invest the percentage not exceeding 20 per cent of the Fund in local registered stock issued by Southern Rhodesia, Northern Rhodesia or Nyasaland governments. Sowelem observed that, the Board throughout its lifetime did not acquire any local registered stock inspite of this amendment.

It should be noted that at various times during the colonial rule, both South African and United Kingdom currencies as well as notes issued by the local commercial banks, had been legal tender in all the three territories. Infact it was not until 1955 that the United Kingdom coin was demonetized in Zambia.

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The prohibition of fiduciary issuance meant, as Musokotwane (1985) observed, that the trends in the balance of payments, rather than decisions of the Currency Board, determined the growth in supply of the Local Currency. Therefore, the money supply was to some extent exogenous.

#### CENTRAL AFRICAN CURRENCY BOARD

The Southern Rhodesia Currency Board was replaced by the Central African Currency Board which was formed in 1953 at the time of the establishment of the Federation of Rhodesia and Nyasaland. The establishment of the Central African Currency Board was an interim measure, pending the establishment of a central bank. Sowelem reports that the Board did not issue Federal Currency Notes, instead the Southern Rhodesia Currency media continued.

#### BANK OF RHODESIA AND NYASALAND

The Bank of Rhodesia and Nyasaland was established by the Bank of Rhodesia and Nyasaland Act of 1956. It started operations on April 1, 1956, when it acquired the assets and liabilities of the Central Africa Currency Board.

The Bank became the sole note and coin issuing authority in the Federation. Sowelem observed that although the external value of the currency was not defined in the Act, infact, the currency was defined in terms of sterling-the value of one Rhodesia pound being made equal to one pound

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sterling. Under the terms of its Act, the Bank was required to maintain a minimum foreign exchange reserve consisting of gold, sterling or foreign assets convertible into gold or sterling equal to 25 per cent of its liabilities to the public. In practice, the ratio of foreign exchange reserves to total liabilities, as Sowelem noted, never fell below 80 per cent . This may imply reluctance by the monetary authorities to adjust the level of liabilities.

In order to take over Northern Rhodesia Government accounts and provide better management for the issue of notes and coins, a branch of the Bank of Rhodesia and Nyasaland was opened in Lusaka in 1961.

#### THE BANK OF ZAMBIA

In 1965, the Bank of Zambia was established by the Bank of Zambia Act of 1965. The Bank took over responsibility as the currency issuing authority from the Bank of Rhodesia and Nyasaland. Initially, currency issued by the Bank of Zambia was designated in Pound Sterling and Shillings. In January, 1968 a centesimal system was introduced on the basis of a new unit, the KWACHA (equivalent to 10 Shillings- at that time) divided into 100 minor units called NGWEE. The names which are inflexible in plural, originated from one of Zambia's leading vernacular- Chinyanja and are associated with the struggle for independence. KWACHA means "dawn" and NGWEE means "Bright".

cont/.....



The Zambian currency is not backed by gold and there are no statutory provisions which regulate the extent to which the central bank may create money. Money supply in Zambia, as Mutale (1982) observed, is principally from three sources:

- i) The balance of payments;
- ii) Bank credit to finance government budget deficits; and
- iii) Bank credit to the private sector.

It is the trend in the above mentioned factors which determine the growth in money supply, rather than decisions of the monetary authorities. Thus, money supply is to some extent exogenous.

Currency in circulation as a percentage of GDP rose from 2.6 per cent in 1965 to 6.5 per cent in 1976 and closing at 6.0 per cent in 1984. The increase in currency in circulation is indicative of monetization of the economy during the period under review. (See End Table I)

The organised money market assets have grown from about 20 per cent of GDP in 1965 to about 56 per cent of GDP in 1981. This indicates that the importance of the organised money market has grown substantially. Also worth noting is the fact that fastest growth was recorded during the seventies. (See End Table II)

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The Zambian money and capital market are still in their infancy, the major financial market instruments being in the nature of government treasury bills and stocks. Commercial banks are the principal operators in this market with other financial institutions and private individuals playing a marginal role. (See End Table III)

#### GROSS DOMESTIC PRODUCT

Over the period under study, the course of the Zambian economy, as revealed by the data on real GDP and real GDP per capita has been characterised by an uneven and inadequate growth performance as shown by graphical presentation End Table IV. Real GDP grew steadily from 1965 to 1970, thereafter, the growth has been marked by year to year fluctuations. Real GDP per capita has declined from K263 in 1965 to K219 in 1984 about 17 per cent. Some of the factors which affected the growth performance during the period include the behaviour of copper prices in the world market, the effect of weather conditions on crop harvests, the impact of stagflation in the industrial world, failure to diversify exports, the oil crisis and disruption of supply routes caused by the Rhodesian border closure and the Angolan civil war.

Throughout the period under study the Zambian economy has been monocultured, relying very heavily on the copper mining industry which accounts for over 86 per cent of export revenue in 1984 compared to 90 per cent in 1965 as shown

cont/.....

in the End Table V

This dependence on copper inspite of efforts made to restructure the economy is largely attributed to the adverse factors mentioned earlier. Efforts to restructure the economy are discussed later. This dependence on copper exports has resulted into balance of payments position being determined by copper prices and copper output. For instance, in 1969 when average cash price of copper on the London metal exchange was K1,047 per tonne, the balance of payments in 1969 recorded a surplus of K338.3 million, while in 1971, when copper price fell to K766 per tonne, the balance of payments recorded a deficit of K176.5 million.

#### MAJOR IMPORTS

During the period under study there has been significant movements in the composition of imports (See End Table VI). Machinery and transport equipment continued to be the biggest class of imports by value. Manufactured goods have dropped to the fourth position from the second position; Mineral fuels have moved into the second position from the fourth position. Chemicals have moved into the third position from the fifth position. Another interesting feature is that food has moved from sixth position into fifth position, although as per centage of total imports it has declined from 7.8 per cent in 1965 to 5.3 per cent in 1982. The dramatic movement of mineral fuels imports from

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9.7 per cent in 1965 to 20.7 per cent of total imports in 1982 is largely a result of oil price increases of the 1970's. The decline of manufactures from 23.6 per cent in 1965 to 11.8 per cent in 1982 is an indication of the growth of manufacturing capability in the Zambian economy and inadequate foreign exchange.

#### COMPOSITION OF GDP

The major components of GDP in 1965(see End Table VII) were mining and quarrying 41%, Agriculture, forestry and fishing 13.7%, wholesale and retail trade 11.3%, community, social and personal services 9%. During the period understudy, the economy underwent structural changes in which the mining and quarrying contribution to the GDP declined from 41 per cent in 1965 to 14 per cent in 1984. Thus, the mining and quarrying lost its first position to manufacturing whose contribution to the GDP in 1984 was 20.8% compared to 6.8 per cent in 1965. As can be seen the manufacturing sector's contribution to the GDP has grown by over 200 per cent . Other major components of the GDP in 1984 are community, social and personal services 16.9%, Agriculture, forestry and fishing 14.7 per cent and wholesale and retail trade 12.5 per cent. Over the period, Agriculture, forestry and fishing sector and the wholesale and retail trade sector have recorded the lowest growth rates of 7 per cent and 10 per cent respectively.

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The construction sector contribution to the GDP declined from 5.8 per cent in 1965 to 2.9 per cent 1984. One important feature of the GDP composition is that in 1965, the biggest contribution was 41 per cent while in 1984 the biggest contribution is 20.8 per cent.

#### ECONOMIC PROBLEMS

During the period under review the Zambian economy experienced four major economic problems:-

- a) Balance of payments deficits;
- b) Decline in production;
- c) Inflation; and
- d) unemployment

#### BALANCE OF PAYMENTS

Until 1970, Zambia's export surplus was sufficient to finance all its invisibles on current account. The first balance of payments deficit was recorded in 1971, a deficit of K185 million. Apart from 1974, when a small balance of payment surplus of K186.6 million was recorded, the overall balance of payments has been in deficit since 1971.

Factors which adversely affected the balance of payments include:-

- i) Low copper prices;
- ii) The Rhodesian border closure in 1973 resulting in transport bottlenecks

- iii) The Angolan Civil War; resulting in the interruptions of routes to the Atlantic Ocean ports
- iv) The instability in the international monetary system;
- v) The oil crisis;
- vi) The stagflation in the developed countries; and
- vii) Failure to diversify exports.

Efforts have been made to solve the problems of balance of payments deficit, these include;

- i) Import restrictions; mainly through strict import licencing
- ii) Devaluation of the kwacha, for example, the kwacha was devalued by 20 per cent in July, 1976, with a hope to increase the competitiveness of exports and also encourage import substitution;
- iii) Standard International Monetary Fund package of stringent economic reforms and structural adjustment programmes; and
- iv) The diversification of the export base through the promotion of non-traditional exports.

The persistence of the balance of payments deficits is a proof that the measures discussed above have not been successful. It may be interesting to note that Zambia has been under the IMF stabilisation programme since 1976. Policy pronouncement of the diversification of the export base have not been backed with appropriate investments into the non-traditional exports. Hence,

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these policies have been ineffective (See End Table viii)

### Decline in Production

The performance of the major sectors of the economy, namely, mining, agriculture and manufacturing, was disappointing. The actual growth rates in these sectors fell short of the planned targets.

Copper production which predominates the mining industry rose from 684,000 tonnes in 1965 to 712,900 tonnes in 1976. Thereafter, it has declined to an average of 550,000 tonnes during the 1980-84 period. The decline in the copper output was due to the depletion of some existing mines, the high rates of turnover among managerial, technical and supervisory staff, and transportation difficulties caused by the Rhodesian border closure in 1973 and the Angolan civil war.

The establishment of the school of Mines at the University of Zambia and the introduction of mining courses at the Zambia Institute of Technology was intended to provided the mines with managerial, technical and supervisory staff. The construction of the Zambia Tanzania Railway (TAZARA) was an effort to solve the transportation problem. However, these measures appear to have been not very successful in stoping the decline in production.

The agricultural sector had grown at an average annual rate of 1.8 per cent between 1965 and 1970. Between 1971 and 1976, the growth rate was 3.6 per cent as compared with the target of

cont/.....

5-6 per cent. Between 1980 and 1984 the average annual growth rate of the sector has declined to 1.5 per cent as compared to the planned annual growth rate of 5.5 per cent. The major problems experienced in the sector included inadequate rainfall, low investments and inadequate skilled manpower. Measures were taken to adopt investment and production programmes and provision of agricultural credit with a view to increasing production. Education and training facilities have been expanded and measures have been taken to improve quality.

The average annual growth rate of the manufacturing sector was 4.9 per cent between 1965 and 1970. While the growth rate between 1971 and 1976 was 4.5 % its planned annual rate was 14.7%. Between 1980 and 1984 the growth rate was 1.7 per cent per year as against the planned growth of 8 per cent. The major problems include heavy dependence on imported raw materials, as a result the performance of manufacturing sector is linked to the vagaries of the country's balance of payments and inadequate foreign exchange causing low capacity utilisation.

### Inflation

Prices of consumer goods for high and low income groups had risen at average annual rates of 5.5 per cent and 6.5 per cent respectively during the period 1965-70. In 1976, there was an acceleration of price increase, prices of consumer goods rose by 16.7 per cent for the high income group and 19.3 per cent

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for the low income group. In 1984, average inflation for both groups was 20 per cent. Over the study period 1965-84) average inflation was 10 per cent per annum.

### Unemployment

Formal employment has been adversely affected by the low tempo of investment activity in the economy and the scant attention given to adoption of labour- intensive techniques even where choice was available. In 1967, formal employment was 312,050. Although this indicates an increase of 17 per cent, it is misleading because throughout the period understudy, formal employment targets have never been achieved. For instance, between 1980 and 1984 formal employment declined from 381,490 at the end of June, 1980 to 365,190 at the end of June, 1984, a decline of 4 per cent. If unemployment statistics were available our point would have been much more clear. However, it is common knowledge that unemployment figure exceeded one million during the period understudy.

Efforts made to solve the problem of balance of payments deficit discussed earlier were also intended to solve the problems of decline in production, inflation and unemployment. Unfortunately the efforts were not successful.

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## CHAPTER II

### THE DEMAND FOR MONEY: AN OVERVIEW

#### The Definition of Money

What is money? Honor Croome (1965) defines money as "... that particular kind of asset which can, because of its universal acceptability, be immediately used in order to settle... debts-whether these are debts in the usual sense of outstanding obligations, or the 'debt' incurred and wiped out, in a single over-the-counter purchase". Croome emphasized that for an asset to qualify as money it ought to be acceptable, by any seller or other creditor, immediately, without any delay for ascertaining market values, realizing them, or checking on credit-worthiness. Besides, there is voluminous literature on the empirical definition of money. For example, Harry G. Johnson (1972), Boris P. Pesek and Thomas R. Saving (1967) and Milton Friedman and Anna Schwartz (1970).

Milton Friedman and Anna Schwartz (1970) discussed four alternatives namely;

- i)  $M1 = \text{Currency} + \text{demand deposits};$
- ii)  $M2 = M1 + \text{time deposits};$
- iii)  $M3 = M1 + \text{deposits at mutual savings banks and post office; and}$
- iv)  $M4 = M1 + M2 + M3 + \text{Loan shares} + \text{savings}.$

cont/.....

Each of these had some claim to be designated the money stock.

Writers who have tried to formulate the definition of money on a priori grounds have generally stressed either the medium of exchange function or the liquidity. An attempt is made to determine which assets are used to effect transactions and classifies these and only these as money. The liquidity approach classifies assets by degree of liquidity. One dimension often stressed in discussions of liquidity is the ability to sell an asset on demand for a nominal sum fixed in advance, by this measure, currency is considered perfectly liquid. Milton Friedman and Anna Schwartz (1970) argue that both these approaches offer uncertain guide to the classification of assets into those that serve as a medium of exchange and those that do not or draw a line between assets that can be termed non-liquid or liquid. They concluded that "... the definition of money is an issue to be decided not on ground of principle as in the priori approach, but on grounds of usefulness in organizing our knowledge of economic relationships. There is no hard and fast formula for deciding what total to call money".

Milton Friedman and Anna Schwartz (1970) define money as M2 above. Their decision is based on a study which indicated that M2 was a more homogeneous magnitude to holders in the United States

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both for the century 1867-1968 as a whole and for distinctive short periods within the century, than the other monetary totals. Money has four specific functions, each of which obviates one of the difficulties of pure barter. These functions are to serve as:

1. A unit of value: The monetary unit serves as the unit in terms of which the value of all goods and services is measured and expressed. Under pure barter there is lack of any common unit in terms of which to measure and state the values of goods and services;
2. A medium of exchange : This function of money is served by anything that is generally accepted by people in exchange for goods and services, the only essential requirement being that people in general be willing to accept it in exchange for their goods and services. Whereas under pure barter there is need for a double coincidence of wants, that is, an individual who has something to exchange needs to search out for someone who both wants what he has and offers what he wants in exchange;
3. A standard of deferred payments: As soon as money comes into general use as a unit of value and a

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cont/.....

medium of payments, it almost inevitably becomes the unit in terms of which deferred or future payments are stated . Under pure barter there is lack of any satisfactory unit in terms of which to write contracts requiring future payments; and

4. A store of value: As soon as money comes to be used as a unit of value and as a generally acceptable means of payment, also becomes a popular store of value. Whereas, under pure barter there is the lack of any method of storing generalized purchasing power.

#### The Demand for Money

The demand for money is defined as the demand to hold money and, by holding money we mean showing a preference for money over other assets. There are three main motives for holding money as distinguished by Lord Keynes (1965):

- i) The transactions motive. A household requires money with which to pay for food, clothing, rent etc., while a business firm requires money for the payment of wages, the purchase of raw materials, etc. This reason for holding money is called the transactions motive by Keynes.

cont/.....

- ii) The Precautionary Motive. Both households and business firms hold money in reserve as a precaution against unforeseen contingencies. This is the precautionary motive for holding money.
- iii) The Speculative Motive. If money is held in excess of the amount required for either of the two purposes just considered it is held in preference to being invested. This is the speculative motive for holding money.

Keyne's liquidity preference theory signifying the demand for money to act as a medium of exchange and unit of account is a remarkable refinement of the classical theory. Keynesian theory suggests three fundamental psychological motives, viz; transactions, precautionary and speculative motives as being determinants for community's preference for cash to other relatively illiquid assets. Transactions motive implies that money is demanded by an economic unit to conduct day-to-day transactions smoothly, conveniently and comfortably. The precautionary motive signifies the demand for money to meet unforeseen contingencies including sickness, unemployment and other hazards of life. Both these motives are positively correlated with the level of aggregate economic activity (income) and are non-responsive to changes in rate of interest. The speculative motive is the demand for money for capital gains and is primarily an inverse function of the rate of interest.

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### Determinants of the Demand for Money

The invention of money removed the complexities and difficulties associated with the barter system by performing such functions as unit of value, a medium of exchange, a standard of deferred payments and store of value. Highlighting the importance of money, R.S. Thorn (1976) remarks that without money and its attendant financial institutions, the modern industrial society that we know could not have come to being. Money is the cement that binds the modern capitalist economic system together.

Tarlok Singh (1984) states that the exchange function and asset function performed by money act as a magnetic power for the people to demand it.

The quantity theory of money propounded by David Ricardo, J.S. Mill, Irving Fisher, etc, emphasizing on the means of exchange function of money, reveals that the level of income is the only determinant of the demand for money. Fisher's fundamental equation of exchange in the form of  $MV=PT$ , signifies that the whole money demand (MV) is utilized to satisfy consumption requirements. In this equation M, V, P, and T stand for stock of money, velocity of circulation of money, general price level and the total number of transactions, respectively.

cont/.....

The Cambridge or neo-classical economists including notably Marshall, Robertson, Pigou, Keynes, etc., concentrated on the fraction of GNP that people hold in the form of money ( $k = \frac{1}{v}$ ), rather than concentrating on the rate of turnover of a given stock of money during the year. They also concluded that the demand for money is mainly conditioned by the level of income. The fundamental equation of exchange given by the Cambridge Cash Balance approach i.e.,  $M = KPY$ , reveals that the amount of money demanded by an economic unit to satisfy day to day requirements depends upon the level of nominal money income.

Singh (1984) states that there are two main reasons accounting for the increase in the demand for idle inactive money balances with the fall in the rate of interest in any given state of expectation. Firstly, every fall in the rate of interest strengthens the expectations about the future rise in the rate. Consequently, the potential capital loss involved in holding bonds becomes more obvious which, sometimes, may affect the current earnings to be obtained from the purchase of bonds. Secondly, every fall in rate of interest widens the gap between the market rate of interest and normal rate of interest being determined by the average opinion, thereby increasing the risk of holding bonds. Keynes further suggested that at some low positive rate of interest, the demand for money becomes perfectly elastic and the system finds itself in a liquidity trap. Conversely,

cont/.....



with every increase in the interest rate, the greater is the possibility of capital gains and lower the risk of holding bonds, and hence the smaller is the amount of money demanded by the members of the society.

Based on Keynesian transactions demand for money, Baumol (1952) and Tobin (1956) developed independently theories which give rise to consistent and identical results. The logic of their theories is that, given the transaction cost, both explicit and implicit incurred in converting earning assets into money an economic unit would invest some portion of his income in government bonds and securities to realise the maximum interest income. Baumol observed that the amount invested initially in Government bonds and securities will differ depending upon the number of transactions the economic unit wishes to conduct.

It may be concluded that since the transactions demand for money is negatively correlated with the changes in the interest rate, above a certain level, it is therefore, not merely a function of the level of income but also an inverse function of the rate of interest.

Tobin, (1956) modifying the Keynesian approach in his portfolio Balance Theory, has visualised the asset demand for money as a problem of capital theory. Tobin's analytical framework, which

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relies mainly on the attitude towards risk rather than expectations, suggests that in the world of uncertainty people hold diversified portfolios so as to mitigate the risk. A general rise in the interest rate may cause readjustment in the portfolio selection in favour of bond holdings on account of the reduction in risk. The reverse will also be true if the rate of interest and hence asset yield happen to experience a downward shift.

Sprenkle C.M. (1972) criticized the transactions demand models of Baumol and Tobin. He argued that these models are incapable of explaining either the theoretical or the actual cash holdings of large economic units in the United States. Sprenkle argued that the theoretical inadequacies arise primarily from the assumption that all economic units have one centralized deposit or account, whereas in fact multiple accounts are the rule. He maintained that until more is known of the nature and number of multiple accounts, no transactions demand model will be useful.

Sprenkle believes that the inadequacies of the models in explaining actual cash holdings are further compounded by the fact that cash holdings of large economic units in the United States have little if anything to do with transactions motives at all, but rather reflect the institutional detail that bank services are paid for by compensating balances rather than fees. Actual cash holdings thus reflect payments for bank services

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rather than transactions needs.

However, Sprenkle acknowledged that the Baumol-Tobin models may be much more applicable to the United Kingdom. In the UK, banks are paid by fees rather than by compensating balances and, because of geography, along with the existence of a branch rather than a unit banking system, cash management is much more centralized than in the United States. Thus, the number of accounts and balances held by a large UK firm is likely to be very small compared with a number held by a same size United States firm. Also, in the UK no accounts are held to compensate banks. In addition, Sprenkle believes that the attribution of actual cash holdings as being for transactions purposes depends for any country on the non-existence of precautionary and speculative motives. He argues that the lack of a speculative demand by large firms needs no justification because of the existence of a wide array of near-money, short-term assets available in both UK and the United States. The precautionary motive may not be non-existent but should be very small in both countries and probably smaller in the UK than in the United States because of the availability of automatic overdraft arrangements. Sprenkle concludes that, considered in toto, the Baumol-Tobin models might be presumed to fit the UK situation very closely.

Milton Friedman (1956) reformulating the traditional quantity theory, pointed out that money is demanded because of its utility like any other consumption goods. He distinguished

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between ultimate wealth holders who demand money as a part of their portfolio and business firms who demand money as a means of production. Since current income is subject to erratic year-to-year fluctuations, therefore, he used the concept of permanent income as a proxy for wealth. Friedman concludes that the rate of interest is not as influential as the real permanent income and the fraction of income derived from property in determining the demand for money.

Tarlock Singh(1984) believes that besides the income and the rate of interest, there are certain other factors which may also significantly influence the demand for money. These factors are wealth of the community, the ease and certainty of securing credit, expectation as to future income receipts and prices, the nature and variety of substitute assets, the system of payments in the community and the extent of social security measures. The demand for money increases as the wealth of a community increases, therefore, wealth of a community is positively correlated with the demand for money. The ease and certainty of securing credit reduces the demand for money, therefore, it is negatively correlated with the demand for money. When future income receipts are expected to be irregular and prices to be stable, there is a positive correlation with the demand for money. If the future income receipts are expected to be regular and prices to rise rapidly, there is a negative correlation with the demand for money. The demand for money is negatively correlated with the increase in the number of substitute assets. The demand for money by households would be higher where salaries and wages are paid on monthly basis compared to a situation where salaries and wages

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are paid on weekly basis. Generally, improvement in social security has a negative correlation with the demand for money.

Bronfenbrenner and Mayer (1960) estimated the separate effects of wealth and interest rates along with the income and lagged money balances. Their results showed that interest rate, income and lagged money balances are statistically significant by the usual tests, but the wealth variable is non-significant. Empirical studies that support the role of interest rates in the long-term demand function for money, notably Latane's (1954) are based on the use of income and not wealth as a constraint on money balances. Thus the role of interest rates in a demand for money function that takes wealth as a constraint, like the measurement procedure for wealth itself, remains an open empirical question. (Bronfenbrenner and Mayer, 1960).

#### CHOICE OF THE RATE OF INTEREST

There is voluminous literature on the influence of various interest rates on the demand for money. However, opinions vary widely as to which interest rate or subset of alternative interest rates is a relevant determinant of the demand for money. Eisner (1963) and Latane (1954) prefer an interest rate on long-term bonds, since Keynesian economics links the long rate to investment and income through the demand for and supply of money. Brunner and Meltzer (1964 and Hamburger

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(1966) argue that the demand for money should be treated in a theory of broader portfolio selection and suggest that the demand for money depends on the yield on equities as well as on bonds. Bronfenbrenner and Mayer (1960), Teigen (1964), Heller (1965), and Laidler (1966) on the other hand, argue that the demand for money is a function of a short-term interest rate, because the short rate indicates the opportunity cost of holding money in place of close substitutes. Gurley and Shaw (1955) argue that liquid assets such as savings deposits at non bank financial institutions are closer substitutes for money and, therefore, that the demand for money depends on interest rate on non bank intermediary liabilities.

T. H. Lee (1967) argues that the demand for money is theoretically a function of a whole spectrum of interest rates and the principal issue is an empirical one: which interest rate approximates 'the' rate of interest and exerts the most significant influence on the demand for money? Lee believes that the yield on non bank intermediary liabilities is the most significant interest rate variable in affecting the demand for money. However it has been stated By Laidler (1966) that the movements of various interest rates are related to one another, therefore, one would expect almost any rate chosen at random to show some relationship to cash balances.

#### THE DEMAND FOR MONEY AND INFLATIONARY EXPECTATION

Inflation as an explanatory variable reflecting the opportunity cost of holding money has been discussed by several writers including Contogiannis and Shahi (1982), Khan (1977), and

Stadler (1981). Generally they all agree that increases in the price level appear to have a distinct negative effect on money balances.

Contogiannis and Shahi (1982) in their study of the demand for money and inflationary expectations in South Africa, introduced price expectations in the form of adaptive expectations.

They specified the demand for money as:

$$M_t = a + b Y_t + c P_t^* + U_t \quad (1)$$

Where M is the actual money stock, Y is real income and  $P^*$  denotes the expected price variable. The subscript t denotes the time and U the disturbance term. They assumed that price expectations are governed by an adaptive process of the form:

$$P_t^* - P_{t-1}^* = S(P_t - P_{t-1}^*) \quad (2)$$

$$0 \leq S \leq 1$$

Where S is the coefficient of price expectations which represents the speed with which expectations regarding the change in prices are revised; its inverse represents the average length of time by which such expectations of prices changes lag behind actual price changes. Based on the above , they derived the following estimating equation:-

$$M = a S + b Y_t - b(1-S) Y_{t-1} + c S P_t + (1-S) M_{t-1} + U_t \quad (3)$$

Contogiannis and Shahi (1982) observed that the above estimating equation has five estimators and four parameters and therefore the equation is over-identified. They suggested that a constrained non-linear estimation technique should be used in order to obtain unique estimates of the parameters. They also recognized that in addition to the lag in expectations specified in (2) there may

be a lag in the adjustment of actual money balances to the money demand. Arising from costs, inertia, disequilibrium in the money market etc., money holders will usually delay adjustments of their actual money balances to their "desired" level. They assumed that money holders adjust their actual money balances by a fixed proportion  $r$ , i.e.,

$$M_t - M_{t-1} = r(M_t^* - M_{t-1}) \quad (4)$$

$$0 < r < 1$$

Where  $r$  is the coefficient of adjustment. Therefore, (1) should be written as:

$$M_t^* = a + b Y_t + c p_t^* + U_t \quad (5)$$

and combining (2), (4) and (5) they derived the following equation:

$$M_t = a r S + b r Y_t - b r (1-S) Y_{t-1} + C r S P_t + (2-r-S)M_{t-1} - (1-r) (1-S) M_{t-2} + V_t \quad (6)$$

Equation (6) has six estimators and five parameters, consequently, a constrained non-linear estimation technique was proposed.

Contogiannis and Shahi also specified a more general model where an adaptive expectations mechanism was introduced for income. For simplicity, they assumed the same coefficient of expectations with respect to prices and income. Thus,

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$$M_t^* = a + b Y_t^* + c P_t^* + U_t \quad (7)$$

$$Y_t^* - Y_{t-1}^* = S(Y_t^* - Y_{t-1}^*) \quad (8)$$

$$P_t^* - P_{t-1}^* = S(P_t^* - P_{t-1}^*) \quad (8a)$$

$$M_t - M_{t-1} = r(M_t^* - M_{t-1}^*) \quad (8b)$$

Substituting successively (8) and (8a) into (7) and the resulting expression into (8b) and applying a Koyck transformation, they derived the following equation:

$$M_t = a r S + b r S Y_t + c r S P_t + (2-r-S)M_{t-1} - (1-r)(1-S)M_{t-2} + W_t \quad (9)$$

They recommended that this model requires a non-linear estimation technique.

The above models were estimated for the period 1965-1980. Two definitions of money were used: a narrow definition of the money stock M1 consisting of currency and demand deposits held by the public, and a broad definition of money M2 consisting of money and near-money. The price level employed was represented by the consumer price index; the income variable was the GDP at factor cost. In all regressions the money stock and the income variable were deflated by the consumer price index. The regressions were run in logarithmic terms. The results indicated that the expected change in prices is a significant variable in the demand for money function. The estimated price elasticity was -0.5. The coefficient of price expectations was close to unity for the M1 definition of money

Applying the Cagan (1956) formulation, the expected rate of inflation is revised per period of time in proportion to the difference between the actual rate of inflation and the rate of inflation that was expected to prevail in period  $t$ :

$$D\pi^e(t) = n(\pi(t) - \pi^e(t)) \quad (2)$$

Where  $\pi(t)$  is the actual rate of inflation, and  $D$  is a differential operator,  $D = \frac{d}{dt}$ . The coefficient of expectation,  $n$ , is expected to be positive.

Khan explicitly allowed for the variation in  $n$  by specifying a function of the form:

$$n(t) = \mu + B/\pi(t) \quad (3)$$

Where  $n$  is a linear function of the absolute rate of inflation. Substituting equation 3 into 2, Khan derived the following equation:

$$D\pi^e(t) = \mu(\pi(t) - \pi^e(t)) + B/\pi(t)(\pi(t) - \pi^e(t)) \quad (4)$$

Expected real per capita income is assumed to be generated by adaptive expectations as follows:

$$D \log Y^e(t) = r(\log Y(t) - \log Y^e(t)) \quad (5)$$

$r > 0$

Where  $y(t)$  is the actual real per capita income.

Substituting equation (2), (4) and (5) into equation (1) and eliminating the unobservable,  $\pi^e(t)$  and  $\log Y^e(t)$ , Khan obtained a second -order differential equation for real per capita money balances:

cont/.....

$$\begin{aligned}
 D^2 \log m(t) = & \mu r a_0 + B r a_0 / \pi(t) / + \mu + B / \pi(t) / (a_1 \pi(t) \\
 & + r a_1 \pi(t) + r a_2 D \log Y(t) + \mu + B / \pi(t) / ) \\
 & r \log y(t) - (\mu + B / \pi(t) / + r) D \log m(t) \\
 & - \mu + B / \pi(t) / r \log m(t) + W(t)
 \end{aligned} \tag{6}$$

Where  $w(t) = (D + \mu + B / \pi(t) /) (D + r) U(t)$

In order to estimate equation (6) using discrete data, Khan used approximations as were discussed by Sargan (1974) and Wymer (1972). The application result in a second-order difference equation:

$$\begin{aligned}
 \Delta^2 \log m_t = & \mu r a_0 + B r a_0 A \pi_t / + (\mu + B / A \pi_t /) (a_1 A \pi_t + r a_1 A \pi_t) \\
 & + r a_2 \Delta \log Y_t + (\mu + B / A \pi_t /) r a_2 A \log Y_t \\
 & - (\mu + B / A \pi_t / + r) \Delta A \log m_t \\
 & - (\mu + B / A \pi_t /) r A^2 \log m_t + w^* t
 \end{aligned} \tag{7}$$

Where  $\Delta = 1 - L$ ,  $A = \frac{1}{2} (1 + L)$

$W^*$  is an error term which contains the model errors and the errors of approximation.

$L$  is a log-operator,  $Lx_t = x_{t-1}$

Khan noted that the values of the estimated parameters showed that both the expected rate of inflation and expected real per capita income exert significant effects on the holdings of real balances. The average lags in the adjustment of expected income to actual are reported to be generally very short, while those in the adjustment of expected inflation to current inflation are reported to be longer- ranging from less than one quarter to a maximum of slightly over five quarters.

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THE DEMAND FOR MONEY FUNCTION

Several writers have written on the demand for money function: These include Friedman M (1956), Laidler (1966), Lee (1967) and Bhattacharya (1974).

T H Lee (1967) specifies the demand function as:-

$$M = f (Y_p, r) \quad (1)$$

Where  $Y_p$  is per capita real permanent income, M denotes per capita money stock in real terms for the traditional concept of money and r represents a vector of interest rate differentials between yields on other assets and the yield on money. The yield on traditionally defined money is derived as the weighted average of rates of return on demand deposits. The price deflator employed for real variables is current price rather than permanent price. This static model can be cast into a dynamic stock adjustment model of Chow (1966) and Teigen (1964) varieties by introducing a lagged dependent variable  $M_{-1}$  as:-

$$M = g(Y_p, r, M_{-1}) \quad (2)$$

The above model, is a variation of Friedman's permanent income formulation. The foregoing demand functions (1) and (2) for the traditional concept of money can be adjusted for Friedman's concept of money. For this purpose money defined to include time deposits,  $M_T$ , is substituted for M for the current and lagged variables whereas interest rate differentials between yields on other assets and the yield on money so defined,

cont/.....

$r_T$ , is substituted for  $r$ . The yield on money defined, to include time deposits is measured by the weighted average of rates of return on time deposits, demand deposits and currency.

D. Laidler (1966) specifies the demand for money function as:

$$M_d = F \left[ Y_P, \int_{-\infty}^t (Y_T - C_T), r \right] \quad (3)$$

$$M_d = F \left[ \int_{-\infty}^t (1-k) Y_P, \int_{-\infty}^t (Y_T - C_T), r \right] \quad (4)$$

$$M_d = g(Y_P, r) \quad (5)$$

$$M_d = G(Y, r) \quad (6)$$

Where:

$M_d$  = quantity of money demanded

$Y_P$  = Permanent income

$Y_T$  = Transitory income

$Y$  = Measured income

$r$  = Rate of interest

$k$  = Propensity to consume out of permanent income

$C_T$  = Transitory consumption

Equation (3) is based on the following foundations. Permanent income is usually regarded as a proxy for the sum of human and non-human wealth. Thus, it is a plausible hypothesis that the demand for money, this being an asset, might be related to the total size of the wealth portfolio. Permanent income is also

well established as a determinant of consumption so that an alternative interpretation of its role here is as a transactions proxy. It follows from the relationship between permanent income and permanent consumption as a matter of arithmetic that transitory income and negative transitory consumption must be added to assets. This hypothesis states transitory income and negative transitory consumption are added to money balances, so that their level at any time will depend upon all past levels of these transitory components. Thus it is necessary to include their integral rather than their levels, in the demand function.

Equation (4) has much in common with equation (3), it represents a variant of the hypothesis that the demand for money depends upon the level of non-human wealth. Non-human wealth is accumulated savings. Given that saving is equal as a matter of definition to income minus consumption, and given that permanent consumption is a constant fraction  $k$  of permanent income the formulation of the non-human wealth hypothesis included in equation (4) follows immediately.

Equation (5) is essentially that employed by Friedman (1959), but it does include an interest rate variable.

The reader will observe that function number (6) is the demand for money equation commonly found in many macroeconomics textbooks.

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While discussing the resurgence of the quantity theory, Thomas (1982) stated that Friedman (1956) analysis of the demand for money is within the same general framework used by economists to study demand for other goods and services. This suggests that the demand for money should be related to income, the cost of holding money, and the utility associated with the services of money balances, as determined by tastes or preferences. Consequently, Friedman formulated a general demand function for money balances as:

$$M_d = f \left[ Y, r, r, \left( \frac{\Delta P}{P} \right)^e, h, u \right]$$

money balances

Y = real or actual money

r = real

Y = long-run average income

r = return on bonds and other fixed-income assets or deposits.

h = return on equities such as

including both dividends and

capital gains.

$\left( \frac{\Delta P}{P} \right)^e$  = The expected rate of inflation

h = The ratio of human wealth to total wealth (i.e., the fraction of total wealth held in the form of human capital)

u = Tastes or preferences.

Instead of the dependent variable  $M_d/p$  it is possible to place the price level among the independent variables on the right-hand side of equation and make  $M_d$ , the demand for nominal money balances, the dependent variable. However, it is usually assumed (Thomas, 1982) that the demand for nominal money balances varies in exact proportion to the level of prices, that is,  $M_d$  is assumed to exhibit unitary elasticity with respect to  $P$ . Thus, Friedman makes his dependent variable the demand for real balances,  $M_d/p$ , and does not include the price level on the right hand side of the equation.

Friedman states that the demand for real money balances depends on the level of permanent income. The higher the level of permanent income, the greater will be the demand for real money balances with which to finance expenditures.

The parameters,  $r_b$ ,  $r_c$ ,  $\left(\frac{A_p}{P}\right)^e$  are indicators of the opportunity cost of holding money. Therefore, the magnitude of the demand for real money balances is related inversely to each of the three variables.

The ratio of human wealth to total wealth  $h$  represents a substitution of human wealth for non human wealth. Society increases its demand for real money balances as  $h$  increases. But Thomas(1982) observed that this variable is unlikely to exert much short-run impact on demand for money, although, it may exert some gradual influence over a long period of time.

The term,  $u$ , is an inclusive one which summarizes the subjective preferences associated with the holding of money.

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Bhattacharya (1974) specifies the demand for money function as:-

$$M = f(MY^d, r, NW_{-1})$$

Where  $MY^d$  is monetized disposable income;  $r$  is short-term interest rate of organised money market;  $NW_{-1}$  is lagged networth of private sector which includes money supply, time deposits; Government securities and capital stock with the private sector.

Bhattacharya's complete model is as follows:

$$MPC = f(MY^d, NW_{-1})$$

$$MPI = f(MY, r^t, MPI_{-1})$$

$$MY = MPC + MPI + EN$$

$$MY^d = MY - TT + TR$$

$$TT = f(MY, t)$$

$$r^t = f(r, r_{-1}^t)$$

Where, MPC is monetised private consumption, MPI is monetized private investment, MY is monetized net domestic product at market prices,  $r^t$  is long term interest rate, EN is autonomous expenditure which includes Government expenditures and exports minus imports, TT is net tax receipts, TR is net transfers from Government and corporate sectors to household sectors and  $t$  is time trend.

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## THE DEMAND FOR MONEY IN THE LESS DEVELOPED COUNTRIES

A considerable amount of research has been done on the behaviour of the demand for money in those types of economies commonly referred to as less developed. Usually four issues are discussed namely: the role of income, interest rate, inflation and stability of the function. Among researchers who have written on demand for money in the LDC's include; Adekunle (1968, 1968,) Crockett and Evans (1980), Darrat (1985), Balino (1977), and Singh (1984).

Adekunle has done several studies on the behaviour of the demand for money in the less developed countries. Because of the path breaking nature of these studies we propose to review two of them.

In his doctoral dissertation Adekunle (1968 b) set out to examine;

- a) The differences in behaviour in the monetary sector between developed and less developed economies
- b) Whether the functional form for the demand for money differs between developed and less developed economies.

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- c) Whether theoretical relationships developed to explain monetary behaviour, and conclusions and opinions based on the interpretation of monetary experience in the developed economies are applicable to the less developed economies.

The empirical hypotheses tested include the following:-

1. In developed and less developed economies, the demand for money is a predictable function of a limited number of variables;
2. The form of the demand for money function differs for broadly defined groups of countries;
  - a) The expected variables are more appropriate in the sense that expectations are less static in the demand relationship of the developed than in that of the less developed group of countries;
  - b) The income elasticity of the demand for money is positive; a stronger (liquid) asset motive makes for higher income elasticities in less developed than in developed countries;
  - c) Opportunity costs of holding money involving real assets are more important in the less developed group of countries; and

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- d) In the developed group of countries all substitution effects can be subsumed under those of financial assets.

Three demand for money functions implying different specifications about the formation of expectations were estimated as models I, II and III:

Model I

$$M_t = a + b_1 Y_t + b_2 r_t + b_3 \left( \frac{dp}{dt} \right) + u_t$$

Where:

$M_t$  = The private demand for real balances

$Y_t$  = Current income

$r_t$  = Current interest rate

$\frac{dp}{dt}$  = Current rate of change in prices

$U$  = Disturbance term

Income and price expectation elasticities are assumed to be static.

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Model II

$$M_t = a + b_1 Y_t + b_2 r_t + b_3 \left( \frac{dp}{dt} \right)^e + v_t$$

$$\text{Where } \left( \frac{dp}{dt} \right)^e = \lambda_2 \left[ \frac{dp}{dt} + (1-\lambda_2) \frac{dp}{dt}^{t-1} + \dots + (1-\lambda_2)^n \frac{dp}{dt}^{t-n} + \dots \right]$$

Assuming that desired balances are related to current and not to expected real income.

$$\text{Where } v_t = u_t + d_1 u_{t-1} + d_2 u_{t-2}$$

Model III

$$M_t = a + b_1 Y_t^e + b_2 r_t + b_3 \left( \frac{dp}{dt} \right)^e + v_t$$

$$\text{Where } Y_t^e = \lambda_1 \left[ Y_t + (1-\lambda_1) Y_{t-1} + \dots + (1-\lambda_1)^n Y_{t-n} + \dots \right]$$

$$\text{and } \left( \frac{dp}{dt} \right)^e = \lambda_2 \left[ \frac{dp}{dt} + (1-\lambda_2) \frac{dp}{dt}^{t-1} + \dots + (1-\lambda_2)^n \frac{dp}{dt}^{t-n} + \dots \right]$$

Adekunle used adaptive expectation model because it is believed notably, by Feige (1967) that expectations play an important role in explaining behaviour in the monetary sector.

The 18 countries studied were grouped into three economic environments- industrial, other developed and less developed. Adekunle's findings suggest that there is basis for generalisations about desired money holdings, although, he found differences in the form of the demand for money function that can be appropriately applied to each economic environment. For example, the lag in expectation formation in the monetary sector was found to be shorter in the less developed group. This finding implies that income expectations are static in the less developed countries which suggests that money balances should appropriately be related to current real income or rationalized on the basis of the cont/.....

transactions motive. The longer lag in income expectation formation in the developed countries suggests that expected income or wealth is the appropriate variable in the demand for money function for the developed countries.

He also found that in the developed countries desired real money balances were related to interest rates. In the less developed countries they were related to interest rates, expected rates of change in prices and current income. Adekunle emphasised that special variants of the general relationship that are applicable to the alternative types of environment may not appropriately be based on empirical observations of behaviour in the other type. Further, he stated that in the developed countries price movements do not seem to play a significant role in explaining money holdings, but in the less developed countries they do. Thus, in the latter economic environment, changes in current rates of inflation not only tend to lead to adjustments in desired balances but also are more important in the formation of expectations about the future behaviour of the price level.

In another study Adekunle (1968a) examined some of the factors determining the demand for money in both developed and less developed countries. Using a sample of nine countries which include three less developed countries- India, Pakistan and Sri Lanka. Two questions were examined:

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1. The stability of, and the factors determining, the demand for money, with particular reference to real income and interest rates; and
2. The range of of assets which should properly be encompassed by the term "money" i.e., is the stock of "Money" as conventionally defined, or is the stock of money plus quasi-money the more important magnitude for economic analysis.

Adekunle modified Friedman's demand for money function by taking  $r$  to represent the yields on all money substitutes. Thus, reducing Friedman's function to:

$$\frac{M}{P} = f \left( r, \frac{Y}{P}, U \right)$$

Adekunle observed that an estimate of the functional relations with the same value for prices on both sides of the equation may lead to biased results if there are measurement errors in  $P$ . He; therefore, introduced  $P$  directly as a separate independent variable as:

$$M = f ( r, p, Y, U, )$$

For computational purposes this relation was examined in the form:

$$M = a + br + cP + dY + U$$

cont.....

In addition the coefficients for the equation:

$$\Delta M = a + b (\Delta r) + c (\Delta P) + d (\Delta Y) + U$$

were estimated.

The results of the estimates of the demand for total money balances were quite satisfactory.

Because of multicollinearity and the consequent biased standard errors, Adekunle was unable to perform precise tests to determine whether the M1 and M2 elasticities differ statistically. However, he noted by inspection that, of the seven cases where the income variable was significant in both functions, the income elasticity of M2 was larger than that of M1 in five instances. He also found that; except for the income coefficient of the M1 equation for Australia and the interest rate coefficient of the M2 function for Sweden, the signs of the coefficients were the expected ones. The only cases where the income variables did not meet the significance test were in the M1 functions for Australia and South Africa. The interest rate coefficient met the significance test for Australia (M1 and M2), Netherlands (M1), New Zealand (M2), Sweden (M1) and Switzerland (M1 and M2).

In all cases, except Sweden (M2), the signs of the interest rate coefficients were those that should be expected. In every country, except Sri Lanka the results derived from the models incorporating interest rates were **superior to those derived from the alternative models excluding the interest rate coefficient**. However, for all the less developed countries and for South Africa the interest rate was found to be an insignificant factor in determining the demand for money.

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on the stability of the demand for money function;

Adekunle found that the hypothesis that the demand for money is a stable factor supportable at the 99 per cent level of significance for Australia, Sri Lanka, New Zealand, Sweden and South Africa, while it was supported at the 95 per cent level for the Netherlands. But for India, Pakistan and Switzerland the evidence of stability of the demand for money function was doubtful.

On the definition of money, Adekunle found that both money totals - money plus quasi-money to be reasonably stable, except, in the relationship for Australia, New Zealand and South Africa. He noted that these results cast doubt on the hypothesis that the pressure from near money substitutes may be expected to be related to the maturity of an economy and that the more inclusive money total should therefore, be used in the more mature economies.

Crockett and Evans (1980) examined the demand for money in 19 less developed countries using the following basic model:

$$\text{Ln } \frac{M}{P} = a_0 + a_1 \text{Ln } \frac{P}{P_{t-1}} + a_2 \text{Ln } \frac{Y}{P}$$

Where

M = Money Stock

P = Price level

$P_{t-1}$  = Price level in previous period

Y = Income (GDP)

cont/.....

The model is estimated in double logarithmic form, so that the coefficients may be directly interpreted as elasticities. The specification is in constant price terms to reflect the constraints imposed by economic theory that the demand for money not be subject to money illusion.

In general, the equations for broad money M2 were found to be better determined than those for M1 (narrow money), a result which Crockett and Evans attributed to a growing substitution from demand deposits to time and savings deposits. The explanatory power  $\bar{R}^2$  was found to be close to or higher than 0.8 and in many cases 0.9. Standard errors of estimate were generally lower than 10 per cent, often around 5 per cent.

As was to be expected, the coefficient on income turned out to be highly significant in nearly all cases with the notable exception of Pakistan.

Although the coefficient estimates vary quite widely, they are generally between 1 and 2, with the largest number in the range of 1.0 to 1.5. The influence of inflation on the demand for money was found to be much less clear - cut than for income elasticities. In most cases perverse positive signs were obtained. Only three countries, Afghanistan, Iran and Saudi Arabia indicated correct negative sign and significant

cont/.....

coefficient of the opportunity cost variable (inflation). Crockett and Evans concluded that:

"The results are perhaps disappointing but are similar to other studies of money demand in non industrial countries which have also had difficulty uncovering significant opportunity cost effects.... It may well be that in the absence of liquid asset alternatives to holding money for much of the population in many of these countries, the opportunity cost effect is indeed insignificant."

Darrat (1985) examined the demand for money in Kenya. The study was intended to estimate an appropriate money demand function for Kenya using quarterly data over the period 1969: I to 1978: IV and to ascertain whether the Kenyan demand for money relationship had shifted during the period of estimation. The demand for money function is specified as:

$$\frac{M_d}{P} = f (X_t, \pi_t^e, R_t)$$

Where

- $\frac{M_d}{P}$  = Desired real money balances
- $X$  = Real income
- $\pi^e$  = Expected rate of inflation
- $R$  = Short - term foreign interest rates (this variable is

constructed as the average of  
quarterly short-term interest rates  
in major OECD countries)

Darrat argues that "contemporary economies are more or less open to each other. In such economies international opportunity cost of holding money should also be considered along with the domestic counterpart. That is, foreign (not just domestic) financial assets ought to be considered as a potential alternative to holding domestic money balances in Kenya. "He, therefore introduced the foreign interest rate. The domestic interest rate was dropped from the demand for money equations estimated because financial assets in Kenya are inadequate. Consequently, very little substitutability exists between money and other financial assets.

Darrat found that the explanatory variables that significantly influence real money demand in Kenya are permanent real income, expected inflation and short-term foreign interest rates. The long-run elasticities of real money demand (M1 and M2 definitions) with respect to real income was significantly greater than unity (close to 2). The long-run elasticities of real money demand with respect to expected inflation and foreign interest rates, although small, were significantly non-zero. Thus, this indicated that both of these variables also play an important role in portfolio decisions about money holdings in Kenya. The estimated demand for money equation for Kenya was structurally stable over time.

Balino (1977) analysed the demand for money in Argentina for the period 1935-69. The main purpose of his analysis was to find some evidence on whether the Argentina Monetary and banking reform

of 1946-57 had any effect on the demand for money. The main provision of this reform as noted by Balino was that all deposits received by commercial banks were considered liabilities of the Central Bank and not of the individual bank involved. Further, these deposits did not generate by themselves any lending capacity for the banks. The Central Bank compensated banks for the cost of servicing the deposits and also set and paid the interest on savings and time deposits. A Bank could lend up to its capital and reserves plus the rediscount limits that the Central Bank periodically granted. The basic model estimated allowed for partial adjustment of the real stock of money.

$$M_t - M_{t-1} = S (M_t^d - M_{t-1}) + U_t \quad 1$$

$$t = 1, \dots, n$$

$$M_t^d = a + bY_t + c \text{ COST}_t \quad 2$$

From (1) and (2) we get:

$$M_t = as + bsY_t + cs \text{ COST}_t + (1 - s) M_{t-1} + U_t \quad 3$$

Where

$M_t$  = Money stock deflated by the GDP deflator.

$Y_t$  = Gross national income

$\text{COST}_t$  = Measure of the opportunity cost of holding money

$U_t$  = Disturbance term

$s$  = Speed of adjustment.

The above model allow for a partial adjustment of the real stock of money. Both  $M_t$  and  $Y_t$  were specified alternatively in natural and cont/.....

logarithmic values. The COST variable was defined in three alternative ways - as the observed rate of inflation, the expected rate of inflation and the value (corrected for expected inflation) of one peso kept in M1 for one year.

The coefficients of the regression of both M1 and M2 had expected signs and statistically significant. Balino concluded that "...most of the variation in real money holdings can be explained by relatively few variables despite the introduction of unusual monetary arrangements in part of the period; the same can be said about the changes in the composition of money holdings. ....the results suggest that in the nationalization period the substitution relations among money assets and between them and other assets changed enough that a better fit of actual real money holdings is obtained by adding up the components of M2 estimated separately than by direct estimation of the aggregate."

The foregoing suggest, as Balino noted, that the nationalization had an effect on the demand for money.

Among the published studies on the demand for money in India is a study by Singh (1984). The purpose of Singh's study was to identify the determinants of demand for money in India.

A simple two variable linear regression model was used. The basic model being specified as:

$$\Delta Y_t = a + b \Delta X_t + U_t$$

cont/.....

Where  $\Delta Y_t$  = Incremental form of dependent variable  
 $\Delta X_t$  = Incremental form of the independent variable  
 $U_t$  = Random variable

The estimated form of the above equation is as follows:-

$$\Delta Y_t = \hat{a} + \hat{b} \Delta X_t$$

The method deployed to estimate the regression equation is ordinary least squares. The regression equations estimated are as follows:-

$$\begin{aligned} \Delta M_t^d &= \hat{a}_1 + \hat{b}_1 \Delta Y_t \\ \Delta M_t^d &= \hat{a}_2 - \hat{b}_2 \Delta Tbr_t \\ \Delta M_t^d &= \hat{a}_3 - \hat{b}_3 \Delta ig_t \\ \Delta M_t^d &= \hat{a}_4 - \hat{b}_4 \Delta P_t \end{aligned}$$

Where  $\Delta Y_t$  = Incremental form of Net National Product at factor cost at current prices.

$\Delta Tbr_t$  = Incremental form of treasury bill rate.

$\Delta ig_t$  = Incremental form of yield on Government of India Securities non-transferable at 3% 1986 or later.

$\Delta P_t$  = Incremental form of the rate of inflation

$\Delta M_t^d$  = Incremental form of demand for money.

cont/.....

To avoid multicollinearity among the independent variables, multiple regression was not used. Similarly, to prevent autocorrelation data was processed in incremental form.

The coefficient of incremental form of income had expected sign and highly significant. The incremental form of treasury bill rate had expected sign but statistically insignificant. The incremental form of yield on Government of India securities coefficient had expected sign but statistically insignificant.

From the foregoing it is clear that the level of income is the major factor determining the demand for money in India. Both interest rate and the rate of inflation were found to be insignificant.

cont/.....



THE STABILITY OF THE DEMAND FOR MONEY FUNCTION

The stability of the demand for money function is important because it forms the foundation for an effective contracyclical monetary policy. The stability of the demand for money function has received extensive attention over the past several decades. T.F. Cargill, and R.A Meyer (1979) noted that there is no precise meaning for the term stability in the literature and observed that the issue is most often discussed in reference to time series estimates of the function and generally based on three characteristics viz:

- 1) The demand for money can be explained by a small set of variables as determined by various statistical tests.
- 2) The function does not exhibit marked shifts over time, and
- 3) The function is capable of generating reasonable forecasts outside of the interval of estimation.

Stephen Goldfeld and John Boorman (1973) in exhaustive surveys conclude that the relatively simple formulations of the demand for money yield stable short-and long-run functions. Our review indicated that the stability of the demand for money function has been fairly well accepted although there has been some reservations. For instance, Cargill and Meyer (1979) argue that estimating a demand function for money via constant coefficient methods amounts to misspecification. They point

out that the time varying characteristics of the demand function should be explicitly recognized in the estimation procedures to properly investigate the stability issue. Cargill and Meyer's proposal is based on two objectives: First, to use a theoretical model of risk preferences to develop the opportunity cost aspect of the demand for money function, implying time varying coefficients and second, to provide within and outside sample comparisons of constant and variable coefficients estimates of various demand function specifications. Applying the above proposal to United States quarterly and annual data for the period 1890-1975, Cargill and Meyer found that constant coefficient estimates omit important information since several varying coefficient estimation procedures significantly improved explanatory power within the sample, and also improved forecasting characteristics were achieved with time varying estimates. But they noted that the improvements were not dramatic and wondered whether the additional efforts and information needed to estimate variable coefficient models is advisable. Although they maintained that the time varying characteristics of the demand function should be explicitly recognized in the estimation procedures, because the results of their study indicated that when functional forms are estimated by procedures that allow for nonconstant coefficients the overwhelming majority of cases yield a rejection of the hypothesis of constant coefficients. In addition, forecast comparisons also suggested that varying coefficient models outperform constant coefficient models for several specifications, implying, there may be firm support for the conclusion that the demand function for money is temporarily stable.

cont/.....

Several researchers have written on the stability of the demand for money in the less developed countries. These include, Adekunle (1968a) Darrat (1985, 1988) Crockett and Evans (1980), Mahajan (1979), and Deadman and Ghataks (1981).

Adekunle (1968a) investigated the stability of, and the factors determining, the demand for money, with particular reference to real income and interest rates. Applying the Chow test, he found that while some of the estimated coefficients may be highly variable, some of them are remarkably stable. Adekunle found that the hypothesis that the demand for money is a stable factor supportable at the 99 per cent level of significance for Sri Lanka, while for India and Pakistan the evidence of stability in the relation was subject to doubt.

Darrat empirically investigated the demand for money in Kenya, using a battery of stability tests he found that the estimated demand for money function structurally stable. Darrat (1988) study of the stability of the demand for money in India demonstrated that many previous studies, such as Mahajan (1979) and Deadman and Ghataks (1981) in the Indian context are misspecified. He argues that this is the reason why Mahajan and Deadman and Ghataks found the Indian demand for money function structurally unstable. He contends that the misspecifications are two-fold. First, these studies, usually ignore the potential effect of inflationary expectations on the demand for money. Secondly, the effect of technological change is also ignored. This misspecification,

cont/.....

Darrat argues, cause the instability of the estimated coefficients. Darrat's modified demand for money model for India in which both expected inflation and technological change variables were included indicated that the Indian demand for money function is in fact highly stable.

Crockett and Evans study of less developed countries indicated a stable demand for money function. It is interesting to note that Crockett and Evans found that for all of the oil exporting countries, understudy, the income elasticity of demand for money was stable between the pre-1974 and post-1974 periods.

As can be seen from the foregoing, there is much controversy about the stability of the demand for money function.

cont/.....

### CHAPTER III

#### THE DETERMINANTS OF THE AGGREGATE DEMAND FOR MONEY IN ZAMBIA

As discussed in Chapter II, there are several definitions of money. However, in standard monetary literature the most commonly used are:-

- i)  $M1 = \text{Currency} + \text{demand deposits}$
- ii)  $M2 = M1 + \text{time deposits; and}$
- iii)  $M3 = M1 + M2 + \text{deposits at mutual savings banks and post office}$

The Bank of Zambia (1980) defines money in two ways; currency outside banks plus demand deposits is known as narrowly defined money. This of course is what is known as  $M1$  in standard monetary literature. Savings and time deposits are defined as quasi-money. The total money supply is a sum of narrowly defined money plus quasi-money. The reader will observe that the definition of total money supply is similar to  $M2$ .

As observed in Chapter II, for empirical analysis, there is no a priori way of stating the definition of money. The criterion of selection must be which definition yields the more stable demand. Therefore, in our study we consider both  $M1$  and  $M2$  definitions.

cont/.....

Income variable expressed as real gross domestic product is considered a determinant of the demand for money by most writers. However, there are various ways in which this variable is used.

These include; real permanent income, real per capita permanent income, real current income, real monetized disposable income etc.

Separate studies by Friedman (1956), Meltzer and Brunner (1964) have suggested that, as far as the consumer is concerned, money can be treated as a durable consumer good. The holding of money yields services to the consumer and accordingly, permanent income or wealth is an appropriate explanatory variable. Friedman and Meltzer in the separate studies further suggest that although business behaviour required a different theory from that of consumer behaviour money is a durable good yielding services to the firm and that the firm's demand for these services is governed by its income averaged over fairly long period or by its assets. Chow (1966) indicated very explicitly, that, while permanent income is the more important variable in explaining equilibrium stock of a consumer durable, current income is more important in explaining year-to-year change in the stock. Hamburger (1966) states that, "....current income is generally included in the function on the assumption that money is a commodity used

cont/.....

Primary for the purpose of financing a predetermined volume of transactions". Income expressed as monetized disposable income has been proposed by Bhattacharya (1974). He argues that in a developing country, sizable proportions of income and consumption originates through non-monetary transactions like self-consumption of goods and services and barter trade. And it is expected that these proportions decline with economic development. Therefore, the transaction demand for money increases partly because of growth of national income and partly because of a rise in the degree of monetization. As such, the relevant concept of income in monetary analysis of developing countries is a monetized of national income, and not total national income.

Some writers have used wealth as an explanatory variable. However, the relative importance of income and wealth as explanatory variables in the demand for money function is a much discussed but unresolved question. Although Brunner and Meltzer (1964) argue that wealth is the relevant variable, most other writers prefer either current or permanent income.

Net worth of the private sector which includes money supply, time deposits, government securities and capital stock with the private sector has been used by Bhattacharya (1974) as an explanatory variable in combination with monetized disposable income. The coefficient of net worth was found to be significant.

cont/.....

In our study we consider current income expressed as real GDP (excluding subsistence agriculture), real non agricultural GDP and real DGP) (including agriculture). Other concepts are not considered mainly due to lack of data and computational problems. Current income is chosen because we are interested in the year-to-year changes in the money stock. The Zambian money and capital markets are still in their infancy and the major financial market instruments are in the nature of Government Treasury Bills and Stocks. As noted earlier commercial banks are the principle operators in this market with other financial institutions and private individuals playing a marginal role. This implies that Treasury Bills are the most important financial asset substitute for money in this country.

In our study the opportunity cost of holding money is represented by the annual average real treasury bills rate. Our choice is based in part on our belief in Duesenberry's (1959) argument that the rate which is relevant for a theory of liquid asset demand is the rate on securities with neither credit nor market risk, that is, the rate on securities like Treasury Bills and the fact that Treasury Bills are the only significant alternative financial asset in Zambia. Inflation as an explanatory variable reflecting the yield on alternative real assets has been discussed by several writers, who include Khan (1977), Contogiannis and Shahi (1982). Generally, they all agree that increases in the price level appear to have distinct negative effect on money balances. There is some evidences in the less developed countries. Therefore, inflation as an explanatory variable was included in the Model . The

cont/.....



price level employed is represented by the high income consumer price index. This index was chosen because we believe is better than the low income consumer price index. The low income consumer price index refers to the low income group which constitutes all families with incomes of K60 a month and below, while the high income consumer price index refers to the high income group which constitutes all families with income of above K60. According to Central Statistical Office, one important consideration for fixing this limit of K60. per month was that a tabulation of consumer expenditures of various items according to different expenditure levels of range K10 per month, revealed that after the range K50-K60, the consumption of semi-luxury goods increased conspicuously. On the other hand,<sup>up</sup>/to this K50-K60 range, large proportions of expenditure were found to be incurred on items of food and other articles used by poor people.

In addition our study uses the high income consumer price index because we believe that for the low income consumer the largest proportion of income and consumption originates through non-monetary transactions. Hence, this is not relevant for this study. The high income consumer price index is compiled by the Central Statistical Office. The data is collected in four different ways namely:

- a)           Controlled prices are taken from the  
              Gazette notifications;
- b)           From state owned enterprises and from a few  
              large concerns in each town, quotations are

cont/.....

obtained through post in standardised proformae which include the specification of the commodity and also provision for reporting prices for the immediate previous month, in addition to those of the current month;

- c) Considerable number of price quotations are obtained from the office of the price controller who sends price checkers to markets and purchase the selected commodities from shops selected on ad hoc basis from time to time; and
- d) Some prices are directly collected by price checkers and also by representatives of the Central Statistical Office without making spot purchases.

Whenever any price quotation is found to be not comparable with the prices quoted previously, clarifications are obtained by personal visit to the shops concerned by the representative of the Central Statistical Office or by a trunk phone call.

cont/.....

THE DEMAND FOR MONEY MODEL

Economic theory holds that desired real money balances  $M$  is positively related to real income  $Y$  and negatively related to the opportunity costs of holding money, that is, the yields on alternative real and financial assets. As stated earlier, in this study high income consumer price index  $P$  is taken to represent the foregone yield on real assets; and average annual real treasury bill rate  $R$  is used to represent the foregoing yield on financial asset. The demand for money function may then be written as:

$$M = f(Y, R, P) \quad (1)$$

Where the theory postulates that  $f_1 > 0$ ,  $f_2 < 0$ ,  $f_3 < 0$  to make equation (1) estimatable, a number of analytical and technical issues were considered. These included the definition of money stock. This study, like most other empirical inquiries, reports the results from estimating equation (1) using the two conventional money stock definitions, the narrow  $M1$  definition (Currency plus demand deposits) and the broad  $M2$  definition ( $M1$  plus time and savings deposits). As for the specific functional form of the demand for money equation, economic theory provides no a priori rationale, most empirical studies, including the present one uses the log-linear functional form because elasticities can be directly obtained from the estimated coefficients.

cont/.....

### THE EMPIRICAL RESULTS

The demand for money equation was specified as:

$$\text{Log } M = a + b \log Y + c R + d P + u$$

Where all the variables are defined as before and  $u$  is the random term. For empirical definitions of the variables, and sources of data, see the Appendix. As to the signs of the coefficients, the demand for money theory a priori predicts that  $b > 0$ ,  $c < 0$  and  $d < 0$

The regressions have been run in logarithmic terms. An SPSS multiple regression subprogramme has been employed. In models (I) to (III) the definitions of money stock used is  $M_2$ , while in models (IV) to (VI) the definition of money stock is  $M_1$ . The income variable in models (I) and (IV) is real GDP (Excluding subsistence agriculture), in Models (II) and (V) is real non agricultural GDP and in models (III) and (VI) is real GDP (including both subsistence and Commercial agriculture).

Six models were estimated using annual data over 1965 to 1984 period. The regressions were unsatisfactory because the price index coefficient had a wrong positive sign. In view of the low average inflation of 10 per cent over the period it was decided to drop the inflation variable. Based on the foregoing, the Zambian demand for money equation was restated as:

$$\text{Log } M = a + b \log Y + cR + u$$

Where all the variables are defined as before and  $u$  is the random

term. The results obtained from estimating the model are shown in End Table IX. In the End Table IX are shown the estimates of the individual parameters with their respective 't-values', and the Durbin-Watson statistic. Also shown is the coefficient of determination, both  $R^2$  and  $\bar{R}^2$ . The results are discussed individually by model.

a) Model I

Shows that the estimated income coefficient has correct positive sign and is significant at the 5 per cent level.

The treasury bill rate coefficient has correct negative sign and is significant at the 5 per cent level. The estimated equation appears to be reasonably well-specified with 90 per cent of the variation in the real money stock being accounted for.

b) Model II

Shows that the estimated income coefficient has correct positive sign and is significant at the 5 per cent level. The treasury bill rate coefficient has correct negative sign but is insignificant at the 5 per cent level. The fit of the equation is poor with only 53 per cent of the variation in the dependent variable being explained.

cont/.....

c) Model III

Shows that the estimated income coefficient has correct positive sign and is significant at the 5 per cent level.

*The treasury bill rate has correct negative sign and is significant at the 5 per cent level. About 65 per cent of the variations in the real money stock is explained.*

d) Model IV

Shows that the estimated income coefficient has correct positive sign and is significant at the 5 per cent level. The treasury bill rate has correct negative sign and is significant at the 5 per cent level. The estimated equation appears to be reasonably well-specified with 88 per cent of the variation in the real money stock being accounted for.

e) Model V

Shows that income coefficient has correct positive sign and is significant at the 5 per cent level. The treasury bill rate has a correct negative sign but is insignificant at the 5 per cent level. The fit of the equation is poor with only 47 per cent of the variation in the dependent variable being explained.

STRUCTURAL STABILITY OF THE ESTIMATED DEMAND  
FOR MONEY FUNCTION

In the demand for money empirical literature, testing for stability commonly refers to testing for the approximate constancy for the estimated coefficients overtime. Such concept of stability may be formally tested through several available statistical tests. These tests include the Chow test, the Gujarati test and the Farley- Hinich test. In this study the Chow test was chosen. To apply the Chow test, the data set was divided into four parts to coincide with the major economic events which occurred during the period under study. Sub-periods 1965 to 1970 and 1971 to 1984 represent pre and post economic reforms, the collapse of copper prices and the high oil prices respectively. The sub-periods 1965 to 1980 and 1981 to 1984 represent pre and post economic liberalisation respectively.

In April 1968 the Government of the Republic of Zambia announced a package of economic reforms, which broadly speaking, may be grouped into four categories namely;

- a) Limitations on remittances of profits and dividends abroad;
- b) Assumption of State control of 26 major companies;

cont/.....

- c) Regulation of borrowings by expatriate companies; and
- d) Restrictions on the geographical freedom of operations of expatriate traders.

These economic reforms were further reinforced in August, 1969 when the government announced the nationalisation of mineral rights, State participation in the mining industry and the relaxation of credit restrictions to business with a substantial Zambian participation. Also some further encouragement of Zambians to participate in the economy by the modification of the exchange control regulations to favour joint ventures between Zambians and non-Zambians.

These reforms are assumed to have accelerated monetization of the economy. Hence, they are expected to have affected the demand for money positively.

In view of Zambian's dependence on copper exports as discussed in Chapter I and the dependence on imported oil, the collapse of copper prices and the high oil prices are assumed to have had a negative effect on the demand for money.

In 1981, the Government of the Republic of Zambia relaxed price controls and adopted several other measures to liberalise the economy. This economic liberalisation is expected to have had an effect on the demand for money.

cont/.....



Regressions over the four sub-periods were compared to the full-sample regression using an F-ratio to assess whether a significant shift has occurred in the function. The F-statistic for the sub-periods representing the pre and post economic reforms, the collapse of copper prices and high oil prices was estimated to be 21.63. The test rejected the hypothesis of stability at both the 5 per cent and 1 per cent levels of significance. The F-Statistic for sub-periods representing the pre and post economic liberalisation was estimated to be 1.02, the test could not reject the hypothesis of stability at both 1 per cent and 5 per cent levels of significance. The evidence suggests a structural break in 1970, this structural break is not detectable in the sub-periods 1965 to 1980 and 1981 to 1984 because Chow test is unable to detect structural break within sub-period. This structural break implies instability of the demand for money function.

### CONCLUSIONS

The purpose of this study has been to estimate an appropriate demand for money function for Zambia, ascertain the variables that enter the function and the appropriate definition of money stock. The study has also examined the stability of the estimated demand for money equation. The principal conclusions of this study can be briefly summarized as follows:

cont/.....

1. The appropriate demand for money function for Zambia is;

$$M = f(Y, r)$$

where , M is real money stock, Y is real GDP (excluding subsistence agriculture) and r is real treasury bill rate.

2. The explanatory variables that significantly influence real demand for money in Zambia are real GDP (excluding subsistence agriculture) and real treasury bill rate representing the foregone yield on alternative financial asset. As predicted by the theory, the first variable affects real demand for money positively, while the latter variable affects real demand for money negatively. This result is interesting because as Crockett and Evans (1980) noted, it is quite widely accepted that an interest rate is in practice an unsatisfactory measure of the opportunity cost of holding money in the LDC's . The reasons being that, since financial markets outside the banking system are not well developed, the possibilities of substitution between money and other financial assets are limited and that observed interest rates are often centrally determined and remain unchanged for long periods. Thus there is insufficient variation in these interest rates to enable their influence on the demand for money to be estimated with confidence. However, our finding is supported by studies in other less developed countries such as, Darrat (1985) and Adekunle (1968).

cont/.....

3. Real income elasticity of demand for money 1.51  
(Model I) is significantly higher than unity. These findings are consistent with other estimates reported in the literature for similar developing countries for example Adekunle (1968), Crockett and Evans (1980). As reported in the literature review, Crockett and Evans observed that, developing countries tend to exhibit an income elasticity closer to 1.5.
4. Elasticity of real demand for money with respect to inflation had perverse positive signs. Therefore, the equations were rerun with the inflation variable excluded. These results are perhaps disappointing but are similar to other studies of the demand for money in less developed countries which have also had difficulty uncovering significant real asset opportunity cost effects. For example, Crockett and Evans (1980), Singh (1984), Galbis (1979) and Morgan (1979).
5. Based on the Chow test of stability, the estimated demand for money function for Zambia shows a structural break in 1970, this may be regarded as evidence of instability of the parameters of the model.
6. On average the estimates for equations using the broad definition of money stock M2 were better determined than those using narrow money M1 a result which may be attributable to a growing substitution from demand deposits to time and savings deposits. This result is in conformity with those obtained for other less developed countries. For example

Adekunle (1968) and Crockett and Evans (1980).

The demand for money is such a controversial subject that Adekunle (1968) concluded that "...the available theoretical formulations as well as empirical findings do not provide common views about underlying monetary relationships, even when they refer to the same economy".

cont/.....

## APPENDIX

### Description and Sources of Data

This study covers the period from 1965 through 1984 on the basis of annual observations. The empirical definitions of the variables are as follows:-

- M1 = Currency plus demand deposits (narrow definition)
- M2 = M1 plus savings and time deposits (broad definition)
- P = High income consumer Price Index with 1975 as the base year
- Y = Real Gross Domestic Product (at constant 1975 prices)  
expressed as real GDP (excluding subsistence agriculture),  
real non agricultural GDP and real GDP (including both  
subsistence and commercial agriculture)
- R = Real average annual treasury bill rate.

The data series on Money Stock and treasury bill rate are obtained from various issues of the Bank of Zambia Annual Report and Statement of Accounts and Quarterly Financial and Statistical review. Data on high income consumer price index and GDP are obtained from various issues of Monthly Digest of Statistics, a publication of the Central Statistical Office.

The Money stock and GDP were deflated by high income consumer price index (1975 base year ) to obtain real money stock and real GDP respectively.

cont/.....

END TABLE I  
CURRENCY IN CIRCULATION

	CURRENCY IN CIR- CULATION K'000	GDP* K Mn	CURRENCY IN CIR- CULATION AS % OF GDP	CURRENCY IN CIR- CULATION ANNUAL GROWTH %	GDP ANNUAL GROWTH %
1965	18 549	711.1	2.60		
1966	28 355	848.2	3.34	52.86	19.28
1967	35 110	957.1	3.67	23.82	12.84
1968	40 300	1062.0	3.79	14.78	9.88
1969	40 529	1313.5	3.08	0.57	23.68
1970	42 845	1257.7	3.40	5.71	-4.25
1971	58 278	1178.2	4.95	36.02	-6.32
1972	61 350	1311.9	4.68	5.27	11.35
1973	69 396	1591.3	4.36	13.11	21.30
1974	79 642	1892.6	4.20	14.76	18.93
1975	102 354	1583.4	6.46	28.52	-16.34
1976	121 107	1872.2	6.47	18.32	18.24
1977	118 434	1986.4	5.96	-2.21	6.09
1978	130 859	2250.7	5.81	10.49	13.30
1979	126 165	2660.4	4.74	-3.58	18.20
1980	151 068	3063.6	4.93	19.74	15.15
1981	191 758	3485.4	5.50	26.93	13.77
1982	209 491	3595.3	5.82	9.25	3.15
1983	234 944	4181.2	5.62	12.15	16.57
1984	285 621	4733.3	6.03	21.57	13.20

Source

Bank of Zambia:

Annual Report 1977

Central Statistical Office: Monthly Digest of Statistics.

volume Numbers 4 and 5 April/May

1975 Volume XVII Numbers 7 to 12

July/Dec 1981 Volume XXI Numbers

6 and 7 June/July 1985

\*GDP at Current Prices

END TABLE IIRATIO OF ASSETS OF ALL FINANCIAL INSTITUTIONS TO GDP\*

	GDP (Km)	COMMERCIAL BANKS ASSETS (K'000)	NSCB ASSETS (K'000)	ZNBS ASSETS (K'000)	TOTAL FINANCIAL INSTITUTIONS (K'000)	T AS %
1965	711.1	96 694	5 926	37 788	140 408	
1966	848.2	129 254	6 306	42 722	178 332	
1967	957.1	157 942	7 320	48 606	213 868	
1968	1062.0	201 430	7 751	54 531	263 712	
1969	1313.5	240 374	7 895	58 667	306 936	
1970	1257.7	268 257	8 307	68 487	345 051	
1971	1178.2	315 534	9 335	74 085	398 954	
1972	1311.9	367 320	10 549	77 207	455 076	
1973	1591.3	474 200	11 539	83 110	568 849	
1974	1892.6	604 327	13 498	88 175	706 000	
1975	1583.7	695 903	16 385	93 082	805 370	
1976	1895.8	882 525	18 964	96 574	998 068	
1977	1986.4	1161 212	21 239	108 055	1290 506	
1978	2250.7	1251 002	23 962	113 966	1388 930	
1979	2660.4	1446 261	25 999	119 688	1591 948	
1980	3063.6	1548 954	29 488	123 805	1702 247	
1981	3485.4	1791 270	34 683	132 606	1958 559	
1982	3595.3	2262 000	na	144 189	na	
1983	4181.2	2500 522	na	na	na	
1984	4733.3	3043 384	na	na	na	

na = not available

\* GDP at current prices

Source:

Central Statistical Office:

Monthly Digest of Statistics

Volume XI Numbers 4 and 5 April/

May, 1975

END TABLE III  
GRZ TREASURY BILLS  
(By Holders)  
(Kmn)

	BANK OF ZAMBIA		COMMERCIAL BANKS (a)		OTHERS (b)		TOTAL
	AMOUNT	%	AMOUNT	%	AMOUNT	%	
1970	8.3	22.9	21.1	58.1	6.9	19.0	36.3
1971	14.3	47.3	11.4	38.0	4.4	14.7	30.0
1972	14.6	21.3	52.6	76.9	1.2	1.8	68.4
1973	12.0	10.4	78.5	67.7	25.4	21.9	115.9
1974	14.4	65.5	2.4	10.9	5.2	23.6	22.0
1975	66.6	39.2	99.5	58.3	3.9	2.3	170.0
1976	157.4	39.9	236.7	60.0	0.6	0.1	394.7
1977	189.0	28.7	467.6	71.1	1.5	0.2	658.0
1978	730.2	88.9	85.8	10.5	5.0	0.6	821.0
1979	651.8	73.0	233.6	26.2	7.8	0.8	893.2
1980	741.8	74.8	232.7	23.5	16.9	1.7	991.6
1981	714.4	87.7	80.3	9.9	19.8	2.4	814.5
1982	446.6	57.3	317.6	40.7	15.8	2.0	780.0

Source

Bank of Zambia: Quarterly Financial and Statistical Review  
Volume 15 number 11, June, 1985

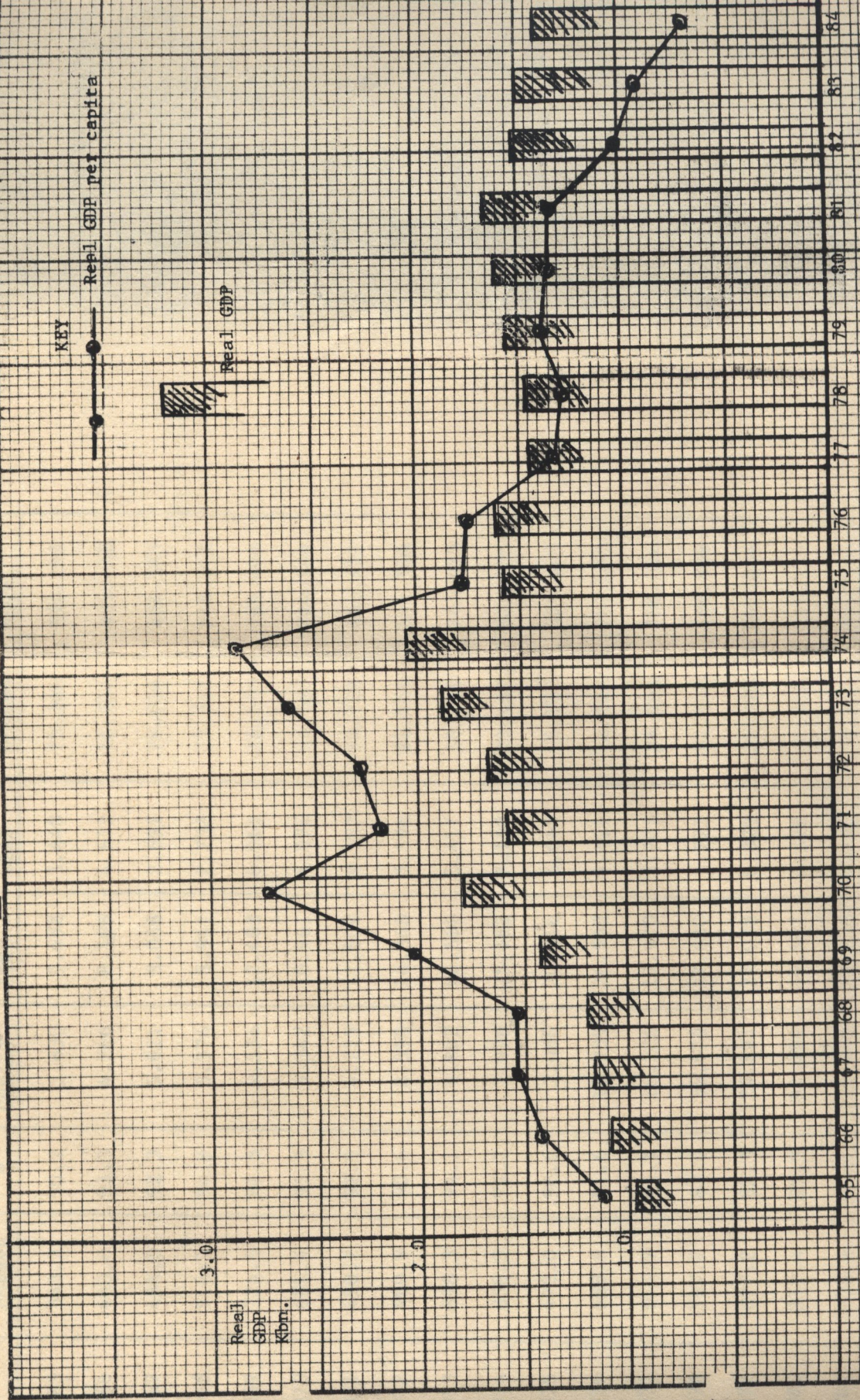
Notes

- a) Includes The Merchant Bank up to December 1971
- b) Includes the Postmaster General and Post Office Savings  
Certificates Fund, the Zambia National Provident Fund,  
the National Savings and Credit Bank, Zimco and Mindeco etc.,



(K MILLION)

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END TABLE IV  
REAL GROSS DOMESTIC PRODUCT \*





## END TABLE V

COMPOSITION OF EXPORTS

(K MILLION)

	COPPER	%	COBALT	ZINC	LEAD	OTHERS	TOTAL
1965	343.2	90.2	3.630	9.658	3.440	20.366	380.294
1966	460.6	93.3	4.266	8.186	4.672	15.734	493.458
1967	434.0	92.3	5.621	8.066	2.691	19.626	470.009
1968	516.1	94.8	3.374	8.961	2.738	13.242	544.415
1969	724.5	94.5	4.536	12.403	6.061	18.989	766.489
1970	681.4	95.3	6.342	10.961	4.874	11.387	714.964
1971	450.2	92.8	4.125	11.507	4.557	14.788	485.177
1972	490.9	90.6	8.590	16.368	5.596	20.110	541.564
1973	698.3	94.1	4.862	16.666	5.411	16.716	741.955
1974	838.5	92.7	7.926	25.162	7.150	25.467	904.205
1975	472.0	90.6	7.066	20.346	5.665	15.972	521.049
1976	688.6	91.6	15.939	26.552	4.421	16.338	751.850
1977	644.9	91.1	16.226	17.920	5.705	23.265	708.016
1978	597.7	87.0	36.679	17.630	3.277	31.522	686.808
1979	897.2	82.3	129.891	27.078	6.079	29.758	1 090.006
1980	872.4	85.3	87.492	19.597	6.528	37.259	1 023.276
1981	835.6	89.2	38.979	22.895	5.132	33.890	936.496
1982	855.4	90.0	25.879	25.002	4.687	39.488	950.456
1983	930.3	88.8	28.768	34.698	6.866	46.913	1 047.545
1984	1 031.2	86.8	19.587	51.569	6.547	79.195	1 188.098

\* Per centage of copper exports in the total exports.

Source

Central Statistics Office:

Monthly Digest of Statistics Volume XI

numbers 4 and 5 April/May, 1975 Volume

XXI, numbers 6 and 7 June/July, 1985.

END TABLE VII

GDP \* COMPOSITION

( PER CENTAGE CONTRIBUTION )

SECTOR	1965	1970	1980	1984
Agriculture, forestry and fishing	13.7	10.5	14.2	14.7
Mining and quarrying	41.0	36.8	16.4	14.0
Manufacturing	6.8	10.1	18.5	20.8
Construction	5.8	6.5	4.5	2.9
Wholesale and Retail/Trade	11.3	9.5	11.8	12.5
Community, Social and Personal Services	9.0	11.5	15.3	16.9

\* GDP at current prices

Source:

Central Statistical Office: Monthly digest of Statistics.

VOL. XI, nos 4 and 5, 1975

VOL. XXI nos 6 and 7, 1985

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## END TABLE VIII

## COMMERCIAL BANKS- ADVANCES BY BORROWER GROUP (K'000)

(MAJOR GROUPS)

	TOTAL	AGRICULTURE	%	MINING & QUARRING	%	MANUFACTURING	%	BUILDING & CONST- RUCTION	%	DISTRIBUTION	%	TRANSPORT & COMMU- NICATION
1975	293873	9887	3.4	83223	28.3	59746	20.3	6297	2.1	56044	19.1	14264
1976	311427	9522	3.1	75178	24.1	64283	20.6	7596	2.4	56946	18.3	15946
1977	319510	12178	3.8	78851	24.7	53382	16.7	6417	2.0	50683	15.9	18345
1978	273571	15774	5.8	34225	12.5	51962	19	8501	3.1	37905	13.9	37341
1979	415363	34880	8.4	34880	8.4	64781	15.6	12393	3.0	66425	16.0	24592
1980	354296	23924	6.8	40981	11.6	67466	19	9771	2.8	19177	5.4	14353
1981	498687	67329	13.5	86774	17.4	56640	11.4	8688	1.7	81999	16.4	29960
1982	598447	91416	15.3	101310	16.9	87462	14.6	9903	1.7	85525	14.3	29803
1983	600058	78939	13.2	77685	12.9	91942	15.3	9799	1.6	91774	15.3	26800
							16.9	13722	1.8	172044	22.8	54108

END TABLE IX

TABLE OF REGRESSION RESULTS

$$\text{Log } M = a + b \log Y + cR + u$$

	a	b	c	R <sup>2</sup>	$\bar{R}^2$	D.TEST	CRITICAL T- TEST
MODEL I	0.7473 (1.572)	1.5136 (9.907)	-2.0479 (6.366)	0.91	0.90	1.86	2.101
MODEL II	3.7083 (5.797)	0.6145 (2.734)	-0.3679 (0.336)	0.58	0.53	0.43	2.101
MODEL III	-1.0472 (1.935)	1.1556 (5.376)	-2.4460 (5.237)	0.69	0.65	1.15	2.101
MODEL IV	1.5071 (3.683)	1.2118 (9.214)	-1.4478 (5.228)	0.89	0.88	2.23	2.101
MODEL V	3.9305 (7.435)	0.4734 (2.548)	-0.1737 (0.192)	0.53	0.47	0.42	2.101
MODEL VI	-0.9534 (2.434)	1.0474 (6.734)	-1.5920 (4.711)	0.74	0.70	1.81	2.101

The figures in parentheses are  
absolute values of t-ratios.

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