SOME ASPECTS OF MONEY AND MONETARY POLICY IN A DUAL ECONOMY : A THEORETICAL APPROACH

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CHAPTER 1 : INTRODUCTION

1.A Statement of the Problem

The theme of this study is that the financial sector of an economy is crucial in any economic development process. It can assist in the break-away from the vicious cycle of poverty in developing countries. The capacity of a developing country to invest is impeded by lack of financial resources. In the first place, the proportion of income saved is generally low due to low per-capita income. Secondly, not all of domestic savings are available for investment purposes because the financial system is still underdeveloped to (efficiently) mobilize and supply available loanable funds. The result is that a good part of domestic savings remains idle and/or is frustrated into unproductive uses. It is obvious that the savings-investment transmission process usually calls for a well-developed financial sector.

The financial sector is composed of markets for financial assets and services. It has its own industries, the monetary system among them, utilizing inputs of productive factors according to relevant technologies. There is a superstructure of regulatory authority with its pattern of policies and array of control instruments. The sector is unique in the sense that its markets, prices, institutions and policies impinge upon all others. Money is the only good that trades against all other goods and interest rates are the relevant prices that have the most permeative relevance to economic decision.

Governments in underdeveloped countries have relied less on monetary and financial policies to promote economic growth than fiscal policy (like government as the main saver and investor in the economy).[1] In more matured and developed economies, monetary and financial policies play a significant role in economic growth and stability. Basically, two major schools of thought in monetary economics can be discerned in developed countries - Monetarist and Keynesian. These two views differ on how monetary policy works on two major economic variables - the aggregate supply of money and the level of interest rates. According to the Monetarist School of Thought, the money supply is thought to be the causal variable and the level of economic activity is the explained variable. An increase in the money supply induces expanded economic activity by enabling people to purchase more goods and services with their extra wealth. It is argued that governments can regulate the economic activity by controlling the growth of money supply.

On the other hand, Keynesians view the money supply as affecting the level of economic activity through the interest rate channel. Any change in the money supply affects the interest rate in the credit market and monetary impulses are transmitted from the financial sector into the real sector through the interest rate. Whatever school of thought one may subscribe to, it is important that straightforward application of either policy in underdeveloped countries will not likely be effective. The reason is that there are extensive differences

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[1] See Brothwell(1977), Meier(1970, pp. 190-209), Park(1973, p. 380).

in structural characteristics and institutional elements between developed and underdeveloped countries.

Economic dualism[1] is the most important feature of a less developed country(LDC). The coexistence of a modern sector (producing industrial goods) and a traditional sector (producing agricultural goods) makes the structure of a LDC radically different from that of a developed country. Unlike a developed country, a larger percentage of the labour force in a LDC is engaged in agriculture. Agricultural commodities are produced by labour-intensive methods. Increasing agricultural output depends on improvements in production technology (such as improvements in seed, small-scale irrigation, pesticides, fertilizers and increment in acreage due to land reclamations or clearing) which are generally self-financed. Farmers use relatively lesser amounts of physical capital such as irrigation pumps, plows, hand tools and livestock. On the other hand, the industrial sector (which is usually concentrated in large urban enclaves) uses both capital and labour as inputs into the productive process. Growth in industrial output depends upon investment in new capital, increases in employment of labour and technological improvements. Industrial investments are almost entirely externally financed as opposed to self-finance in the agricultural sector.

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[1] See Thirlwall(1978, Chapter 5) for a good discussion on the causes and effects of economic dualism in LDCs.

The level of dichotomization is not restricted to output, consumption-savings patterns and technology but extends to the financial system of the economy as well. Most underdeveloped countries operate under a dual monetary system[1] - a small organized money market catering to the financial requirements of a small percentage of the population in the modern-industrial sector and a large unorganized market in the traditional-rural sector.

The traditional sector has few or no financial institutions and as a result its economic units have little or no access to borrowing and lending in the capital market. The virtual non-existence of financial assets results in a large portion of rural savings being held in the form of either currency or non-financial, unproductive, tangible real assets (like gold, jewellery, stock of consumer durables and agricultural commodities)[2]. These tangible real assets serve "either as a means of protection against inflation or to be certain of obtaining the consumer goods when needed" [Tun Wai(1972), p. 31]. For simplicity, these tangible real assets will be termed as inflationary hedge assets. An inflationary hedge asset is defined as a composite good whose characteristics are discussed later in Chapter 3. The composition of individual wealth portfolios in the traditional sector consists of three assets: currency, inflationary hedge assets and

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[1] One of the earliest and best description of a dual monetary system in LDCs is in Tun Wai(1956, 1957)

[2] See Park(1973, p. 390). Ghosh(1964, p. 66) estimated that about 75% of household savings in India is in the form of currency, gold, jewellery and durables.

physical capital. Examples of physical capital are simple agricultural and handicraft tools, livestock, housing construction, land improvement etc. Most of the investments in physical capital are self-financed.

An individual, being limited to self-finance, has to save enough money before he can purchase a unit of physical capital that is different from his own output because of indivisibilities of capital goods. Since both currency and inflationary hedge assets can be used as a store of value, the degree to which an investor relies on one or the other will depend on the relative real rates of return of the two assets. If the real rate of return on money rises due to a fall in the expected rate of inflation then the individual will prefer to accumulate cash balance for the eventual purchase of the capital asset. On the other hand, if the individual expects the inflation rate to increase he will store his savings in the form of an inflationary hedge asset before the eventual purchase of the capital asset takes place. As a result, at any point of time, there will be a discrepancy between (desired) aggregate investment and (desired) aggregate savings. A portion of the aggregate savings will end up in unproductive investment.

The absence of financial institutions reduces the transfer of savings into productive investment because the link between the primary savers and ultimate borrowers is not properly established. People who want to invest in capital expenditure by borrowing will not be able to do so and at the same time, the savers who want to lend will not be able to do so either. In sum, the total (effective) savings <u>may</u> be reduced in favour of consumption and/or unproductive investment due to

the limitations on both the number and desirability of the alternatives to consumption and/or unproductive investment.

The modern sector uses the money and capital markets (however narrow and imperfect the markets may be). As far as the portfolio of the individuals in the industrial sector is concerned, they have a choice between money, capital and financial assets (for example, bank deposits and loans). If the production were undertaken by firms that borrow real physical capital, this capital would be transferred from surplus to deficit units on the financial markets. When savings are placed in a financial intermediary that invests this capital with the deficit units, the financial system achieves a separation of the ownership and the use of (monetary) capital. The "intermediation effect" allocates capital resources to earn an average return much higher than under self-finance.

The degree of financial intermediation is likely to be different between the two sectors and the dual monetary system is a description of two separate economies operating under a single monetary authority. It is in the spirit of the above argument on low degree of financial intermediation of the larger sector of the economy and low price elasticity of agricultural (output) supply that monetary and financial policy prescriptions have been characterized as unsuitable for the LDCs. As a result, most models on economic development and planning have assigned insignificant role to the financial sector of an underdeveloped economy. Moreover, these "real" models have emphasized rapid growth of the modern sector at the cost of stagnation (and possible repression)

of the traditional sector.

One of the most widely circulated views of fostering economic development is to allow a modest flow of international finance from the developed to the underdeveloped countries. This school of thought assigns the crucial role of growth to physical capital accumulation and relates all growth in output to the growth of capital in the recent past, the two magnitudes being expressed in the incremental capital/output ratio. The relationship of capital and output is determined by technological factors and the rate at which output grows is determined by the rate at which output in the past periods has been devoted to capital formation as distinct from consumption. This process of growth attributes savings constraint as an explanation of stagnation. LDCs remain poor because the prevailing mode of production, in which capital is an insignificant input, is capable of producing only a subsistence level of output. Since the whole of the current output is absorbed in necessary consumption there is no surplus for investment and hence little possibility of any increase in per capita output.

This study examines the possibility of financing economic development through domestic savings as opposed to international finance. The immediate goal is to raise the rate of private domestic voluntary (financial) savings and to allocate these savings for productive investment through the development and effective use of financial institutions. Accumulation of financial assets (monetary and non-monetary) is more important than expansion of the size of

aggregate savings. The reason being, as long as a substantial portion of savings goes into unproductive investment, the economy will suffer from chronic savings-investment gap. The emphasis of the theory of economic development must switch from savings-investment bottlenecks associated with capital formation and economic development to that of financial development.

This thesis hypothesizes that developing countries suffer not from lack of savings but from lack of financial resources necessary for capital accumulation purposes. Asymmetric development of financial institutions in two sectors of the economy is at the root of the savings-investment gap. Since the agricultural sector (larger of the two) does not have any financial institutions, a large portion of its savings is diverted into unproductive uses. As a result, it seems necessary to examine the monetary factors in the context of a dual economy. Furthermore, this study postulates that the traditional sector is the (potentially) savings surplus sector and that savings need to be tapped and allocated[1]. A policy towards the proper development and expansion of financial institutions will help in extracting the (potential) savings, and hence assure that the act of saving will lead to productive investment.

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[1]Tun Wai(1972, pp. 22-27) estimated that households contribute about 60% of net domestic savings in LDCs. Since about 80% of the households are in the traditional sector, we can say that traditional sector is the (potentially) savings surplus sector.

1.B The Purpose of the Study

The primary objective of this study is to demonstrate that economic growth and development is not independent of monetary phenomena. To fully appreciate the importance of monetary and financial policies in stimulating investment in a dual economy, this study addresses the following interrelated questions:

(i) how does money affect the flow variables in a LDC?

(ii) how do individuals in the traditional sector dispose of savings in the absence of financial assets?

(iii) what are the monetary transmission mechanisms in a dual economy?

(iv) how are the monetary impulses transmitted from the modern sector (where they originate) into the traditional sector?

(v) why have the roles of monetary and financial policies been undermined in a LDC?

(vi) why is there an asymmetry in the implementation of monetary policy in a LDC?

(vii) why is financial development necessary but not sufficient for a balanced sectoral growth in a dual economy?

Using a two-sectoral macro model with a complete financial sector, this study examines the link between money and the level of economic activity; the portfolio behaviour of the wealth holders and the process of portfolio determination; and the linkage between the dichotomized sectors operating under a single currency. A comparative-static approach within a partial equilibrium framework is used to investigate the causal relationships between the explained and instrumental variables. To demonstrate that monetary factors are important in a dual economy, we assume that one of the sectors is devoid of any financial institutions and then proceed with the monetary menchanism analysis to show the deficiency of such a system.

It was mentioned earlier that straightforward application of monetary policies designed for developed countries is unsuitable for underdeveloped countries. However, to answer the question of how money affects the real flow variables, it is often argued that institutional and structural characteristics of the traditional sector of an under-developed country make the Quantity Theory of Money more relevant than Keynesian monetary theory. Is the classical dichotomy between the real and the monetary sector inevitable because of the lack of financial institutions? There is money and on the other hand there is real physical assets and nothing in between. Money is held only for transaction purposes and therefore the classical quantity theory is valid, i.e., income velocity of money is constant in the short-run. Real income is determined outside the financial sector and can be regarded as constant for analyzing short-run fluctuations. With this assumption in mind,

a change in the nominal stock of money leads to a proportional change in the absolute price level in the short-run. Real income is likely to be determined by supply conditions with no connections either with the aggregate demand or the financial sector. At a first glance this explanation seems to be reasonable for the traditonal sector whose output is quite inelastic and any increase in aggregate demand ends up with a higher price with little or no change in real output. At this point we need to ask ourselves if the absence of financial assets in a portfolio choice denies the existence of a relationship between real cash balance and the opportunity cost of holding money. This study proposes that the absence of financial assets does not necessarily deny the existence of a relationship between the demand for real cash balance and the opportunity cost of holding cash balance. Monetary impulses will most likely affect the real (flow) variables and this study will investigate that causal relationship.

Financial assets are not necessarily the only important substitute for money; rather, both real and financial assets are items in the wealth portfolio. Real assets as well as other financial assets should be explicitly introduced in monetary analysis. The inclusion of real assets in analyzing the monetary problems of LDCs (especially the traditional sector which lacks financial assets other than currency) is of utmost importance. The obvious question that needs to be addressed is: even if we allow for some degree of substitutability between real assets and real cash balances, why has there not been any appreciable capital accumulation in LDCs? Or to put it differently, if we were to accept

that money and real assets should be in the portfolio choice of an economic unit, what is inhibiting any increase in agricultural output? The complete answer to these questions is not to be found in Neo-Keynesian - Quantity Theory debate but on how money influences (or fails to influence) the accumulation of capital in a LDC, and what types of real assets the wealth holders are willing to hold in their portfolios. In other words, how do individuals dispose of their savings?

In a fully developed money and capital economy, money affects the real economy through three channels: cost-of-capital, wealth effect and credit rationing. In a dual economy, where the financial structure of the sectors is different, the monetary transmission process is also different. In the modern sector of a dual economy the financial system is relatively akin to that of an advanced country. Monetary impulses are transmitted partly via cost-of-credit, but mainly through credit rationing. Credit rationing is quite simple because the monetary authority uses various non-price criteria to transmit the monetary impulse from the financial sector to the real sector. The cost-of-capital channel operates through changes in the interest rates. Any change in the nominal volume of money changes the rate of interest (i.e., the opportunity cost of holding money) until the money market equilibrates. The change in the interest rate affects the volume of investment expenditure and ultimately the aggregate demand.

In the traditional sector, where there are no financial institutions and investment expenditures are self-financed, only the cost-of-capital channel operates, and even then it is not very efficient in stimulating

investment. Physical capital has another competing real asset - inflationary hedge asset - in the portfolio of the wealth holders. A fall in the rate of return on money does not necessarily mean that there will be an increase in the demand for physical capital. Whether people will switch from money into physical capital or into inflationary hedge assets or a combination of the two will depend upon the expected capital gain and expected rate of return. Furthermore, the switch into physical capital will be even more complicated because it has to be self-financed and physical capital is indivisible.

Another important aspect of this study is to examine how monetary impulses are transmitted from the modern sector into the traditional sector; in other words, to investigate links between the two sectors. One form of linkage between the two sectors is through the labour market, which is a unidirectional flow of labour from the traditional sector into the modern sector. But this sort of factor mobility has very little economic consequences. Unlike the neo-classical factor mobility theory, rural-urban migration in LDCs does not affect the wages, employment and output in the agricultural sector because the migrants are entirely composed of surplus farm labour. The most important linkage between the two sectors is through inter-sectoral trade. Since each sector produces only one category of commodity but consumes a combination of both categories of commodities, the relative price of the two categories of commodities form the most vital conduit between the two sectors. Therefore, though the traditional sector seems immune to direct monetary influences because of the

absence of financial institutions, it is affected indirectly through changes in the domestic price ratio.

Apart from mobilizing savings and allocating investible resources, financial institutions play a very important role in the inter-sectoral balance of payment adjustment process. The existence of an integrated financial system shared by both the sectors within a country allows sectoral current-account imbalances to be easily financed. But if one of the sectors is devoid of any financial institutions, the adjustment process will not be achieved easily. So long as there is a current-account imbalance between the two sectors, a full static equilibrium cannot be achieved without changes in the relative price of the commodities or changes in the value of wealth in one of the sectors.

Since a large part of the economy does not have any financial institutions, the scope of monetary and financial policies is very limited. The central bank can influence only a small segment of the population and hence the roles of monetary and financial policies have been severly undermined in developing countries. Another effect of the asymmetric development of financial institutions in a dual economy is that there is an asymmetry in the implementation of monetary policy. It is much easier for the monetary authority to implement an expansionary monetary policy than a contractionary monetary policy. An expansion of money supply will readily dissipate throughout the entire economy. On the other hand, if the authority decides to pursue a contractionary monetary policy, it will be very difficult to reduce

the existing money stock in the traditional sector because it is outside the control of the monetary policy influence.

As long as there exists a discrepancy in the rate of return on investment between the two sectors of the economy, a policy towards financial development and expansion has to be supplemented by some kind of credit policy to ensure a balanced sectoral growth of the economy.

1.C An Outline of the Study

The rest of this study is divided into five chapters.

The second chapter describes, evaluates and surveys two contending theories of economic development. The "real" and "monetary" models. The aim is not only to clarify the place of money in an economic system but also to propose that the financial and real sectors of a dual economy need to be treated simultaneously. In short, this chapter shows how the basic arguments of the study are formulated.

The third chapter is devoted to building a complete structural model for a dual economy. The first section deals with the real component of the agricultural sector and the second section describes the portfolio behaviour of wealth holders in that sector. Sections three and four discuss the real component and basic features of financial markets respectively of the industrial sector. The outcome of these four sections is compiled in section five.

The fourth chapter analyzes the workings of the models developed

in chapter three. The models are designed to demonstrate the monetary transmission mechanism in a dual monetary system. The second section describes the schematic process of the transmission mechanism. The third section analyzes the comparative-static results in the industrial sector. Credit rationing policy in the industrial sector is analyzed in the fourth section. The fifth section is an extension of the third section, which deals with the comparative-static results of the agricultural sector.

In the fifth chapter, this study assumes that the financial system is equally developed in both the sectors of the economy. The objective of this chapter is to show that financial development is necessary but not sufficient for a balanced economic growth. This chapter embodies one of the most important contributions of the study. The second section of the chapter analyzes the policy implications of credit dualism for a balanced economic growth.

Finally, the sixth chapter contains the summary and conclusions of the study. The last section of this chapter discusses some of the limitations of the study and suggestions for further research.

CHAPTER 2 : A REVIEW OF THE LITERATURE: "REAL" VERSUS "MONETARY" MODELS

In strictly economic terms, 'development' for the last few decades has meant the capacity of a national economy, whose initial economic condition has been more or less static for a long time, to generate and sustain an annual growth rate in its real GNP of perhaps five to seven percentage points or more. For example, the United Nations 'Decade of Development' in the 1960s was conceived largely in terms of the attainment of a six percent annual target growth rate of real GNP. Economic development has been typically seen in terms of the planned alteration of the structure of production and employment so that agriculture's share in both declines, whereas that of manufacturing and service industries increases. Development strategies, therefore, have usually focused on rapid industrialization often at the expense of agriculture and rural development.

A survey of literature on problems and prospects of economic development in the Third World countries reveals that there is a bias among economists in favour of conceptualizing economic growth and development as independent of monetary phenomena. Most of the economic development models are in "real" terms and the literature over the last few decades has been dominated by three major strands of thought[1]:

(i) the 'stages of economic growth theories',

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[1]See Todaro(1977, p. 51) for a discussion on the first two strands.

(ii) the 'structural-internationalist' models, and

(iii) the 'dualism' models.

Rostow's(1960) "stages of economic growth" focus mainly on the right quantity of and mixture of savings, investment and foreign aid that all LDCs must have to proceed along an economic growth path which historically had been followed by the more developed countries. The economic mechanism of accelerating economic growth was based on the Harrod-Domar growth model. The main constraint to development according to the Rostow-Harrod-Domar theory was insufficient savings[1]. Inadequate savings lead to low investment, and low investment leads to low income and low income leads to low savings and the cycle starts all over again. This is known as the "vicious cycle of poverty" theory. Massive transfers of capital and technical assistance from the developed to the less developed countries were advocated as means of "unlocking" the poverty cycle.

Chenery-Strout's(1966) "two-gap" model was an extension of Rostow's justification for the transfer of resources from the rich to the poor countries. The basic argument of the two-gap model is that foreign assistance can play a crucial role in supplementing low domestic savings and hence filling the domestic "savings gap" and also providing additional foreign exchange and thereby filling the "foreign exchange gap". Most two-gap models assume that the gaps are unequal in

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[1]For criticism of Rostow's theory see Todaro(1977, p. 54) and Baran and Hobsbawm (1961)

magnitude and they are mutually independent. For example, if the ex ante foreign exchange gap is greater than the domestic savings gap, foreign assistance becomes the means of permitting the required imports so that the full savings potential can be realized and resources will not be left underutilized because of an import bottleneck. The necessary ex post identity of the savings-investment and export-import gap is brought about by means of adjustment.

The second major school of thought of economic development is the "internationalist-structuralist" theory. This school of thought has recently gained increasing support as a result of numerous failures and growing disenchantment with the "orthodox" models discussed above. Internationalist-structuralist theories argue that the LDCs are being beset by institutional and structural economic rigidities and being trapped in a dependence and dominance relationship to the developed countries[1]. Underdevelopment is a historical process and most of the LDCs were colonized and exploited, at one time or another, by their colonial powers (most of them are today's developed countries). Although almost all LDCs are politically independent, economically they are not. The LDCs have not been able to get rid of the legacy of the colonial era. The countries are economically, politically and socially dominated by a small ruling elite who help in the perpetuation of the international capitalistic system of inequality. Knowingly or unknowingly this small group often inhibits any genuine reform policies which might benefit

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[1] See Baran(1957), Leys(1975), Amin(1974, 1976), Santos(1970), Furtado(1973) and Wilber(1973).

the wider population. According to this school of thought, economic development has very little to do with accelerating the growth of GNP. Instead, more emphasis is placed on structural and institutional reforms, economic, social and political, which will help eradicate poverty, lessen income disparities and raise the general standard of living (including health and education) of the masses. Inspite of the fact that this school of thought has been able to identify some of the major problems, it has not offered any workable policies acceptable to most economists. Much of the discussion is very much academic in nature.

The third major school of thought of underdevelopment is the "dualism" model. Dualism represents the existence and persistence of increasing divergence between the rich (urban-industrial) and poor (rural-agricultural) sectors of the economy. The contrast in economic and social organization between the advanced sector of the economy and the backward, indigenous sector of the economy is one of the most striking - and puzzling - characteristics of a poor country. Since the country's future development necessarily entails the spread of balanced growth, any effort to accelerate the rate of development must deal with the problem of economic dualism.

How can the absorption of the traditional sector into an expanding modern economy be accomplished? In his seminal work, Lewis(1954) outlined the process of labour re-allocation from agriculture to industry. Lewis offered a perceptive analysis of the interaction between the advanced sector and the traditional sector in a labour surplus economy.

His two-sector model placed heavy emphasis on rapid expansion of the industrial sector while the agricultural sector contributed this industrial expansion with cheap food and surplus labour.

Fei and Ranis (1961, 1964) formalized and extended Lewis' model. Assuming that the real wage in agriculture is determined by institutional forces at some constant level, Lewis-Fei-Ranis showed that the conditions for a successful re-allocation of labour force were (a) a very high rate of capital accumulation and technical process in industry to create increasing employment opportunities and (b) a concomitantly high growth rate in agricultural productivity so that the agricultural sector can produce sufficient food for the entire population with a smaller portion of labour. Following Lewis-Fei-Ranis, a large number of studies on two sector models were published dealing with various aspects of how the modern sector is to expand while the traditonal sector contracts[1].

Myrdal(1968) has put the dualism school of thought in proper perspective. Instead of assigning a passive and supportive role to agriculture, Myrdal asserted that agricultural development needs to be viewed as the dynamic and "leading sector" in any overall strategy of economic development. "It is in the agricultural sector that the battle for long-term economic development will be won or lost", Myrdal(1968, p. 1039). Myrdal has been largely responsible for stimulating a remarkable transition in thinking among development

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[1]The literature is saturated with two-sectoral "real" models designed for poor countries. For example, Jorgenson(1961, 1967), Zarembka(1972), Dixit(1969), Niho(1976), Yotopoulos and Lau(1974). For a complete list see Johnston(1970).

economists - one in which agricultural and rural development are viewed as an indispensable condition for overall economic development[1].

There is widespread agreement among these economists that the main cause of economic underdevelopment is the present structural and institutional setup of the economy. Any strategy for development must start with certain structural and institutional changes. The policies should include the following: (a) land reform; (b) changes in institutions that control production and distribution (eg., seed and fertilizer distribution, storage and marketing facilities, credit facilities, government's pricing policies regarding both inputs and outputs, etc.,); and (c) improvements in "standard of living" including health, education, housing and other social services. Unfortunately, the causal nature of the relationship between these institutional changes and agricultural-rural development has not been fully explored either theoretically or empirically in the non-communist Third World.

It is clear from the above discussion that on the one hand economic theory has been mostly conducted in "real" terms (with emphasis on the sociological, cultural and political factors), and on the other hand, capital accumulation has been emphasized as the major factor governing the rate of development. The accumulation of capital in any developing country requires the mobilization of an economic surplus. If investment is to increase, there must be a growing surplus above current consumption

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[1] See Johnston and Kilby(1975), Thorbecke(1969), Islam(1974), World Bank(1975), Gurley(1974), Reynolds(1975) and Singer(1970).

that can be tapped and directed into productive investment channels. The process of capital formation involves three essential steps: (i) an increase in the volume of real savings, (ii) the transfer of savings to investors, and (iii) the act of investment itself, by which resources are used for increasing the capital stock.

To the extent that an increase in the rate of investment is necessary or desired, a developing country must increase savings. There is a growing concern on the problems of financial development - the manner in which financial institutions and financial policies may help overcome the shortage of capital and influence a country's pattern of development. For an understanding of the process of development, one must analyze how the financial super-structure and the real infra-structure interact, and the effects of such interactions on development[1].

Among the theories that do treat the role of money and financial institutions in economic development one can discern two distinct views. One view holds that money and financial services are demanded as a result of the growth in the economy. Patrick(1966) terms it as "demand-following" phenomenon- the creation of modern financial institutions, their financial assets and liabilities, and related financial services is in response to the demand for these services by

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[1] See Goldsmith(1966) for a discussion on the determination of the size and characteristics of a country's financial structure.

investors and savers in the real economy[1]. This view implies that monetary services and institutions are not causal factors in the growth process, rather the financial system somehow accomodates the growth process. Development of the financial system is a subset of the overall development process. A corollary of this view is that the creation of financial services and instruments cannot cause growth, but a failure to satisfy the economy's demand for them may prevent economic growth and development.

The other view of monetary phenomenon is that financial services are a "supply-leading" phenomenon[2]. The main implication of this theory is that the creation of financial institutions and the supply of their assets, liabilities, and related services in advance of demand for them transfers resources to the more efficient sectors and thereby stimulates and promotes productivity and entrepreneurial activity. The provision of monetary services facilitates these transfer of resources from traditional sectors to modern sectors and thereby enables the economy to operate closer to its production possibility frontier and also may lead to outward shifts in the frontier itself. This view is akin to the Schumpeterian concept of innovation financing. Since financial intermediation raises productivity, economies which have a complete system of financial institutions should attain more rapid growth than those without.

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[1]Patrick(1966, p. 174).

[2]Patrick(1966, p. 175).

Until the early 1960s, the "supply-leading" argument was given less emphasis in academic discussion (if not in policy actions) than the "demand-following" view. One of the early studies subscribing to the "supply-leading" view concluded:

> The poorer a country is, in fact, the greater is the need for agencies to collect and invest the savings of the broad mass of persons and institutions within its borders. Such agencies will not only permit small amounts of savings to be handled and invested conveniently but will allow the owners of savings to retain liquidity individually but finance long-term investment collectively[1].

Theoretical exploration of the causal nature of this relationship between financial development and economic growth was pioneered by Gurley and Shaw. Gurley-Shaw's direct influence on theorizing about monetary and financial processes in poor countries is the result of their debt-intermediation view of money. The debt-intermediation view was an alternative to the generally accepted wealth view of money[2]. Their contribution was that real cash balances are debt, i.e., liabilities

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[1]Nevin(1961, p. 75). For other references on financial institutions see Marquez(1961), Rosen(1958), and Cameron(1963).

[2]Gurley-Shaw(1955, 1956, 1960, 1967) and Shaw(1973).

of the banking system. Liabilities of the banks are associated with real capital accumulation on the asset side of the economy's aggregate balance sheet, and real cash balances are a portion of the debt arising out of the process of capital accumulation itself. They argued that capital markets can operate at optimum efficiency only if the monetary system is fully deployed as a financial intermediary between the savers and investors. The debt-asset system for mobilizing and allocating domestic savings seemed more appropriate in less developed countries than in developed countries because commercial banks are the only "organized" capital market in LDCs, and money (broadly defined) is the only marketable financial asset.

Gurley-Shaw's hypothesis of financial development and capital accumulation in less developed countries was subsequently extended by McKinnon(1973) among others[1]. Gurley-Shaw-McKinnon models concentrated on two interrelated issues: (i) development of financial intermediaries and (ii) "liberalization" of the financial system[2]. They pushed hard for the development of an efficient domestic capital market. Unlike the "stages of growth " theorists discussed on page 18, Gurley-Shaw-McKinnon believed that sufficient savings can be coaxed from households by a healthy financial system providing liquid assets at attractive

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[1] Khatkhate(1972), Chandravarkar(1977), Bhatia and Khatkhate(1975), Galbis(1977), Drake(1977), Tun Wai and Patrick(1973), Newlyn(1977), and Spellman(1976). See Coats and Khatkhate(1979) for an excellent survey on issues and evidences of money and monetary policy in LDCs.

[2] McKinnon(1973, p. 8).

real yields and hence foreign aid and other forms of international development assistance are unnecessary in any development process. However, like the "stages of growth" theorists, Gurley-Shaw-McKinnon's view of economic development was very narrow compared to Myrdal's(1968) or Baran's(1957). Investment and capital formation were conceptualized as the major factors in economic development[1].

Gurley-Shaw-McKinnon models were concerned with efficient operation of the financial system. They argued that policy makers should not only encourage the proper formation and expansion of financial institutions but also let them operate with minimum intervention. Transfer of savings from savers to investors call for high market rates of interest reflecting the prevailing scarcity of capital in poor countries. They were very critical of the traditional Keynesian theory of low interest rate to stimulate investment. It was alleged that policy makers in underdeveloped countries disregard market prices and intervene directly in financial markets in an attempt to "improve" the allocation of resources. This intervention generally takes the form of controls over interest rates, which reduce the rates of return on financial assets and thus depress savings and capital formation and necessitate credit rationing and/or state subsidy to gross investment. High rates of inflation make things even worse. Since

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[1] It can be said that Gurley-Shaw-McKinnon and other "financial intermediary" theorists concentrated only on economic growth. According to Meier(1970, p. 62), economic development means economic growth plus change in socio-political environment.

deposits and loan rates are set in nominal terms, any appreciable rate of inflation can readily make real rates of return on financial assets negative. In such a situation, inflation leads to distortions in the allocation of resources, and the higher the rate of inflation the greater is the distortion. McKinnon(1973, p. 68) and Shaw(1973, p. 80) termed this phenomenon as "financial repression". They have strongly advocated "liberalization" of the financial system.

One of the most serious shortcomings of the Gurley-Shaw-McKinnon theses is their primary focus on the differnce between internal (i.e., self-finance) and external finance within one-sector models. Less developed economies were conceptualized as composed of only the agricultural sector with two distinct technologies - a "traditonal" agricultural technology and a mechanized or "modern" agricultural technology (eg., irrigation system). Investment limited to self-finance locks the economy into an inferior technology. On the other hand, access to external finance will permit the economy to break out of the traditional mold with higher production using modern technology[1]. Furthermore, it was suggested that investors contemplating investing in modern technology can improve their positions even if the marginal cost of borrowing exceeds the marginal rate of return under internally financed investment with the traditional technology. Hence cheap external finance or subsidized credit programs may be both unnecessary and unwise[2].

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[1]McKinnon(1973, pp. 19-21)

[2]McKinnon(1973, p. 15).

There is very little doubt that in a single sector economy, as described above, high rates of interest both for lenders and borrowers introduce the dynamism that is expected in any development process. High rates of interest induce higher savings in the economy and help divert investment from inferior uses so as to encourage technological improvement. However, an underdeveloped economy is not a single sector economy. As we have mentioned earlier, perhaps the most notable aspect of a typical underdeveloped economy is its economic dualism - the coexistence of a modern (industrial-urban) sector and a traditional (agricultural-rural) sector. In fact, one can discern at least four distinct technologies in a typical LDC: an inferior and a superior technology in the agricultural sector, and an inferior and a superior technology in the industrial sector. If the marginal rate of return of a superior technology in the industrial sector is greater than that in the agricultural sector, then there is no assurance that "liberalization" of the financial system will be a necessary and a sufficient condition for agricultural development. It can be said that Gurley-Shaw-McKinnon did not take into account the additional complication of economic dualism therefore, their models do not provide answers to questions regarding balanced sectoral growth and monetary transmission mechanisms.

The main conclusion to be drawn from the brief survey of the literature is that financial development is crucial in any capital formation process but at the same time one needs to recognize the existence of the "dualism" feature of a typical underdeveloped country.

The accumulation of capital in any developing country involves three essential steps: (a) an increase in the volume of real savings, so that resources can be released for investment purposes; (b) the channeling of savings through a finance and credit mechanism, so that investible funds can be collected from a wide range of different sources and claimed by investors; and (c) the act of investment itself, by which resources are used for increasing the capital stock. The significance of financial institutions lies in their making available the means to utilize savings. However poor an economy may be there will be a need for institutions which allow such savings as are currently forthcoming to be invested conveniently and safely, and which ensure that they are channelled into the most useful purposes. It is obvious that real models do not provide the savings-investment-capital formation linkage.

Any discussion on the savings-investment-capital formation process in a LDC needs to be discussed in the context of economic dualism. In many developing countries, a modern money economy has developed alongside a traditional indigenous economy, resulting in an asymmetric development of financial institutions in the economy. The absence of financial institutions in a LDC is confined to the traditional sector only. The savings-investment-capital formation linkage operates in the modern sector but not in the traditonal sector. As a result the problem of mobilization and allocation of resources in a LDC is quite different from that envisaged by Gurley-Shaw-McKinnon. Unlike a single sector monetary model, we are concerned with the relative rate of capital

formation in two sectors of the economy operating under a single monetary authority. As expected the monetary transmission mechanism in a dual economy is more complicated than that of a single sector economy.

This is the first study of its kind which has attempted to explore the causal relationship between financial development and economic growth in the context of economic dualism[1]. In other words, this study borrows the dualism views of Myrdal(1968), Singer(1970) and others and integrates them with Gurley-Shaw-McKinnon's views of financial intermediation.

Like Myrdal and Singer we recognize agriculture as the more important of the two sectors in terms of development strategy, and at the same time we recognize the importance of financial intermediation in providing the savings-investment-capital formation linkage in the economy. The main objective of this study is to analyze the role of money and credit policies in the development process of a dual economy. We hope to show that an asymmetric development of financial institutions results in an asymmetric rate of capital formation in the two sectors of a dual economy. This asymmetry aspect is not dealt with in either "real" dual models or single-sector models(with money).

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[1]At first glance this study seems to bear some resemblance to Galbis(1977). But a closer look will reveal that it contrasts sharply with Galbis. Galbis' two-sector model is a reformulation of McKinnon(1973), and the two sectors were, in fact, two sub-sectors within one super-sector(i.e., agriculture). The two sectors were defined in terms of two production sectors using McKinnon's terminology of "inferior" and "superior" technology.

(cont.)

Since this study deals with the monetary and financial system of a LDC, the narrow definition of economic development is used, and it is assumed that investment and capital accumulation are sine que non for economic development. The approach used in developing the monetary-macro models was inspired by Park(1973) and Tobin(1969). Tobin's models are designed for developed countries and Park's model incorporated features of the financial structure of a LDC. Tobin completely ignored the real sector of the economy[1] and Park introduced only a skeleton of the real sector of the economy[2]. Park did not address the question of economic dualism, although he suggested that "perhaps the system on the production side requires a two-sectoral model, one for agriculture and the other for industrial sector"[3]. The models developed in this study incorporate the duality features of both the real and financial components of a typical LDC.

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footnote #1 continued from page 30.

Unlike this study, Galbis assumed that both sectors produce the same output which is sold at a uniform price, and capital goods and consumption goods are indistinguishable. Furthermore, Galbis discussed the effects of low interest rate ceiling in the "inferior" technology on the efficiency of investment outlets, inflation and the distribution of income. Galbis' two-sector model is a misnomer.

[1]Turnovsky(1977, chapter 7) attempted to integrate Tobin's financial sector with a real sector.

[2]Park(1973, p.402). For a complete list of macroeconometric models designed for LDCs, see Park(1973, p. 402).

[3]Park(1973, p. 410).

CHAPTER 3 : A COMPLETE STRUCTURAL MODEL FOR A DUAL ECONOMY

In this chapter we develop a two-sectoral macro model of a typical LDC in the spirit of the neo-Keynesian theory. In developing models for LDCs, one must realize that the structural and institutional differences among these countries are so varied that it would be almost impossible to build a macro-model representing all countries. What we have looked into are the broad characteristics described in the previous chapters that are common to most of the less developed countries - characteristic features that differentiate these economies from developed ones, and incorporated them into a model within a neo-Keynesian framework.

Macro-models that have been developed for LDCs fall in one of the two categories: dual model without the financial sector or single sector monetary models. We shall formulate a dual model representing the dual monetary system in a LDC for reasons elaborated in earlier chapters. The relevance of the neo-Keynesian monetary theory to LDCs can be examined best within a dual model because it bears the essence of financial intermediaries and the transmission mechanism of monetary impulses.

This chapter consists of five sections. The first section describes the commodity market equilibrium condition and the aggregate supply side of the agricultural sector. The second section describes the financial component of the agricultural sector. The manufactured commodity market equilibrium condition and the aggregate supply

function of the industrial sector are developed in section three. The financial component of the industrial sector is described in the fourth section. Lastly, the fifth section describes the complete dual model - both the agricultural and industrial sectors are put side by side.

We make a number of simplifying assumptions. Firstly, this is a short-run model. There is no technological change or growth of capital, at least explicitly. Secondly, the behavioural relationships are basically static although there are certain elements in the model which are intrinsically dynamic, namely the price-adjustment equations. Thirdly, agricultural and industrial commodities are gross substitutes implying the existence of sectoral budget constraints. Fourthly, a partial equilibrium approach is used in analyzing the model.

3.A Income-Expenditure and Price Equations in the Agricultural Sector

We assume that the agricultural sector produces only agricultural commodities but consumes a combination of both agricultural and manufactured goods. No inputs in the production process are imported from the other sector. The restriction on factor mobility is crucial for the dual economy theory, and it needs some explanation.

Only two types of factors (labour and capital) can be theoretically perceived as mobile. It is easier to rule out capital

mobility than labour mobility. Since the agricultural sector is assumed not to have any financial institutions, inflow and outflow of financial capital between the two sectors is almost nil. Trading of physical capital between the two sectors is also zero because production of both consumption and capital goods are sectorally specialized. Agricultural commodities and physical capital used in its production process are produced in the agricultural sector, and the same holds for the industrial sector. Trading between the two sectors is confined to finished consumption goods only.

It is true that there is a substantial amount of rural-urban migration in the LDCs. However, the unidirectional flow of labour from the traditional sector into the modern sector has very little economic consequences. Unlike the neo-classical factor mobility theory, rural-urban migration in the LDCs does not affect wages, employment and output in the agricultural sector because the migrants are entirely composed of surplus farm labour whose marginal productivity is zero or negative. Furthermore, this is a short-run model and rural-urban migration is not expected to change the urban wage rate or the level of employment in the urban industries because the migrants are most likely to be unskilled for any industrial job. With these interpretations of the factor mobility restrictions in mind, we will proceed with the aggregate demand and supply functions of real output.

Consumption is assumed to be a function of the domestic price ratio and real income[1]. The price ratio has been included to reflect the possible gross substitutability between the two goods as their prices change[2]. Consumption expenditure responds positively with both the variables.

Investment decisions are made by small self-financing units who have no access to the (financial) capital market in the modern sector. Investment expenditures are usually in the form of small amounts of physical capital like plows, hand tools, livestock, housing construction, land improvement etc. Investment is a decreasing function of its own rate of return (r_{1K}) or an increasing function of the relative price of capital measured in terms of the price of consumption goods (P_{1K}/P_1), where P_{1K} is the price of capital and P_1 is the price of consumption goods[3].

Physical volume of exports of agricultural goods to the modern sector and imports of manufactured goods from the modern sector are functions of domestic price ratio and real income. Export is a decreasing function of domestic price ratio but an increasing function of real income. On the other hand, import is an increasing function of both domestic price ratio and real income.

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[1] We could have used wealth as another variable affecting the level of consumption expenditure, and its partial derivative would have been positive. Since we will not trace the wealth effect route of monetary transmission mechanism we will delete it from the function.

[2] Laursen and Metzler(1950, p. 256) used a similar argument to explain the effects of exchange rate changes on the expenditure schedule of a country.

[3] Tobin(1969). This formulation contrasts McKinnon(1973, p. 61).

On the demand side, the agricultural commodity market equilibrium condition may be written as,

$$(3.A\text{-}1) \qquad P_1Y_1 = [\Omega_1P_1 + \Omega_2P_2]c_1 + P_1I_1 + P_1X_1 - P_2X_2$$

As there are two types of commodity prices: P_1 and P_2, the real value of output is different from real income. In the above equation, P_1Y_1 is the market value of agricultural output and Y_1 is the aggregate physical output. $P = \Omega_1P_1 + \Omega_2P_2$ is the consumer price index for the entire economy, where Ω_1 and Ω_2 are the weights, and $\Omega_1 + \Omega_2 = 1$. The weights represent the proportion of sectoral absorption of each other's products. For simplicity we will assume that the weights in both the sectors are identical because there is no reason to believe that the composition of consumption goods will be radically different in the two sectors. In short, it can be said that (at least theoretically) a common CPI operates in the economy[1].

The market value of consumption expenditure in the agricultural sector is denoted by Pc_1 because this consumption expenditure is on both the commodities. The market value is derived by multiplying c_1 (the volume of consumption goods) by the consumer price index (P). By the same token, investment expenditure is P_1I_1 because investment expenditure is on agricultural goods only. P_1X_1 and P_2X_2 are the market value of exports and imports respectively, where X_1 and X_2

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[1] In any case this is an empirical issue.

are the physical volumes of exports and imports.

The real values of the variables are derived by dividing the market values with the CPI deflator:

(3.A-2) $$P_1Y_1/P = c_1 + P_1I_1/P + P_1X_1/P - P_2X_2/P$$

(3.A-3) $$y_1 = c_1 + i_1 + x_1 - x_2$$

The specific functional relationship of the income-expenditure equilibrium condition is the following:

(3.A-4) $$y_1 = c_1[P_2/P_1, y_1] + i_1(r_{1K}) + x_1[P_2/P_1, y_2] - x_2[P_2/P_1, y_1]$$

where $c_{11} > 0$; $1 > c_{12} > 0$; $i_{11} < 0$; $x_{11} > 0$; $x_{12} > 0$; $x_{21} < 0$; $x_{22} > 0$.

The notations are as follows:

y_1, y_2 = real income of the agricultural and industrial sector respectively, which are distinct from physical outputs.

P_1, P_2 = market prices of agricultural and industrial sector respectively.

c_1 = real consumption expenditure on both agricultural and industrial goods by individuals in the agricultural sector.

i_1 = real investment expenditure in additional (physical) capital in the agricultural sector[1].

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[1] Capital is assumed not to depreciate. Existing capital and new capital equipment are perfect substitutes and sell at the same price, i.e., we do not make any distinction as Tobin(1969) has.

r_{1K} = real rate of return on physical capital in in the agricultural sector.

x_1 = real value of export of agricultural commodities by the agricultural sector into the industrial sector (equivalent to real value of imports by the industrial sector).

x_2 = real value of import of industrial goods by agricultural sector from the industrial sector (equivalent to real value of industrial sector's export).

The income-expenditure equilibrium condition (3.A-4) deserves a couple of explanations. Firstly, instead of using the absolute price levels (P_1 and P_2) we would like to focus on the current rates of inflation. For convenience let us substitute,

(3.A-5) $$P_1 = P_{1,t-1}(1 + \pi_1)$$

$$P_2 = P_{2,t-1}(1 + \pi_2)$$

where π_1 and π_2 denote the current rates of inflation of agricultural and industrial goods respectively. Without any great loss of generality, let us assume the $P_{1,t-1} = P_{2,t-1} = 1$. As a result, the income-expenditure condition (3.A-4) will be a function of π_1 and π_2 instead of P_1 and P_2.

Secondly, the fact that investment is self-financed with no access to borrowing in the capital market implies that, at any moment,

aggregate savings usually exceed aggregate investment.[1] Any discrepancy between actual savings and actual investment must be reflected by a change in asset holdings (Δm_{1S}),

$$s_1 = i_1 + \Delta m_{1S} \qquad (3.A\text{-}6)$$

We should bear in mind that Δm_{1S} is a component of savings which has not been transferred into investment. How people choose to hold this excess savings will be discussed later. The disposition of excess savings is a crucial question in a region which does not have any financial institutions.

Now, to relate (3.A-6) with (3.A-4), we need to ask the following question: what is the source of a spurt of money supply in an economy which does not have any financial institution? Starting from an initial equilibrium trade condition ($x_1 - x_2 = 0$), we assume that Δm_{1S} is the change in the (endogenous) money supply in the agricultural sector resulting from a surplus or deficit in the balance of trade. In short, to analyze the monetary transmission mechanism from industrial sector into the agricultural sector, we identify excess savings over investment (i.e., Δm_{1S}) with a surplus in the balance of trade.

If both the sectors of our model had fully developed financial institutions, the likelihood of an inequality between savings and investment would have been very slim. The main reason being current account surplus(deficit) would balance the capital account deficit (surplus). There would be portfolio investment in the capital account

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[1] Thirlwall(1978, p. 263).

of the inter-regional balance of payments. The financial intermediaries in each sector would have exchanged non-monetary claims/liabilities between them to balance their asset-liabilities accounts. This is just an indication of the role of intermediaries in settling inter-regional current accounts.

We are dealing with an open agricultural sector, defined as one which has linkage with the rest of the national economy (namely the industrial sector). The linkage can operate through output markets or input markets or both. To take account of the effects of these linkages on the equilibrium of the agricultural sector, linkage equations must be specified. These linkage equations typically consist of the demand functions of the industrial sector for agricultural goods and inputs, and the supply functions of manufactured goods and inputs to the agricultural sector. At the same time the linkage equations provide channels of transmitting monetary impulses in-between the two sectors. Since we have ruled out factor mobility between the two sectors, the linkage operates only through the output markets. In short, we will be considering an agricultural economy which is open with respect to the output markets but closed with respect to the input markets. The equilibrium of the output markets is achieved by the equality of output supply and the sum of the demands for agricultural goods by the two sectors, which may be represented by the following equation:

$$(3.A\text{-}7) \qquad Q_1^S = Q_{11}^D + Q_{12}^D$$

where Q_1^S is the output supply of the agricultural sector and Q_{11}^D and Q_{12}^D are the demand for agricultural output in agriculture and industry respectively. Similarly, $Q_2^S = Q_{21}^D + Q_{22}^D$ is the equation for industrial output. Since the sectors are closed with respect to inputs, equilibrium in the agricultural input markets is achieved by the equality of demand and supply in the sector itself, and the same is true for the industrial input markets:

$$\Gamma_1^S = \Gamma_1^D \tag{3.A-8}$$

and

$$\Gamma_2^S = \Gamma_2^D$$

where Γ_1^S and Γ_1^D are the supply and demand of inputs for agricultural inputs, and Γ_2^S and Γ_2^D are the supply and demand for industrial inputs.

It is apparent that Q_{12}^D and Q_{21}^D are the volume of exports (imports) and imports (exports) of the agricultural (industrial) sector, and they form the major linkage between the two sectors. The market value of the demand for the two commodities are

$$P_1 Q_{12}^D = P_1 X_1 \tag{3.A-9}$$

and

$$P_2 Q_{21}^D = P_2 X_2$$

and the real values are x_1 and x_2 as specified in equation (3.A-3). The demand functions are homogenous of degree zero in P_1 and P_2 like any consumer demand function, i.e.,

$$(P_1/x_1)(\partial x_1/\partial P_1) + (P_2/x_1)(\partial x_1/\partial P_2) = 0 \tag{3.A-10}$$

and

$$(P_1/x_2)(\partial x_2/\partial P_1) + (P_2/x_2)(\partial x_2/\partial P_2) = 0$$

The linkage balance of trade equation is,

(3.A-11) $$B_1 = P_1X_1[P_2/P_1, y_2] - P_2X_2[P_2/P_1, y_1]$$

where $X_{11} < 0$; $X_{12} > 0$; $X_{21} > 0$; $X_{22} > 0$.

The first component on the right hand side of the above equation is the market value of total exports of agricultural commodities to the modern sector, and the second component is the market value of total export of manufactured goods to the agricultural sector. The signs of the derivatives are obvious.

A surplus in the balance of trade of one sector must be balanced by a deficit in the balance of trade of the other sector, so that

(3.A-12) $$B_1 + B_2 = 0$$

where B_1 and B_2 are the net nominal balance of trades of agriculture and industry respectively. Money supply in the traditional sector will increase if $B_1 > 0$; decrease if $B_1 < 0$; and remain unchanged if $B_1 = 0$. This implies

(3.A-13) $$\Delta M_{1S} = B_1$$

$$= P_1X_1 - P_2X_2$$

The inhabitants in the agricultural sector can obtain more money by running a trade surplus with their neighbours.

So much for the demand side of the output market and the linkage equations. Let us now turn to the supply side of the output market and the determination of agricultural price(P_1). The supply side of the market is crucial because its introduction closes the real system. Agricultural price (P_1) is determined by the total level of demand - which includes the industrial sector's demand. The supply of output is a simple increasing function of its own price. The current rate of inflation in agricultural goods is determined by the demand pressure in the agricultural output market,

$$\pi_1 = \alpha_0 + \alpha_1(y_1 - \bar{y}_1); \qquad \alpha_1 > 0 \tag{3.A-14}$$

where the rate of inflation (π_1) is substituted for P_1 using the relation derived in (3.A-5). Demand pressure is approximated by $(y_1 - \bar{y}_1)$, the deviation of actual output from its full capacity level. Inflationary expectations do not influence the current rate of inflation because the labour market is not organized in this sector.

3. B Portfolio Behaviour and Composition of Wealth in the Agricultural Sector.

In the absence of a variety of financial assets, asset choices of wealth owners will be restricted to holding either currency or real (tangible) assets like precious metals and jewellery, stock of durables and agricultural commodities, agricultural and handicraft tools, livestock, land improvement, housing construction etc. Real assets

are an important substitute for money. Some real assets are unproductive and others are productive. The distinction between productive and unproductive assets is based on the role of an asset in the production of consumer goods and services. Any meaningful analysis of how money affects the real flow variables in the agricultural sector must identify the assets that the wealth holders consider good substitute for money and then examine the extent to which changes in the nominal rates of return on these assets influence the demand for money. In other words, the composition of individual wealth portfolios consists of three assets: unproductive tangible assets (which are held as inflationary hedges), productive tangible assets and currency.

(a) Unproductive Tangible Assets:

Examples from this category assets are precious metals, jewellery, stock of durables and agricultural commodities. At any point in time the supply of these are fixed and will be represented by H_1 - a composite asset.

The most important characteristic of this asset is that it is held as an inflationary hedge.[1] Another important reason why people hold a substantial portion of their wealth in this form is that, in the absence of any financial assets alternatives, this is the only asset which is relatively liquid, divisible and offers protection against general price inflation.

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[1] Tun Wai(1972, p. 31).

The expected nominal rate of return of an asset depends on two components: the marginal product of the asset and the expected capital gain or loss. Since this asset is not used as an input to produce other goods and services, the marginal product is zero. Moreover, the supply is fixed at any point in time, the marginal product is zero anyway. The nominal expected capital gain(loss) is equal to the rate at which the price of the asset is expected to increase (decrease) over time[1] and it is denoted by r^*_{1H}.

Park(1973, p. 390) suggested that the expected rate of general inflation(π^*) could very well be a reasonable proxy for expected nominal rate of appreciation (r^*_{1H}) of the asset price. However, there are two problems with Park's suggestion. In the first place, the expected real rate of return would be zero and secondly, the asset price and the commodity price would be indistinguishable. This would imply that commodity price is being determined in the asset market and vice versa, which is too simplistic a notion of how the markets operate. Instead, it is assumed that the expected price of inflationary hedge diverges from the expected commodity price and the expected real rate of return on an inflationary hedge asset is non-negative. The reasons being, this asset is relatively liquid and the (historical) behaviour of the expected real rate of return has been mostly positive.[2]

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[1] See Vogel and Buser(1976, p. 37) for a similar explanation.

[2] Evan though data are not available for the expected price of an inflationary hedge and the expected CPI, it can be (intuitively) deduced that if an asset is to be held as a protection against inflation its expected real rate of return should be at least non-negative.

(b) Productive Tangible Assets:

The second type of asset held by individuals is the productive, tangible real assets - namely capital goods, and this includes simple agricultural and handicraft tools, livestock, dwellings, land improvement etc. Unlike unproductive assets, capital goods are not generally used as inflationary hedge because the market is relatively unspecific and hence they are relatively illiquid. The capital inputs used in the production of agricultural goods are produced within the sector (which is in accordance with our earlier assumption that there is no inter-sectoral trade of inputs).

The real rate of return on physical capital is the rate per unit of value of capital[1], which can be expressed as

(3.B-1) $$r_{1K} = \frac{R_1 K_1}{P_{1K} K_1}$$

or $$r_{1K} = R_1 / P_{1K}$$

where R_1 = marginal physical product of capital (MPP_{1K})

K_1 = stock of capital

r_{1K} = real rate of return on capital

P_{1K} = price of existing capital in terms of the price of currently produced goods (or in Tobin's terminology in terms of reproduction cost).

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[1] See Tobin(1969, p. 327).

(c) Currency as a Financial Asset:

The third type of asset available to wealth holders is the financial asset (only currency). In the absence of any financial institutions in this sector, there are no demand deposits, bonds, saving certificates etc. and no financial liabilities. Currency holdings do not earn interest but there is the possibility of capital gains or losses on money due to changes in prices of consumption goods. The expected rate of change in the real rate of return on money holdings is equal to the expected rate of deflation. The price of money is the inverse of the consumption goods price(P), and an increase in the expected rate of inflation will decrease the real rate of return on money, i.e., money will be losing value faster. In short, the real rate of return on money is equal to the expected rate of deflation ($-\pi^*$).

One very important aspect of the financial structure of the agricultural sector that has not been mentioned up to now is the rural money-lending-trading system[1]. The rural money market is not a homogenous unit and is largely composed of moneylenders, traders and landlords some of whom combine money lending with trade and other activities. The rate of interest charged by these moneylenders is relatively high and in some way reflects the true cost of credit. There are a number of reasons why the rural money-lending-trading

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[1] See Tun Wai(1957) for a very good description.

system will not be examined in this study. The first and foremost reason is that loans are mainly for consumption purposes[1] and do not finance long-term fixed capital investment. Unlike financial intermediaries, the money lenders do not mobilize small savings and do not affect the capital accumulation and/or production process in the agricultural sector. The second reason is that the money lenders are outside the direct control of the central bank and are not influenced by its monetary policies because these money lenders do not participate in any transaction with the organized money market, especially in terms of portfolio investment. Thirdly, the rate of interest and the size of the market cannot be measured in any statistical sense because the market is not homogenous and organized. It is true that a proxy measurement could be used but as long as the money lenders remain outside the control of the central bank, monetary policies will be ineffective. More importantly, small units of savings will keep bypassing institutional channels into unproductive investment.

The real quantities of currency, capital and inflationary hedge assets that wealth owners desire to hold in their portfolios depend on their real non-human wealth(w_1), rates of return on various assets and the aggregate level of income. The optimal amount of wealth allocation in capital(K_1), inflation hedge asset(H_1) and currency(M_{1S}) depend on the following:

r_{1M} = the expected real rate of return on currency (which is the expected rate of deflation).

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[1] Thirlwall(1978, p. 262).

r_{1K} = the expected real rate of return on capital

r_{1H} = the expected real rate of return on inflation hedge assets (whose nominal rate is the expected rate of appreciation or depreciation of the price of the asset).

All assets are assumed to be gross substitutes in an individual portfolio, i.e., an increase in the rate of one asset raises the demand for that asset and hence lowers the demand for all others. The demand-supply functions of the asset markets are the following:

(3.B-2) $$L_1(y_1, r_{1M}, r_{1K}, r_{1H}, w_1) = \frac{M_{1S}}{P}$$ (currency)

(3.B-3) $$F_1(y_1, r_{1M}, r_{1K}, r_{1H}, w_1) = \frac{R_1 K_1}{r_{1K}}$$ (capital)

(3.B-4) $$J_1(y_1, r_{1M}, r_{1K}, r_{1H}, w_1) = H_1$$ (inflationary hedge)

(3.B-5) $$w_1 = \frac{M_{1S}}{P} + \frac{R_1 K_1}{r_{1K}} + H_1$$ (wealth constraint)

The signs of the partial derivatives are as follows[1]:

$$L_{11} > 0;\ L_{12} > 0;\ L_{13} \leq 0;\ L_{14} \leq 0;\ 1 > L_{15} > 0$$

(3.B-6) $$F_{11} = 0;\ F_{12} \leq 0;\ F_{13} > 0;\ F_{14} \leq 0;\ 1 > F_{15} > 0$$

$$J_{11} < 0;\ J_{12} \leq 0;\ J_{13} \leq 0;\ J_{14} > 0;\ 1 > J_{15} > 0$$

and we shall explain these signs later.

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[1]Tobin(1969, p. 327) used similar relationships in his model.

From the wealth constraint,

$$(3.B\text{-}7) \qquad L_{1j} + F_{1j} + J_{1j} = 0 \qquad j = 1, 2, 3, 4$$

$$L_{15} + F_{15} + J_{15} = 1$$

Within the context of the portfolio-adjustment model, changes in currency balances held must be explicitly inter-related with movements in other assets in the portfolio. Total wealth has to be held in one of the available form of assets. If the amount of one of the assets people wish to add to their portfolios as wealth increases is quite large, then the response of all the other assets (taken together) must be smaller in order to ensure that the increase in all assets demanded as wealth increases is constrained exactly to equal that increase in wealth. In short, the sum of the coefficients relating the demand for all the individual assets with respect to wealth must sum to unity, and the value of each derivative at each level of wealth constraint is positive.

The wealth constraint further implies that if the movement of some causal variable causes an increase in the demand for an asset then the demand for the sum of all other assets must fall by a like amount so that the balance-sheet identity is maintained, and the sum of assets held must equal the total value of wealth. The sum of the partial derivatives along any of the rows must sum to zero because the demand functions are homogenous of degree zero in rates of returns. Similarly, the sum of the partial derivatives along any

of the columns must sum to zero because if the demand for currency-balances increases with the level of real income then the demand for the other two assets (taken together) must fall equivalently in order to accomodate the increased demand for currency.

As long as changes in the expected rates of return on assets do not cause changes in income and wealth, their effects will be limited to causing a substitution between assets in the portfolio. It is the relative return and not the absolute return on alternative holdings that causes portfolio adjustments. An equal increase in the yield on all assets, leaving the differential between asset yields unchanged, should not change the proportions in which asset holders wish to distribute their portfolios between the various assets (assuming that the level of income and wealth are constant). The demand for an asset is positively related with its own yield and non-positively with all other yields. This aspect of the demand for an asset attributes a very important characteristic to the rates of return coefficient sub-matrix,

(3.B-8)
$$\begin{bmatrix} L_{12} & L_{13} & L_{14} \\ F_{12} & F_{13} & F_{14} \\ J_{12} & J_{13} & J_{14} \end{bmatrix}$$

The sums of the coefficients along the rows are zero because the functions are homogenous of degree zero, and variations in the yield variables induce substitutions in the portfolio which must sum the column coefficients to zero. Moreover, an increment in the demand

for an asset is theoretically equivalent to the shifting out of an asset into an asset whose yield has (relatively) increased. This behaviour of the asset market is similar to the Slutsky effect in price theory which requires the yield coefficients sub-matrix to be symmetrical. The main diagonal of the sub-matrix is positive and the off-diagonal elements are non-positive and equal to each other, i.e., the elements below the main diagonal form a mirror image of the elements above. This implies that,

(3.B-9) $$L_{13} = F_{12};\quad L_{14} = J_{12};\quad F_{14} = J_{13}$$

and $$L_{1j} + F_{1j} + J_{1j} = 0 \qquad j = 2, 3, 4$$

$$\sum_{j=1}^{3} L_{1j} = \sum_{j=1}^{3} F_{1j} = \sum_{j=1}^{3} J_{1j} = 0 \qquad j = 2, 3, 4$$

The partial derivatives with respect to income are slightly different from the rest. $L_{11} + F_{11} + J_{11} = 0$ where $F_{11} = 0$ implies $J_{11} = -L_{11} < 0$. $F_{11} = 0$ because physical capital is not a transaction substitute for money. An increase in the demand for money for transaction purposes is met by instantaneously reducing inflationary hedge assets(H_1) holdings and not by adjusting holdings of physical capital. This follows from our earlier observation that H_1 is a mirror image of cash balance, and that H_1 is held primarily as a good store of value during periods of inflation.

3.C Income-Expenditure and Price Equations in the Industrial Sector.

The industrial sector uses all its resources to produce manufactured goods but consumes a combination of both agricultural and manufactured goods. It is an open sector which trades only in the commodity markets, i.e., the output markets are open but the input markets are closed. No inputs in the production process of manufactured goods are imported from the other sector for reasons cited in Section 3.A.

The demand side of the industrial commodity market equilibrium condition is,

$$(3.C\text{-}1) \qquad P_2Y_2 = P_{\cdot}c_2 + P_2I_2 + P_2X_2 - P_1X_1$$

P_2Y_2 is the market value of industrial output(income) and the right hand side of the above identity represents the expenditures. To derive the real income and expenditures, we deflate the nominal variables by the consumer price index(P), which is a weighted average of the two commodity prices,

$$(3.C\text{-}2) \qquad y_2 = c_2 + i_2 + x_2 - x_1$$

The specific functional relationship of the income-expenditure identity (3.C-1) may be represented as,

$$(3.C\text{-}3) \qquad y_2 = c_2[P_2/P_1, y_2] + i_2(r_{2K}, r_L) + x_2[P_2/P_1, y_1] - x_1[P_2/P_1, y_2]$$

The signs of the partial derivatives of the functions are:

$$c_{21} < 0; \quad 1 > c_{22} > 0; \quad i_{21} < 0; \quad i_{22} < 0;$$

$$x_{21} < 0; \quad x_{22} > 0; \quad x_{11} > 0; \quad x_{12} > 0$$

The notations are the same as used in (3.A-3) except for two new variables: r_{2K} and r_L. r_{2K} is the rate of return on physical capital in the industrial sector, and r_L is the bank loan rate. The demand for investment expenditure in additional capital is a decreasing function of the rate of return on capital and bank loan rate. The signs of the other derivatives are the same as explained in Section 3.A.

In order to focus on the current rate of inflation we will be using the same substitutions as outlined in (3.A-5). The most important difference between the income-expenditure identities of the two sectors is the investment function. In the agricultural sector, investment expenditures are self-financed. An individual, being limited to self-finance has to save enough money before he can purchase a unit of physical capital that is different from his own output. There are two sources of investible resources in the modern (industrial) sector which may contribute to the growth of capital stock. Non-consumed income, $s_2 = y_2 - c_2$, is the first source of investment fund. Secondly, since the modern sector has access to capital market (to be discussed in Section 3.D) we can expect some portion of the investment to be financed by bank credit.

According to the loanable funds theory[1],

$$(3.C\text{-}4) \qquad i_2 = s_2 + \Delta(H_{2P}/P)$$

where total investment expenditure is generated by savings and real value of credit flows (H_{2P}/P). The credit flow is generated by changes in holdings of demand deposits, time and savings deposits and/or government subsidies. This implies that starting from an initial trade equilibrium condition ($x_2 - x_1 = 0$), the excess of investment over savings is financed by loans (increase in the stock of money). As a consequence of an increase in the stock of money, the income level will rise in the next period as the dynamic process continues. The equilibrating mechanism will be conducted via changes in the income level and the rate of return on capital. In other words, an expansion (or contraction) of income flow (which may be identified with the discrepancy between investment and savings) may be achieved only through an increase (or decrease) in the total money supply. It is clear that in the modern sector, an increase in bank deposits (i.e., financialization of savings) can lead to an increase in credit flows and hence, an easing of the financial assets constaint.

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[1] See Tsiang(1956, p. 552) for such an explanation.

The linkage equation may be represented by,

(3.C-5) $$B_2 = P_2X_2[P_2/P_1, y_1] - P_1X_1[P_2/P_1, y_2]$$

where $X_{21} > 0$; $X_{22} > 0$; $X_{11} < 0$; $X_{12} > 0$

and refering back to (3.A-12), $B_2 = -B_1$.

In the agricultural sector, nominal money supply is treated as an endogenous variable where the money supply can increase(decrease) if the sector runs a surplus(deficit) in the current trade account with the industrial sector. Factors associated with monetary expansion in the modern (industrial) sector can be expressed by,

(3.C-6) $$\Delta M_{2S} = B_2 + \Delta H_{2P}$$

where ΔM_{2S} is the change in the stock of money, B_2 is the current account surplus (or deficit) with the agricultural sector; and ΔH_{2P} is the increase in bank credit. If $B_2 = 0$, then change in the stock of money is the result of a change in the bank loan. In (3.C-6) the bank(money) multiplier is implicit. The bank multiplier is not treated explicitly in the model because in a qualitative model (like this one) exclusion of a positive parameter will not alter the results of the model.

Flow of bank credit is brought about by changes in the central bank's monetary expansion policies,

(3.C-7) $$\Delta H_{2P} = \gamma$$

where γ is assumed to be an exogenous money supply element controlled

by the central bank and again the bank(money) multiplier is treated implicitly. It is a component of the monetary base, for example, commercial bank's borrowing from the central bank to provide credit to the industrial sector. Commercial bank's demand for additional money from the central bank is a translation of general (non-bank) private demand for bank credit. In other words, the residents of the industrial sector can obtain more money either by running a trade surplus or by borrowing from their local banks (indirectly financed by the central bank through an exogenous change in the money supply). Monetary expansion has both endogenous as well as exogenous factors associated with it.

The total money supply in the entire economy is the aggregate of the two money stocks in the two sectors. At any point of time,

$$M_S = M_{1S} + M_{2S} \tag{3.C-8}$$

where M_{1S} and M_{2S} are the existing stocks of money in the two sectors. From (3.C-6), (3.C-7), (3.C-8) and (3.A-13) we get

$$\Delta M_S = \Delta M_{1S} + \Delta M_{2S} \tag{3,C-9}$$

$$= \gamma$$

which implies that the total money stock in the economy can change through certain changes in the central bank's policies operated via the commercial banking system in the industrial sector.

The current rate of inflation of manufactured goods depends partly on the demand pressure on manufactured goods and partly on changes in cost of production. A Phillips curve relationship is assumed to represent the determination of inflation in the modern sector,

$$(3.C\text{-}10) \qquad f_1 y_2 - \pi_2 + f_2 \pi^* = 0$$

$$\text{or} \qquad \pi_2 = f_1(y_2 - \bar{y}_2) + f_2 \pi^* \qquad \text{where } f_1 > 0; \quad 1 \geq f_2 \geq 0$$

Two short comments about the inflation determination equation. The first component on the right hand side of the equation represents total demand for manufactured goods(a part of it coming from the agricultural sector). Second comment: it is true that the Phillips curve is more relevant to advanced countries but the manufacturing sector of a LDC is akin to that of an advanced country. The effects of changes in costs of production on π_2 are measured by percentage change in unit of labour cost. Labour costs depend on the labour market conditions and inflationary expectations. Phillips curve brings out the essence of the manufacturing sector of LDCs and hence justifies its place in our model[1].

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[1] Park(1973, p. 410) suggested a Phillips curve for LDCs on similar grounds.

3.D Portfolio Behaviour and Composition of Wealth in the Industrial Sector.

In this section we will discuss the financial structure of the modern(industrial) sector. There are two types of assets: financial and real. Financial assets consists of currency and bank deposits, and real assets are physical capital stocks. The existence of the banking system gives the investors access to credit markets. Unlike the traditional sector, where there are no direct contacts between primary borrowers and ultimate lenders, external financing or intermediation through the monetary mechanism represents the main artery of the modern financial sector. The process of portfolio determination is carried out by the interplay between the banking sub-sector and the non-bank private sub-sector in four markets: currency, deposits, credit and physical capital.

The banking system is assumed to hold cash as its monetary reserve and bank loans as its earning assets. The balance sheet of the banks' assets and liabilities is described by the following accounting identity:

$$L_{2B} + H_{2B} = D_{2B} \tag{3.D-1}$$

where L_{2B} and H_{2B} are the bank's monetary cash reserves and loans respectively, and D_{2B} represents bank's liabilities(i.e., bank deposits)[1].

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[1]The subscript 2 denotes the industrial sector, B denotes banking sector, and subscript P will denote the non-bank private sector.

The value of a bank's holdings of currency and loans must exactly equal its liabilities(deposits).

The portfolio of the banking system depends on the complete financial structure of the modern sector, that is, which parameters the banking system takes as exogenously given and which are the endogenous variables that the banking system can vary in response to shifts in the parameters. Until the asset preferences of the (non-bank) private sector are explicitly treated, we cannot show how the volume of funds deposited with the banks is determined.

The (non-bank) private is assumed to hold currency, bank deposit, real physical capital and bank loans (treated as negative assets) in their portfolios. The private's balance sheet may be written as

$$L_{2P} + H_{2P} + F_{2P} + D_{2P} = W_{2P} \qquad (3.D\text{-}2)$$

where L_{2P}, H_{2P}, F_{2P}, D_{2P} and W_{2P} are the private holdings of currency, bank loans, physical capital, bank deposits and wealth respectively. The sum of all assets equals non-human wealth.

The behavioural equations explaining the demand for each asset in the banking sector are the following[1]:

$$L_{2B} = L_{2B}(r_C, r_L, D_{2B}, RR) \qquad \text{(Bank Reserves)} \qquad (3.D\text{-}3)$$

$$H_{2B} = H_{2B}(r_C, r_L, D_{2B}, RR) \qquad \text{(Bank Loans)} \qquad (3.D\text{-}4)$$

---

[1]Demand for assets by the banking system is in fact the supply of loans by it.

The demand for monetary reserves and the supply of loans are functions of the rate of return on currency(r_C); the rate of return on bank loans (r_L); bank deposits (D_{2B}) and the legal reserve requirement (RR). We should stress that the above equations might not be properly specified because of the way RR has been introduced. A correct specification requires $[(RR)(D_{2B})]$ in (3.D-3) and $[(1-RR)(D_{2B})]$ in (3.D-4) instead of two separate variables. The justification for introducing RR as a separate variable is to simplify the operation of the model and to allow the use of RR as a policy variable, although we do not deny the over-simplification.

Since currency and loans are gross substitutes in the portfolio of the bank, the demand for an asset responds positively with its own rate of return and non-positively with all other rates. The partial derivatives of bank's demand for assets with respect to the rates of return are

(3.D-5) $$L_{2B1} > 0; \quad L_{2B2} \leq 0; \quad H_{2B1} \leq 0; \quad H_{2B2} > 0;$$

where the third subscript denotes the variable in the function used in the derivatives. The sub-matrix of the rates of return coefficients is symmetrical,

(3.D-6) $$\begin{bmatrix} L_{2B1} & L_{2B2} \\ H_{2B1} & H_{2B2} \end{bmatrix}$$

with positive diagonal elements and non-positive off-diagonal elements.

The sums of the rows are zero because the demand functions are homogenous of degree zero in the rates of return, and the sums of the columns are also zero because only changes in the rates of return induce a substitution effect upon the portfolio, that is,

(3.D-7) $$L_{2B1} + L_{2B2} = H_{2B1} + H_{2B2} = L_{2B1} + H_{2B1} = L_{2B2} + H_{2B2} = 0$$

and $$H_{2B1} = L_{2B2}$$

The signs of the partial derivatives with respect to bank deposit are,

(3.D-8) $$1 > L_{2B3} > 0; \quad \text{and} \quad 1 > H_{2B3} > 0;$$

and $$L_{2B3} + H_{2B3} = 1$$

Bank deposits act as a constraint, anologous to wealth constraint for the (non-bank) private sector. The value of the bank deposits is taken as given. At any point of time, given the volume of their liabilities (i.e., bank deposits) the banks' range of choice is restricted to asset management between reserves and loans. The demand for reserves responds positively to legal reserve requirement and supply of loans responds negatively to legal reserve requirement.

The behavioural equations explaining the demand for each asset in the (non-bank) private sector are the following:

(3.D-9) $$L_{2P} = L_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P})$$ (currency)

(3.D-10) $$H_{2P} = H_{2P}(r_C, r_L, r_D, r_{2K}, y_2)$$ (bank loans)

(3.D-11) $D_{2P} = D_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P})$ (bank deposits)

(3.D-12) $F_{2P} = F_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P})$ (capital)

The real rate of return on currency holdings is r_C; r_L is real bank loan rate; r_D is real bank deposit rate of interest; real rate of return of physical capital is r_{2K}; y_2 is real income and w_{2P} is non-human wealth. The rate of return on physical capital is defined in the same way as in Section 3.B. Again, the sub-matrix of the return coefficients is symmetrical with diagonal elements being positive and the off-diagonal elements being non-positive. The sums of rows and the sums of columns are zero for reasons cited earlier.

The complete financial structure of the modern sector is derived by summing the demand functions of the two components[1]:

	Banks	Private	
(3.D-13)	$L_{2B}(r_C, r_L, D_{2B}, RR)$	$+ L_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P}) = \frac{M_{2S}}{P}$	(currency and reserves)
(3.D-14)	$H_{2B}(r_C, r_L, D_{2B}, RR)$	$+ H_{2P}(r_C, r_L, r_D, r_{2K}, y_2) = 0$	(loans)
(3.D-15)		$F_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P}) = \frac{R_2 K_2}{r_{2K}}$	(capital)
(3.D-16)		$D_{2P} = D_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P})$	(definition of deposits)

[1] Formulation of these equations relies on Tobin(1969, p. 336).

Net non-human wealth is $w_{2P} = \frac{M_{2S}}{P} + \frac{R_2 K_2}{r_{2K}}$ and the banks' net worth is zero because its assets equals its liabilities. For any internally generated financial asset the net sum is zero. From the market equilibrium conditions, the following relationships must hold,

$$H_{2B} = -H_{2P} \quad \text{and} \quad D_{2B} = D_{2P}$$

The demand for bank loans by private sector is treated in its account as negative assets. The definition of D_{2B} is such that banks are price setters and hence, they accept all the deposits people are willing to leave with them.

There is a possible source of deficiency which could lead to abnormal results. The "gross substitutability" assumption may be violated in the complete structure even though it is satisfied by the banking sector and the public sector individually. For example, an increase in the bank deposit rate (r_D) will influence the private sector to substitute deposit for currency and hence the demand for currency will fall. At the same time, banks' demand for currency may simply increase because they have more deposits. To put it differently, $\partial L_{2B}/\partial r_D = (\partial L_{2B}/\partial D_{2P})(\partial D_{2P}/\partial r_D)$ is the change in the demand for currency due to a change in the bank deposit rate(r_D). The sign of the derivative is clearly positive because both the derivatives on the right hand side are positve: an increase in bank deposit rate will increase bank's demand for currency reserves. But $(\partial L_{2P}/\partial r_D) < 0$ because the yield on deposit has a negative effect

on private sector's demand for currency. As a result, the net demand for currency for the entire financial sector is ambiguous. To circumvent the ambiguity we will assume that the sum of the two symmetric matrices is also a symmetric matrix. As this is a qualitative model, we are only concerned with the signs of the elements of the matrix and therefore, we will assume that the summation of two symmetric matrices leaves the signs of the elements unchanged.

3.E The Complete Sectoral Models

Any meaningful monetary analysis in an underdeveloped country requires structuring of models which focuses on the dual monetary system as well as on the dual production system. The effects of financial variables on real variables cannot be analyzed without the complete financial structure of the economy. In this section the complete structural models of the agricultural and industrial sectors are developed by juxtaposing the real and financial components.

(a) Agricultural Sector:

The complete model consists of the agricultural commodity market, the financial structure, the price formation equation and the linkage equation. On the aggregate demand side we will be using the income-expenditure equilibrium condition (3.A-4) and on the aggregate supply side, the price formation equation (3.A-14) will be used.

The linkage equation as expressed by the balance of trade equation (3.A-11) will be utilized. The complete financial structure of the model is represented by the three asset market equilibrium conditions (3.B-2, 3.B-3, and 3.B-4) and the wealth constraint (3.B-5). Current rates of inflation will be used instead of the absolute price levels using the substitution equations (3.A-5).

(3.E-1) $$c_1\left[\frac{1+\pi_2}{1+\pi_1}, y_1\right] + i_1(r_{1K}) + x_1\left[\frac{1+\pi_2}{1+\pi_1}, y_2\right] - x_2\left[\frac{1+\pi_2}{1+\pi_1}, y_1\right] - y_1 = 0$$

(3.E-2) $$\pi_1 - \alpha_0 - \alpha_1(y_1 - \bar{y}_1) = 0$$

(3.E-3) $$L_1(y_1, r_{1M}, r_{1K}, r_{1H}, w_1) - \frac{M_{1S}}{(1+\pi)} = 0$$

(3.E-4) $$F_1(y_1, r_{1M}, r_{1K}, r_{1H}, w_1) - \frac{R_1K_1}{r_{1K}} = 0$$

(3.E-5) $$J_1(y_1, r_{1M}, r_{1K}, r_{1H}, w_1) - H_1 = 0$$

(3.E-6) $$w_1 - \frac{M_{1S}}{(1+\pi)} - \frac{R_1K_1}{r_{1K}} - H_1 = 0$$

(3.E-7) $$B_1 - (1+\pi_1)X_1\left[\frac{1+\pi_2}{1+\pi_1}, y_2\right] + (1+\pi_2)X_2\left[\frac{1+\pi_2}{1+\pi_1}, y_1\right] = 0$$

Besides (3.E-6) there are a few other definitional equations; namely the real rate of return equations, changes in money supply and the inflation version of the consumer price index.

(3.E-8) $$r_{1K} = \frac{R_1}{P_{1K}}$$ (capital)

(3.E-9) $$r_{1M} = -\pi^*$$ (currency)

(3.E-10) $r_{1H} = r^{*}_{1H} - \pi^{*}$ (inflationary hedge)

(3.E-11) $B_1 = \Delta M_{1S}$ (money supply)

(3.E-12) $P = \Omega_1 P_1 + \Omega_2 P_2$ (CPI)

or $\pi = \Omega_1 \pi_1 + \Omega_2 \pi_2$

According to (3.E-8), the real rate of return on physical capital is the marginal physical product of capital (R_1) per unit of the price of capital (P_{1K}). The real rate of return on holding currency is the expected rate of deflation. The nominal rate of return on holding inflationary hedge assets is the expected rate of appreciation (or depreciation) of the asset price, and is denoted by r^{*}_{1H}. The real rate on inflation hedge is the deviation from the expected rate of general inflation (π^{*}). In equation(3.E-12) the consumer price index is defined as the weighted average of the two commodity prices (P_1 and P_2) and Ω_1 and Ω_2 are the weights. Using the inflation version, where $P_{t-1} = P_{1,t-1} = P_{2,t-1} = 1$ we derive the current rate of inflation as the weighted average of the two rates.

There are six behavioural equations and six definitional equations in the model. Of the six behavioural equations only five of them are independent. From the three portfolio balance equations (3.E-3, 3.E-4, 3.E-5) only two of them are independent[1] because of the

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[1]The Jacobian of the three asset market equilibrium conditions with three unknowns will vanish. One of the equations is redundant. For similar argument see Tobin(1969, p. 325).

wealth constraint: the three equations will not determine three rates but at most two of them. One of the rates of return has to be determined outside the system, so we can delete one of the equations. The rate of return on currency(i.e., expected rate of inflation) is exogenously determined, and this implies that we are left with only two independent asset markets to determine the returns on capital and inflation hedge. By substituting the various definitional equations into the five independent equations (3.E-1, 3.E-2, 3.E-3, 3.E-5, and 3.E-7) we can determine five unknowns: y_1, π_1, r_{1K}, r^*_{1H}, and B_1 in terms of the exogenous variables: y_2, π_2, $-\pi^*$, w_{2P}, K_1, R_1 and H_1, and the constant parameters. We should note that if π_2 is exogenously determined and π_1 is endogenously determined, we do not need to determine π independently because it is a weighted average of the two rates. Once the endogenous variables are determined, the instantaneous values of the definitional variables can be determined recursively.

An examination of the exogenous variables and the constant parameters of the system reveals that none of them can be used as conventional policy instruments - monetary or fiscal. This augments our earlier argument that the agricultural sector is apparently immune to any direct policy actions or influences. To understand what can cause changes in the exogenous varibales we need to discuss the industrial sector. Monetary policies are initiated in the industrial sector and then monetary impulses are transmitted into the agricultural sector through the sectoral balance-of-trade channel. The impulses will be dissipated in a number of channels at the secondary stage level.

(b) Industrial Sector:

Like the agricultural sector, the complete model of the industrial sector includes the aggregate demand and supply equations, the linkage equation and the financial sector. Most of the equations and information used in developing the model are taken from Section 3.C and 3.D. Again, inflation rates are used instead of the absolute price levels.

(3.E-13) $$c_2\left[\frac{1+\pi_2}{1+\pi_1}, y_2\right] + i_2(r_{2K}, r_L) + x_2\left[\frac{1+\pi_2}{1+\pi_1}, y_1\right] - x_1\left[\frac{1+\pi_2}{1+\pi_1}, y_2\right] - y_2 = 0$$

(3.E-14) $$\pi_2 - f_2(y_2 - \bar{y}_2) - f_2\pi^* = 0$$

(3.E-15) $$L_{2B}(r_C, r_L, D_{2B}, RR) + L_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P}) - \frac{M_{2S}}{1+\pi} = 0$$

(3.E-16) $$H_{2B}(r_C, r_L, D_{2B}, RR) + H_{2P}(r_C, r_L, r_D, r_{2K}, y_2) = 0$$

(3.E-17) $$F_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P}) - \frac{R_2K_2}{r_{2K}} = 0$$

(3.E-18) $$D_{2P} = D_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P})$$

(3.E-19) $$B_2 - (1+\pi_2)X_2\left[\frac{1+\pi_2}{1+\pi_1}, y_1\right] + (1+\pi_1)X_1\left[\frac{1+\pi_2}{1+\pi_1}, y_2\right] = 0$$

(3.E-20) $$w_{2P} - \frac{M_{2S}}{1+\pi} - \frac{R_2K_2}{r_{2K}} = 0$$

In addition to (3.E-18) and (3.E-20), the other definitional equations are:

(3.E-21) $$r_{2K} = \frac{R_2}{P_{2K}} \qquad \text{(capital)}$$

(3.E-22) $r_C = -\pi^*$ (currency and reserves)

(3.E-23) $r_L = \bar{r}_L - \pi^*$ (bank loans)

(3.E-24) $r_D = \bar{r}_D - \pi^*$ (bank deposits)

(3.E-25) $\Delta M_{2S} = B_2 + \gamma$ (money supply)

(3.E-26) $\pi = \Omega_1\pi_1 + \Omega_2\pi_2$ (CPI)

Equations (3.E-23) and (3.E-24) define the real rate of interest on bank loan and deposits respectively, where $\bar{r}_L$ and $\bar{r}_D$ are the nominal rates. There are six behavioural equations and eight definitional equations. Of the four asset market equations, three of them are equilibrium conditions and the bank deposit equation(3.E-18) is a definition. Nominal interest rates on bank deposits and loans are institutionally determined, and the real rate of return on currency is the expected rate of deflation. As a result only the rate of return on capital is endogenously determined. The number of independent equations in the asset markets is only one, hence three of the four portfolio balance equations are redundant. In total there are four independent bahavioural equations (3.E-13, 3.E-14, 3.E-15, and 3.E-19) determining four unknowns: y_2, π_2, r_{2K} and B_2 in terms of the following exogenous variables: y_1, π_1, w_1, RR, γ, K_2, R_2, π^*, $\bar{r}_L$, and $\bar{r}_D$, and the constant parameters. To take the deposit rate ($\bar{r}_D$) and the loan rate ($\bar{r}_L$) as institutionally or legally fixed adds to the list of monetary policy instruments and

permits analysis of the question whether an increase in $\bar{r}_L$ or $\bar{r}_D$ is expansionary or contractionary. Once these endogenous variables are determined within the system, the instantaneous values of the definitional variables can be determined recursively.

CHAPTER 4 : MONETARY POLICY AND CHANNELS OF EFFECTS IN A DUAL MONETARY SYSTEM

4.A Introduction

The real problem in a LDC seems to be the apparent insufficiency of domestic savings to finance capital formation requirements. The word apparent is very crucial because, as will be demonstrated later in this chapter, it is not so much the lack of resources as it is the transfer of resources that seems to be the critical problem. In any case, this chapter investigates the role of monetary policy in closing the gap between savings and investment, and stimulating investment. Is an expansionary monetary policy conducive to growth? To answer this question, we need to examine the transmission process of monetary impulses in the economy and determine how monetary impulses affect the real flow variables. In a dual monetary system, where one of the sectors enjoys the privilege of using the services of financial institutions and the other sector does not, the effects of monetary policy are likely to be different in the two sectors.

The influence of monetary policy will be seriously weakened by the absence of financial institutions in one of the sectors. A large part of the stock of money is held in the form of currency and the multiple credit expansion capacity of the banking system is reduced. The monetary authority can influence only a small segment

(ie., the industrial sector) of the economy.

It is expected that the monetary transmission process in a dual monetary system will be more complicated than in a single sector economy. It is generally understood that monetary policy consists of using changes in the stock of money to bring about changes in the flow of spending in the economy. An expansion in the stock of money naturally provides an increase in the liquidity flow to the holders of the stock of money. To the extent that this liquidity and other assets can be substituted for one another, the holders of the increased money stock will try to give up some of their liquidity for other assets depending on the rates of return on these assets. Simultaneous changes in the demand and supply conditions in all the asset markets will determine the equilibrium rates of return in each of the asset market. The asset markets will settle when the wealth holders complete their portfolio composition re-adjustments. Since this portfolio adjustment process does not decrease the quantity of money in the economy - money only changes hands - the process can continue unabated until the flow of spending has reached an equilibrium level at which the augmented stock of money and the corresponding augmented flow of liquidity no longer seems excessive.

The impacts of portfolio adjustment process on the real flow variables in the economy depend on the composition of assets in the portfolio of the wealth holders. For example, in a simple Keynesian income-expenditure model, money and bonds are the only two assets in

the portfolio of the wealth holders and bonds are a mirror-image of capital. In such a model, monetary impulses operate through changes in the rate of interest (the rate of return on a long-term government bond). Any change in the money stock alters the rate of interest so as to equate the demand and supply of money. The change in the rate of interest (viewed as a measure of the cost-of- capital) stimulates investment. The change in investment expenditure has a multiple effect on equilibrium income. The interest rate is the key linkage variable between the real and financial sectors. This type of monetary transmission process is usually referred to as the cost-of-capital channel.

The effectiveness of monetary policy (crucially) hinges on how the wealth holders store their additional wealth and what types of assets the wealth holders are willing to hold in their portfolios. There is a distinct possibility that the household savings are channelled into unproductive assets as idle money balances, precious metals, durables, consumer goods, etc., and in such a case the linkage between the financial and real sector will be tenuous. The portfolio adjustment process will not be able to establish the cost-of-capital channel and hence, not all domestic savings will be made available for productive investment. This implies that savings will not affect the real flow variables.

In what circumstances will the household savings be diverted into unproductive assets? Household savings will be diverted into unproductive uses in the total absence of financial assets. The

first section of this Chapter traces the channels of monetary impulses from the industrial sector into the agricultural sector and attempts to demonstrate how savings are diverted into unproductive assets in the absence of financial assets. The subsequent sections of this Chapter analyze the comparative-static results of the models developed in Chapter 3 in the light of the transmission mechanisms of monetary policy.

4.B The Monetary Transmission Mechanism

The most important question in monetary theory is, how does the money stock affects real flow variables? The disagreements among different schools of thought of monetary theory are centered on the transmission mechanisms of monetary influences rather than on ultimate results. Do changes in the quantity of money have a significant effect on the levels of income and employment? There is little disagreement that the answer to the question is a definite "yes". If, then, it is agreed that money is relevant the debate between "Keynesians" and "Monetarists" must be over either how money operates, that is, the mechanism by which it affects the real variables and the price level, or how much it affects these variables in practice.

In the short-run analysis, the debate boils down to how additional money enters the system and whether money is a close substitute for other financial assets or for real assets.

If, as Friedman(1969, p. 4) has postulated, money were dropped from helicopters and if money is a close substitute for real assets (there is money and there is real assets and nothing in between), individuals would balance their portfolios of real assets by directly substituting goods for money through purchase of more goods. Keynesians argue that money is usually issued through interest-bearing governments bonds and an increase in the supply of money affects real variables through its impact on the rate of interest, and on the real value of cash balances held by consumers. If money is injected by open market operations the interest rate on bonds (an alternative to holding money) will fall (i.e., bond prices rise) and will fall more the less substitutable money is for financial assets. The fall in the interest rate would stimulate investment and ultimately the aggregate demand.

In the long-run analysis, the debate revolves around the shape of the long-run Phillips curve. Neutrality of money in the long-run depends on whether the long-run Phillips curve exhibits any trade-off between the rate of inflation and the rate of unemployment, and that is an empirical issue.

It can be concluded that money need not be neutral, at least in the short-run. So to determine whether money affects real flow variables, we need to trace the monetary transmission process. As mentioned earlier, monetary policy (generally understood to be expansion or contraction of the money stock) affects expenditure decisions by causing changes in relative asset yields and in wealth,

thereby influencing the amounts of assets which wealth holders want to hold. Such effects on spending can theoretically be divided into the effect on savings decisions of the household and on the investment decisions of the firms. An examination of the causal link between the financial and real sectors of the economy requires a disaggregated model in the neo-Keynesian fashion because it bears the essence of financial intermediation and helps us in tracing the transmission mechanism.

The dual model that we have developed in Chapter 3 is very much in the neo-Keynesian tradition. The flow of impulses in our model is of two types: vertical(internal) and horizontal (external). Vertical channels of monetary impulses flow in between the financial component and the real component either within the agricultural sector or within the industrial sector. Horizontal channels of impulses flow across the agricultural and industrial sectors.

In studying the details of the transmission process, it is important to see how much influence money has at each step in the process. We should stress the simultaneity of the process, although for analytical purpose we identify the steps in succession.

Step 1 : Any change in the quantity of money through a monetary policy action generates a portfolio disequilibrium, at the prevailing rates of return of assets and the level of income. Adjustments in portfolio of the wealth holders restore the

equilibrium in the financial sector where the stimulus was initiated, and set off the second chain of reactions.

Step 2 : Changes in equilibrium rates of return induce changes in real aggregate demand in the industrial sector. Equilibrium in the real component is achieved by certain adjustments in the price of the product, price of factors and the quantity of output supplied.

Step 3 : The change in the price of the product alters the terms of trade for the industrial sector. Variations in the terms of trade create a new disequilibrium in the inter-sectoral trade market. Balance of trade is attained through the relative price effects and income changes, and the result is an inflow or outflow of currency between the two sectors. This is the horizontal(external) channel of transmission.

Step 4 : Increase or decrease in money generates another disequilibrium in the financial component of the agricultural sector. Equality in the demand and supply of money is achieved through a new round of substitution of assets in the financial markets of the agricultural sector.

Step 5 : Some aspects of the asset substitution affect the total expenditure in the agricultural sector and hence create a new disequilibrium in the output

market. Equilibrium there is restored by adjustments in the price of the product, price of factors and quantity of output produced.

Step 4 and Step 5 represent the vertical channels of transmission in the agricultural sector. Diagram 4.B-1 on page 84 illustrates the transmission process.

We should stress that the transmission process we refer to and discuss are only the first-round effects which occur within the single period we are considering. They are the net effects completed within that time interval, taking into account the interaction between the various sectors of the model. Because of the intrinsic dynamics of the system it is clear that any changes in a given period will give rise to further feedbacks throughout subsequent periods until a new state of full equilibrium is reached. These longer-run repercussions are not considered in our analysis, although that is not to deny their importance.

The second important observation about the transmission mechanism is that we have discussed only one type of channel. We should bear in mind that there are at least three possible channels[1] of transmitting monetary impulses from the financial sector to the real sector: (i) cost-of-capital (substitution effects via the relative prices of assets), (ii) credit rationing and (iii) wealth effects.

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[1] See Spencer(1974) and Park(1972) for excellent discussions on the transmission mechanism of monetary influences.

We dealt only with the cost-of-capital channel, although it might so happen that the other two channels could play equally important roles in transmitting monetary impulses. In fact we shall see that credit rationing is used quite extensively in the industrial sectors of LDCs. Certain institutional factors do not allow markets in LDCs to operate smoothly and hence resources need to be allocated by non-price criteria.

The scope of monetary policy in a LDC has to be analyzed from two points of view: (i) whether the money supply is an endogenous or exogenous variable? and (ii) given the duality features of the financial structure, how effective is monetary policy?

The stock of money at any moment in time is the result of a number of interaction decisions by the central bank, the commercial banking system, and the (non-bank) private sector. The central bank determines the amount of high-powered money or monetary base - the net monetary liabilities of the government held by the banking system and the private sector. The banking system determines the amount of income-earning assets and the volume of excess reserves it will hold. Lastly, the (non-bank) private sector determines how to allocate its monetary wealth into different types of income-earning assets and currency. The stock of money (defined in broader terms) in our model is not completely exogenous. It is some multiple of the monetary base and the multiple element is the money multiplier. The money multiplier is a ratio (usually greater than unity) of the behavioural parameters like the reserve requirement ratio (RR) and

the currency to bank deposit ratio. For the central bank to control the money stock it must be able to alter, at least, some component of the multiplier and/or the monetary base. Out of the two behavioural parameters, the RR is unvolatile and within the control of the monetary authority. The monetary base can be defined either in terms of sources or uses. One of the most important sources of monetary base is the central bank credit to the commercial banking system and the government. We ignored credit to government because we did not incorporate the government sector into our model. However, we did mention central bank credit to commercial banks and represented it by γ in (3.E-25). We can assert without too much hesitation that most of the industrial credit is financed by increasing the monetary base, i.e., central bank credit to commercial banks.

The traditional tools of monetary policy: open market operations, the discount rate and the reserve requirement ratio affect the availability of credit generally. The effectiveness of monetary policy in LDCs is extremely limited because of the existence of the duality of the monetary system. The modern sector is susceptible to monetary influence but the traditional sector is outside the direct reach of the central bank influence. Monetary policy in LDCs is very "urban biased" and as a result monetary policies have been far from effective in stimulating output, employment and other flow variables in the agricultural sector.

In the remaining portion of this section, we will trace the transmission of monetary impulses using Flow Diagram 4.B-1. The transmission of monetary influences from the modern sector, where they originate, to the agricultural sector may be illustrated by tracing the effects of reducing the reserve requirement ratio of the banks or of an increase in the monetary base (eg., central bank credit to commercial banks). Either action by the monetary authority will increase the commercial banking system's excess reserves as exhibited in Diagram 4.B-1. The banks are assumed to have, under given market conditions, a desired proportion of earning to non-earning assets (reserves). An increase in excess reserves lowers the proportion of earning assets in banks' portfolio below the desired level. In attempting to restore the ratio, banks attempt to increase their holdings of earning assets. In our simplified model, the only earning asset available to the banks is bank credit to the private sector. As we have mentioned earlier, credit rationing is the most direct and powerful channel of transmission of monetary changes to the real sector. The bank loan rate ($\bar{r}_L$) is institutionally determined and kept below the true cost of borrowing in a capital scarce economy. At that prevailing rate of bank credit, the demand for credit exceeds supply and as a result the banks have very little difficulty in reducing their unborrowed reserves to zero. Banks operate to restore their desired ratio by extending new loans to the private. New loans create new deposits, thereby increasing the money supply.

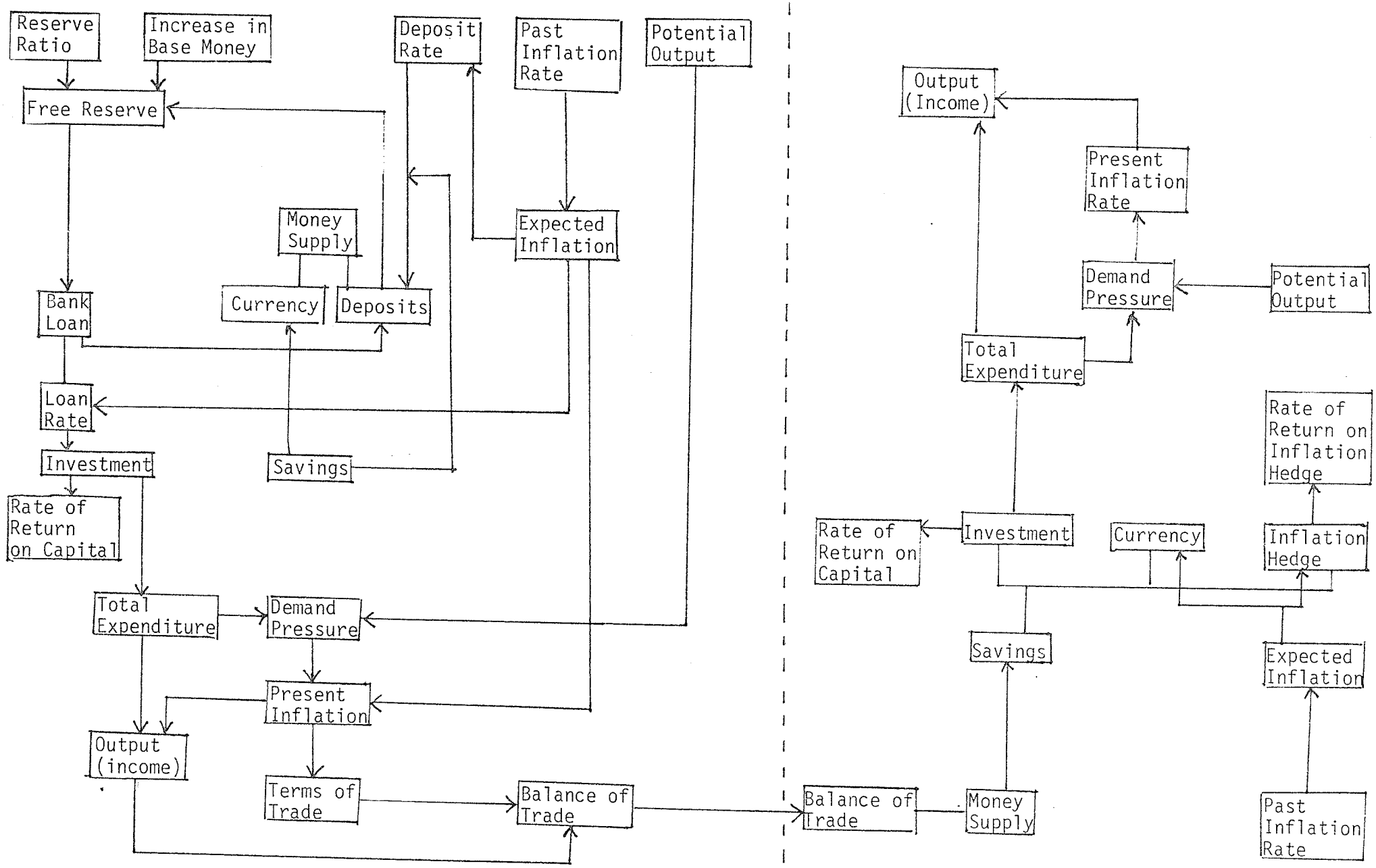

Diagram 4.B-1 : Flow Diagram of First Round Effects of Monetary Policy in a Dual Monetary System

The bank credit market equilibrates at a higher equilibrium level of investment funds demanded and supplied. The rationing of credit influences the desired capital-output ratio and increases the investment component of final demand. The increase in the desired capital-output ratio affects the physical capital market, and a discrepancy develops between the actual and desired capital stock. Excess demand in the capital market is eliminated either by an increase in the price of capital or by a net addition of capital stock or a combination of both. In other words, the adjustment depends on the shape of the supply curve of capital.

Monetary actions affect only one type of spending - investment. An increase in investment spending causes successive rounds of new final demand causing income(output) to rise by a multiple of the initial change in investment. At the same time, an increase in total expenditure creates a new demand pressure in the output market. Excess demand in the output market is eliminated by an increase in the price and quantity produced. The new equilibrium income and price of manufactured goods change the terms of trade. The terms of trade affect the sectoral balance of trade and hence money supply in the agricultural sector is also changed.

Since, money supply (currency) is an endogenous variable in the agricultural sector, a new (secondary) monetary policy is activated. Trading of commodities is the linkage between the two sectors and monetary impulses are transmitted through this channel.

How does a change in the money stock affect the flow variables in the agricultural sector? To answer this question, let us assume that due to a surplus in the balance of trade with its partner, there is a net increase in the money supply in the agricultural sector. An increase in the money stock amounts to an increase in net monetary wealth of the people in agriculture, and this is equivalent to an increase in aggregate savings as mentioned in (3.A-6). In the absence of any financial institutions, what do the people do with their net additional savings? Accumulation of financial assets is a mirror image of real assets accumulation. However, lack of financial intermediation leaves a gap between the decisions to save and the decisions to invest because the distribution of savings among economic units is not necessarily the same as the distribution of investment expenditure among them. Some investments are financed from own savings and some amount of capital formation does take place without generating financial assets. However, this is undoubtedly not the most efficient method of capital formation. Referring back to Diagram 4.B-1, we can see that only a portion of aggregate savings is used for investment. The remaining portion of the savings is stored in the form of currency and/or inflationary hedge assets because there is no mechanism for the distribution of net additional savings beyond the perimeter in which they are generated.

Investment expenditure affects the total spending of the sector and ultimately via the multiplier effect, income is increased. At the same time, total spending increases the demand pressure and a new equilibrium price is attained.

From the above discussion it is clear that financial assets other than money need to be created if savings are to be fully mobilized for financing investment. In the absence of financial assets, a large part of the savings is generally invested in physical assets such as goods and gold which contribute little or nothing to economic growth. The prime objective in LDCs "is not simply to increase aggregate saving, so much as to enlarge the amount of transferrable savings" [Coats and Khatkhate(1979, p. 1883)]. Savings are transferrable if they are invested in financial assets and the creation of financial intermediaries provides a surer guarantee that the act of saving will lead to productive investment.

The subtle distinction between transferrable(i.e., financial) and non-transferrable savings has been overlooked and the savings-invesment gap emerged as the most important bottleneck in LDCs. In the light of this type of diagnosis of the problem, the monetary authority assumed that developing countries will not be able to provide domestic savings to finance capital formation requirements. The existence of a financial gap between savings and investment led policy makers to resort to industrial credit expansion policy. The credit-rationing channel is deemed as the most powerful and direct source of transmitting monetary impulses to the real sector of the economy. Under normal circumstances, a monetary expansion policy relaxes the degree of credit rationing exercised by the commercial banking system, and the expansion is expected to feed directly into consumption and investment expenditure streams.

Diagram 4.B-1 shows that two channels [as categorized by Park(1972) and Spencer(1974)] of monetary transmission operate in the two sectors. In the modern sector, a discretionary credit rationing policy ensures that monetary changes are transmitted to the real sector. On the other hand, lack of financial institutions makes it impossible for the central bank to pursue a discretionary credit rationing policy in the traditional sector. As a result, the monetary transmission mechanism is left up to the asset market forces, where the portfolio substitution process determines the composition of portfolios of the wealth holders. As we have mentioned earlier, the effectiveness of the cost-of-capital channel depends on the types of assets the wealth holders are willing to hold. For the cost-of-capital channel to be effective, accumulation of financial assets must have a real counterpart.

4.C Monetary Policy in the Industrial Sector

We will now turn to the analysis of monetary policy options open to an economy characterized by the phenomenon of financial dualism. Since any policy action must originate in the modern sector, we will carry out the comparative-static analysis in the modern sector first. Totally differentiating the modern sector model as developed in Section 3.E (pp. 69-70), and setting it up in matrix form we get the following[1]:

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[1] See Appendix II for the complete derivation of the equations and signs of the elements of the matrix.

$$\begin{bmatrix} 1 & -b_{14} & -b_{15} & 0 \\ 1 & 1 & 0 & 0 \\ 31 & -b_{33} & 0 & 1 \\ 41 & b_{43} & b_{42} & -b_{44} \end{bmatrix} \begin{bmatrix} dy_2 \\ d\pi_2 \\ dr_{2K} \\ dB_2 \end{bmatrix} = \begin{bmatrix} b_{12} & b_{13} & -b_{16} & b_{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & f_2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & f_1 \\ b_{32} & -b_{34} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -b_{410} & b_{413} & -b_{45} & -b_{46} & -b_{47} & b_{48} & b_{49} & -b_{411} & -b_{412} & 0 \end{bmatrix} \begin{bmatrix} dy_1 \\ d\pi_1 \\ d\pi^* \\ d\bar{r}_L \\ d\bar{r}_D \\ d(RR) \\ d\gamma \\ dM_{2,t-1} \\ dK_2 \\ dR_2 \\ d\bar{y}_2 \end{bmatrix}$$

which may be written as,

$$A_2X_2 = B_2Y_2$$

where A_2 is a 4 x 4 coefficient matrix of the endogenous variables; X_2 is a 4 x 1 column vector of the endogenous variables; B_2 is a 4 x 11 coefficient matrix of the exogenous variables, and Y_2 is a 11 x 1 column vector of the exogenous variables. The signs and notations of b_{ij} is given in Appendix II.

The signs of all the elements of A_2 are unambiguous. The Jacobian of the system is the determinant of A_2 matrix,

$$|A_2| = b_{11}(-b_{42}) + b_{14}(f_1 b_{42}) + b_{15}[f_1(b_{33}b_{44} - b_{43}) - (b_{31}b_{44} + b_{41})]$$

and it is unambiguously positive. The unambiguity of the sign of the Jacobian ensures that the system can be uniquely solved for the unknown,

$$X_2 = B_2 Y_2 A_2^{-1}$$

The reserve requirement ratio and direct control of central bank credit to commercial banks are powerful and effective instruments of monetary policy. In our study, we will concentrate on these two instruments and assume that central bank credit to commercial banks (to finance private industrial loans) amounts to an exogenous change of the monetary base.

The sign pattern of the comparative-static results are summarized in Table 4.C-1. Only the results of the relevant monetary policy instrument variables are summarized.

	dY	$d\bar{r}_D$	$d(RR)$	$d\bar{r}_L$
dy_2	> 0	> 0	< 0	?
$d\pi_2$	> 0	> 0	< 0	?
dr_{2K}	< 0	< 0	> 0	< 0
dB_2	< 0	< 0	> 0	> 0

An expansionary monetary policy characterized by an increase in the monetary base affects the system through the asset markets. An increase in the supply of money ($d\gamma$) raises the demand for real balance on at least two accounts. In the first place, the demand for money is a decreasing function of the rate of return on physical capital and when the supply of money increases it lowers the rate of return on capital (one of the alternative assets to cash balances). Secondly, an increase in the money supply decreases the rate of return of capital (r_{2K}), thereby increasing investment, which in turn leads to an increase in real income thus raising the quantity of real cash balances held for transaction purposes.

The impact of expansionary monetary policy on the rate of inflation is quite similar to conventional models where prices are endogenous. Given an upward sloping supply curve as represented by the price-adjustment equation (3.E-14), an increase in the supply of money will shift the aggregate demand curve upward. Excess aggregate demand will push the inflation rate upward along the aggregate supply curve. However, in a model where inflation is an endogenous variable, the impact of a change in the money supply is likely to be less expansionary than when the prices are held constant. An increase in the money supply, other things being equal, decreases the rate of return for capital which increases the demand for capital on the part of the wealth owners. Increase in the demand for capital thereby increases the equilibrium price of capital and thus raises the level of output of investment goods, which in turn leads to an increase in

real income. The simultaneous operation of the whole process involves two negative feed-backs. The initial increase in income raises the transaction demand for money causing a partially off-setting increase in r_{2K} and decrease in income. The second negative feed-back originates when higher income creates a higher rate of inflation and causes a partially off-setting decrease in the real cash balances. A fall in the real cash balances implies a leftward shift in the money market equilibrium locus in r_{2K} and y_2 space, and which results in a further off-setting increase in the rate of return on capital and hence, decrease income.

The two negative feed-backs, discussed above, suggest that the net expansionary effect of monetary policy depends on the price elasticity of the aggregate supply curve. If the aggregate supply curve is perfectly inelastic with respect to the commodity price (which would be equivalent to the "classical case" with no money illusion in the labour market)[1] then an expansionary monetary policy will only result in a higher rate of inflation. In our model the net expansionary effect is likely to be positive for two reasons. In the first account, the aggregate supply curve is not perfectly inelastic and it is assumed that there is a positive trade-off between output supplied and the price of the commodity. More importantly, we know that the general price level is a weighted average (see page 37)

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[1] Scarfe(1977, p. 223) has derived a similar result for a small open economy.

of the two commodity prices. Firms producing final industrial goods are interested in the price of the industrial goods only, whereas household savers are interested in the consumer price index. As a result, the wealth holders' cash balance demand behaviour depends on the CPI deflator. The CPI deflator changes by only a fraction of the change in the price of the industrial goods. This implies that the money market equilibrium locus in r_{2K} and y_2 space will not return to its initial position due to the negative feed-back effect of an increase in the rate of inflation of the industrial goods. In brief, an increase in the money supply is expected to have a net positive impact on real income and industrial commodity price, and a net negative effect on the real rate of return on capital.

The fourth endogenous variable in the system is the balance of trade (B_2). The balance of trade is important because it provides an insight into how money flows across the two sectors. One of the main objectives of this study is to examine the impacts of monetary policy on the agricultural sector, so it is important to (explicitly) identify the channel through which monetary impulses are transmitted from the industrial sector into the agricultural sector. An improvement (deterioration) of the balance of trade for the industrial sector implies a deterioration (improvement) in the balance of trade for the agricultural sector. To determine how an initial increment in the money supply diffuses from the industrial sector into the agricultural sector, we examine the effects of monetary policy on B_2. From our earlier discussion we know that an expansionary monetary

policy stimulates income and the rate of inflation in the industrial sector, and both of these effects are expected to contribute to an unambiguous deterioration in the balance of trade for the industrial sector.

The impact of a change in the money supply on the balance of trade can be perceived as stemming from two sources: income and price. Equation (4.C-1) expresses the total effect of an expansionary monetary policy on the balance of trade,

$$(4.C\text{-}1) \qquad \frac{dB_2}{d\gamma} = \frac{dy_2}{d\gamma} \cdot \frac{dB_2}{dy_2} + \frac{d\pi_2}{d\gamma} \cdot \frac{dB_2}{d\pi_2}$$

and it is unambiguously negative. $dy_2/d\gamma$ and $d\pi_2/d\gamma$ are the direct effects of monetary expansion on income and inflation and they are positive. dB_2/dy_2 and $dB_2/d\pi_2$ are the indirect effects of income and inflation rate on the balance of trade. The signs of the indirect effects depend on the elasticity conditions of demand for imports and exports[1]. Income-elasticity of demand for agricultural products is very small but positive, and therefore $(dB_2/dy_2) < 0$ because total imports appear as a negative value in the balance of trade equation. The Marshall-Lerner condition suggests that $(dB_2/d\pi_2) < 0$. An expansionary monetary policy deteriorates the balance of trade for the industrial sector and it can be concluded that some portion of the initial increase in the money supply finds its way into the agricultural sector.

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[1] See Appendix II for derivations of signs and Marshall-Lerner condition.

Bank deposit rate and reserve requirement ratio affect the system via the money market substitution effect. A policy to change any of these policy variables shifts the supply of loanable funds curve thereby changing the money supply. The signs of the multipliers are summarized in Table 4.C-1. An increase in the bank deposit rate, other things being constant, will increase both the level of income and the rate of inflation, while resulting in a deterioration in the balance of trade and lowering the marginal rate of return on business investment. An increase in RR will have opposite effects on the explained variables.

4.D Credit Rationing Policy in the Industrial Sector

Credit rationing is one of the most powerful and effective channels of transmitting monetary impulses from the financial component to the real component of the economy. Credit rationing is widely exercised in situations where the price allocation mechanism fails. Under imperfect money and capital markets, the price of bank loans is determined institutionally rather than by market forces. The price of loanable funds does not tend to change even when there is a change in the demand for funds, so that financial intermediaries ration the available supply of credit using various non-price criteria. Accordingly, the demand for credit is limited "not by borrowers' willingness to borrow at the given rate but by the lenders' willingness to lend - or, more precisely, by the

funds available to them to be rationed out among the would-be borrowers"[1]. In general, deficit spending on investment is influenced by both the cost and availability of funds: the demand for loans describes the extent to which potential borrowers are willing to go into debt, at every level of borrowing cost. But it is the amount of funds they actually obtain that determines how much spending they actually carry out. The implication is that monetary policy could affect total expenditure directly by changing the degree of credit rationing and consequently the volume of loans, even without any appreciable change in the price of loans.

To stimulate private investment in the industrial sector, the monetary authority deliberately pegs the bank loan rate below the market rate. As a result, there is an excess demand for bank credit at that rate. Figure 4.D-1 illustrates a typical credit rationing case. The vertical axis measures the bank loan rate and the horizontal axis measures the demand for and supply of credit. i_2i_2 is the demand for credit curve, that is, demand for funds for investment per unit of time. s_2s_2 is the supply of credit curve, that is, supply of financial investible resources (savings) per unit of time. Given a rate of return on capital, the demand for bank loans is a decreasing function of the cost of borrowing. The supply of credit is an increasing function of the bank loan rate, given the rate of bank deposit the banks have to pay to the public for lending the money to the banks.

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[1]Modigliani(1963, p. 98).

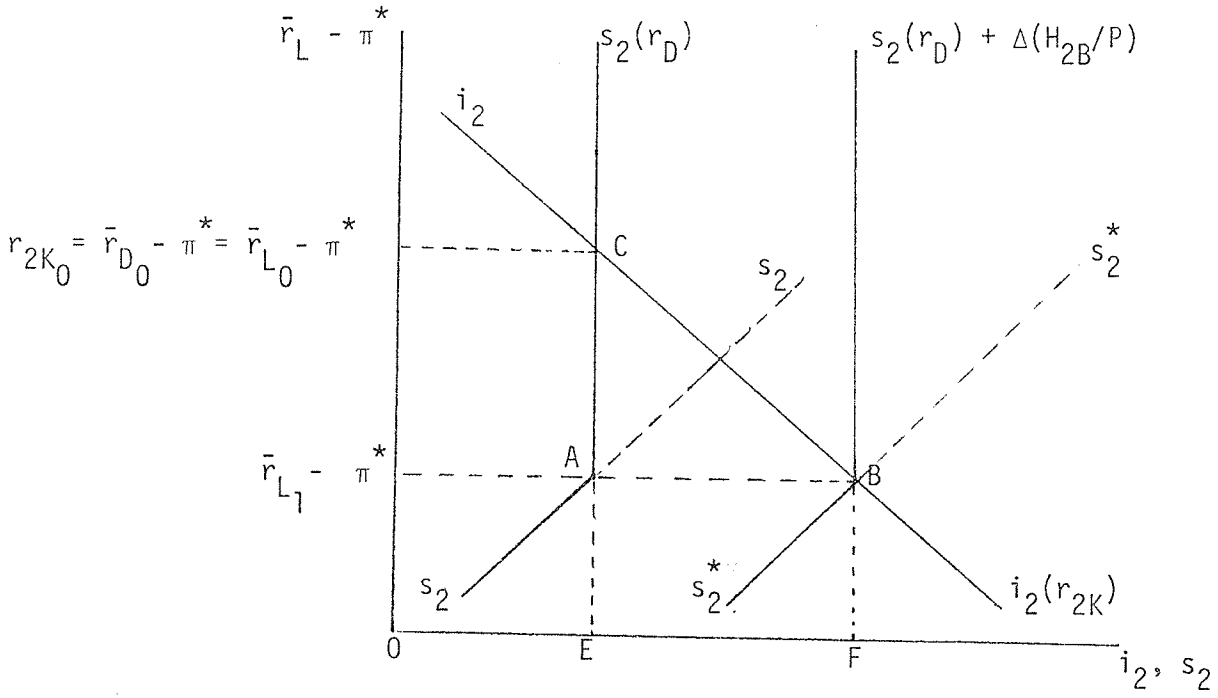

Figure 4.D-1

At any point above A on the supply curve, no interest can compensate for the risk involved in granting loans. When the bank loan rate is pegged downward, the bank deposit rate should fall accordingly for the banks to operate profitably. At a low bank deposit rate, the desired demand for bank deposits by the banks exceed desired supply of bank deposits (equivalent to savings) by the non-bank private sector. The equilibrium rate of bank loan and investment funds are determined by the intersection of the demand and supply curves at C. At C, the three rates of interest (r_{2K}, $\bar{r}_L - \pi^*$, $\bar{r}_D - \pi^*$) are equal where risk premium and profit margin are imputed into the market rates.

In most LDCs, the monetary authority keeps the cost of borrowing

far below the true cost to stimulate investment in industrial capital. In such circumstances, business investment is constrained not so much by the cost of borrowing as by the unavailability of loanable funds. Lowering the (nominal) bank loan rate from $\bar{r}_{L_0}$ to $\bar{r}_{L_1}$ creates an excess demand for investment funds. Banks have to ration credit among the potential borrowers, and the allocation of investment resources is done using a non-price criteria. Banks are assumed to be risk averters, and this risk aversion is reflected by the interest-inelastic segment of the supply curve. Fixing the bank loan rate below the market rate creates discrepancy between demand and supply in both credit and deposit markets. In Figure 4.D-1, AB is the excess demand for investment over savings, and AC is the discrepancy between the marginal rate of return and cost of borrowing. The excess of demand over supply at $\bar{r}_{L_1} - \pi^*$ needs to be financed, and is usually financed by an expansion of bank loans. Discretionary monetary policy allows the central bank to extend credit to commercial banks specifically for industrial investment[1].

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[1] This aspect of the monetary policy reflects the government's priority to industrialization as the cornerstone of economic development in LDCs.

AB is the amount of bank loan and is equivalent to an increase in the money supply,

$$i_2 = s_2 + \Delta(H_{2B}/P)$$

where $\Delta(H_{2B}/P)$ is the increase in bank loan[1].

It should be quite obvious from our discussion on credit rationing mechanism that credit policy crucially depends on the the fixation of the bank loan rate. Business investment expenditure in LDCs is extremely sensitive to the degree of credit rationing[2], and the latter may be measured by the amount of bank loans the monetary authority is willing to increase to ease the state of disequilibrium in the credit market. The closer the bank loan rate is fixed near the market rate, the smaller will be the gap between the marginal rate of return on business investment and the cost of borrowing, and consequently the smaller the degree of credit rationing. Raising the bank loan rate closer to the market rate implies that the monetary authority is less willing to extend bank credit, which signals a tight money (credit) policy. In short, an increase in bank loan rate will put a squeeze on total business investment and hence, will have negative effects on both income and inflation.

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[1]This equation involves a stock-equilibrium and a flow-equilibrium condition . According to the loanable fund theory [see Ackley(1957, p. 665)], simultaneous existence of stock-equilibrium and flow-equilibrium positions are possible.

[2]Park(1973, p. 394)

Under normal circumstances, $\bar{r}_L$ is an explained variable determined by the demand and supply conditions. In our model, $\bar{r}_L$ is an institutionally determined causal variable and as a result, any change in $\bar{r}_L$ is a reflection of monetary policy action. The impacts of any change in the bank loan rate ($\bar{r}_L$) on income and investment will not necessarily be similar as in a model where $\bar{r}_L$ is determined endogenously.

Starting from an initial trade equilibrium position ($B_2 = 0$), the matrix of the complete model on page 89 is used to determine the bank loan rate multipliers. Using proper substitutions, the impact of a change in $\bar{r}_L$ on y_2 may be represented in the following simplified manner[1]:

$$(4.D\text{-}1) \qquad dy_2/d\bar{r}_L = \frac{1}{|A_2|}[(\partial i_2/\partial r_{2K})(\partial L_{2B}/\partial \bar{r}_L) - (\partial i_2/\partial \bar{r}_L)(\partial L_{2P}/\partial r_{2K})]$$

where $(\partial i_2/\partial r_{2K})$ is the partial effect of an increase in the capital rate of return on investment expenditure; $(\partial L_{2B}/\partial \bar{r}_L)$ is the measure of bank's responsiveness to hold currency reserves when the bank loan rate changes; $(\partial i_2/\partial \bar{r}_L)$ measures what will be the change in investment demand when there is one unit change in $\bar{r}_L$; and $(\partial L_{2P}/\partial r_{2K})$ is the

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[1] According to the matrix on page 88, $dy_2/d\bar{r}_L = [1/|A_2|][b_{15}b_{45} - b_{16}b_{42}]$. From Appendix II, we substitute the following: $b_{15} = (\partial i_2/\partial r_{2K})$; $b_{45} = (\partial L_{2B}/\partial \bar{r}_L)$; $b_{16} = (\partial i_2/\partial \bar{r}_L)$; $b_{42} = (\partial L_{2P}/\partial r_{2K})$.

partial derivative of an increase in capital's rate of return on the demand for currency by the (non-bank) private sector. All the partial derivatives are negative and the Jacobian is positive, and as a result the sign of $(dy_2/d\bar{r}_L)$ is ambiguous (see Table 4.C-1, p. 90).

We will now attempt to analyze the ambiguity in the bank loan rate multiplier as expressed in (4.D-1). The matrix of the model on page 89 shows that there are two elements associated with $\bar{r}_L$, and these are the two direct effects: $(\partial L_{2B}/\partial \bar{r}_L)$ and $(\partial i_2/\partial \bar{r}_L)$. The bank loan rate affects the explained variables in the model via two channels: (i) the money market asset substitution effect and (ii) the investment demand (credit rationing) effect. We shall term $(\partial L_{2B}/\partial \bar{r}_L)$ as the money market asset substitution effect, and $(\partial i_2/\partial \bar{r}_L)$ as the investment demand effect. The other two partial derivatives in (4.D-1) are the indirect effects.

Figure 4.D-2 is a portrayal of credit policy in our model. The supply of loanable funds (represented by s_2s_2 curve) reflects asset substitution behaviour of the banks (and indirectly, non-bank private sector's behaviour also). The demand curve (i_2i_2) represents demand for investment funds and is greatly influenced by the credit rationing policy of the monetary authority. Along the supply curve, an increase in the bank loan rate suggests that the banks are willing to extend credit, that is, they are willing to substitute excess reserves for income-earning assets. Along the demand curve, an increase in the loan rate implies that the demand for investment must fall. Intersection of demand and supply at E determines the market equilibrium values.

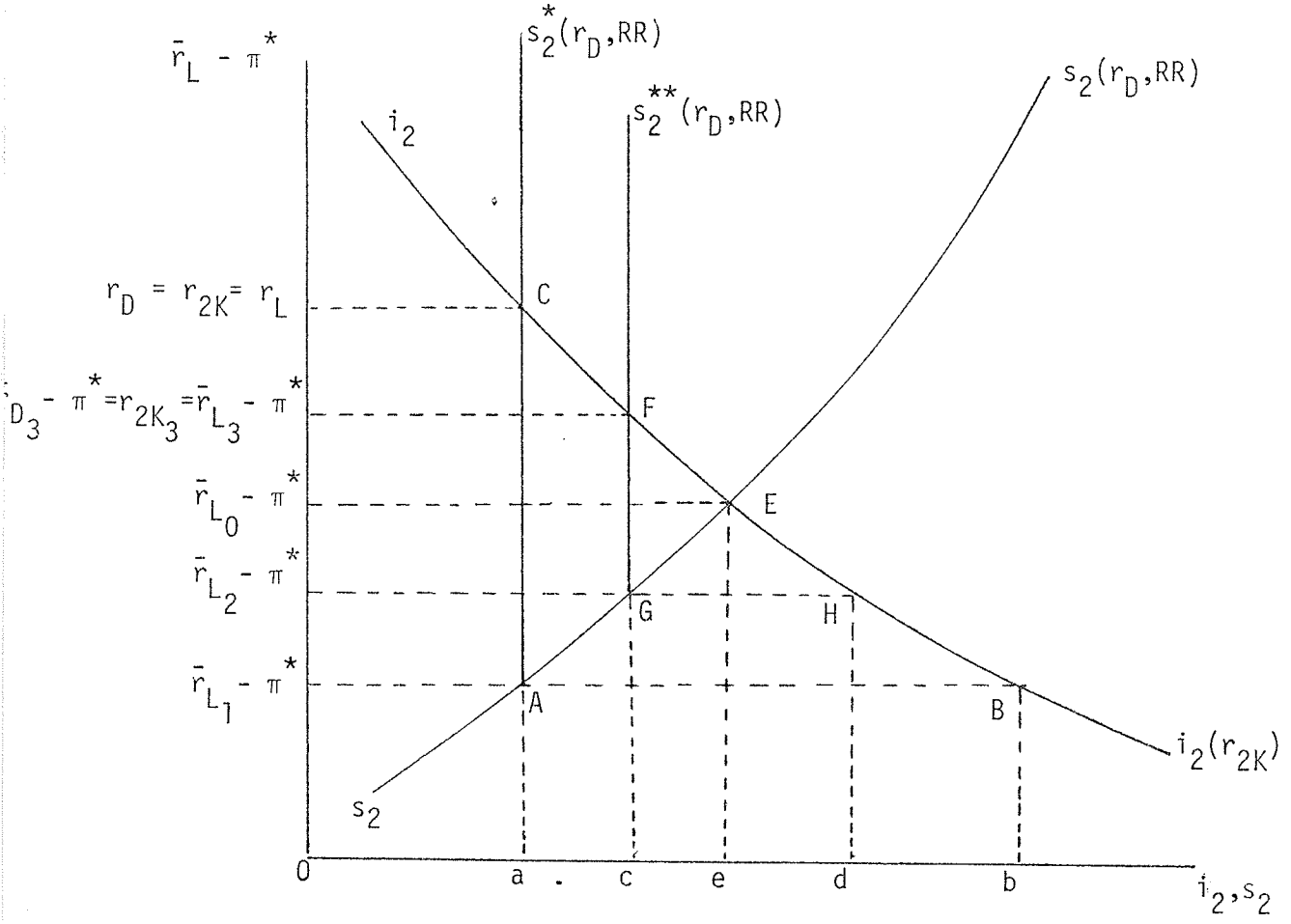

Figure 4.D-2

If the bank loan rate is (institutionally) fixed below the market equilibrium rate, Ei_2 portion of demand curve will not be satisfied unless the excess demand is financed through additional expansion of credit. If the excess demand for investment funds is not to be satisfied, then the bank multiplier (4.D-1) will be unambiguously positive. An increase in $\bar{r}_L$ will increase investment funds through the asset substitution effect and additional loanable funds will feed into

investment and ultimately income will be increased. Although the equilibrium level of investment will be less than the market determined level of investment at E.

However, the main purpose of fixing the loan rate below the market equilibrium rate is not to reduce the equilibrium level of investment but to increase it. If the bank loan rate is fixed at $O\bar{r}_{L_1}$, the supply of credit is Oa and the demand is Ob (AB is the excess demand). If the excess demand (AB) is to be financed through additional expansion of credit, the equilibrium level of investment (Ob) would be greater than the market determined level of investment (Oe). The credit expansion policy would then be a reflection of an accomodative expansionary monetary policy.

Let us suppose that there is an increase in the bank loan rate from $\bar{r}_{L_1}$ to $\bar{r}_{L_2}$ which is an indication of tight credit policy, then the accommodative money supply will be reduced. An increase in loan rate will induce the banks to expand credit. In the event the banks are completely loaned up at $\bar{r}_{L_1}$, they will increase bank deposit rate to attract new deposits from the non-bank private sector (ie., the private, in turn, will re-adjust their postfolio holdings). The effect of an increase in bank loan rate will enable the banks to move along the supply curve from A to G. The effect of the increase in loan rate on the endogenous variable is the "asset substitution effect". There will be a simultaneous effect on the demand for investment funds. Investment demand falls from Ob to Od, and excess demand shrinks from AB to GH. Movement from B to H along the demand curve is the

"investment demand effect". Furthermore, an increase in loan rate will not only reduce the gap between demand and supply, but will also reduce the discrepancy between the marginal rate of return on investment and the cost of borrowing. The market equilibrium loan rate (determined by demand and supply) will fall from C to F, and the gap between marginal rate of return and cost of borrowing will be reduced from AC to GF. "Asset substitution effect" and "investment demand effect" are of opposite signs. The total effect depends on the location of the institutionally determined bank loan rate (whether the rate is fixed above or below market equilibrium point E) and elasticities of demand for money and investment expenditure with respect to bank loan rate.

It is clear that the multiplier (4.D-1) cannot be signed without any information on the elasticities of demand for assets and demand for investment funds with respect to the bank loan rate. As long as there exists a discrepancy between the marginal rate of return on investment and the cost of borrowing, business investment will be extremely sensitive to the central bank's credit policy. From this observation, we can say that the absolute value of elasticity of investment demand with respect to cost of borrowing is at least equal to or greater than the absolute value of elasticity of demand for investment with respect to its own own rate of return, i.e.,

$$(4.D\text{-}2) \qquad \left|(\partial i_2/\partial \bar{r}_L)(\bar{r}_L/i_2)\right| \geq \left|(\partial i_2/\partial r_{2K})(r_{2K}/i_2)\right|$$

An increase in the credit rate, other variables being held constant, is going to narrow the gap between r_{2K} and $\bar{r}_L - \pi^*$ and create a dampening effect on investment demand. Both the rates of interest are alternative rates of returns to holding money and the partial derivatives are negative. The bank loan rate is directly relevant to banks' desire to hold currency reserves, and r_{2K} is directly relevant to non-bank private's demand for currency. The rate of return on capital affects banks' demand for currency reserves to the extent of how r_{2K} affects bank deposits. An increase in r_{2K} will induce non-bank private to move out of money into capital. How fast people will move out of currency into capital will depend on how fast the banks are willing to extend credit to business investors. The banks' willingness to extend credit (ie., move into income-earning assets) will depend among other factors, on the amount of free reserves in the banks' balance sheet at the given RR and $\bar{r}_D$. Other things being constant, the absolute value of the elasticity of demand for money with respect to r_{2K} is greater than or at least equal to its absolute elasticity value with respect to $\bar{r}_L$. When the bank loan rate is kept below the market rate, people will be more willing to move out of currency and demand capital than the banks' excess reserves will permit. The reason being that there is a big discrepency between rate of returns on the two assets (bank deposit and capital) the people are willing to hold in their portfolios. At best a simultaneous change in $\bar{r}_L$ and r_{2K} of equal amount will result in a quid pro quo degree of responsiveness for the money demand

components. In short, we can expect,

$$(4.D\text{-}3) \qquad \left|(\partial L_{2P}/\partial r_{2K})(r_{2K}/L_{2P})\right| \geq \left|(\partial L_{2B}/\partial \bar{r}_L)(\bar{r}_L/L_{2B})\right|$$

From the elasticity restrictions (4.D-2 and 4.D-3), we may conclude that the absolute value of the "investment demand effect" is greater than the "asset substitution effect", and hence the multiplier (4.D-1) is

$$(4.D\text{-}4) \qquad dy_2/d\bar{r}_L < 0$$

because total investment has fallen due to a contraction in the (accommodative) money supply.

From the price adjustment equation (3.E-14), it is clear that given our assumption on the elasticities,

$$(4.D\text{-}5) \qquad (\text{sign})\ dy_2/d\bar{r}_L = (\text{sign})\ d\pi_2/d\bar{r}_L .$$

The effects of bank credit rate on the market determined rate of return on investment (r_{2K}) may be expressed by the following multiplier,

$$(4.D\text{-}6) \qquad dr_{2K}/d\bar{r}_L = \frac{1}{|A_2|}[(\partial L_{2B}/\partial \bar{r}_L)(\alpha_{4,3}) + (\partial i_2/\partial \bar{r}_L)(\alpha_{1,3})] < 0$$

where $\alpha_{4,3}$ and $\alpha_{1,3}$ are the cofactors of the (4,3) and (1,3) elements of A_2 coefficient matrix from page 89. The cofactors are the indirect effects of the direct channels of effects: $(\partial L_{2B}/\partial \bar{r}_L)$ and $(\partial i_2/\partial \bar{r}_L)$. For reasons cited earlier, we can say that $(\partial L_{2B}/\partial \bar{r}_L)(\alpha_{4,3})$ and

$(\partial i_2/\partial \bar{r}_L)(\alpha_{1,3})$ are the asset substitution and investment demand effects respectively. The cofactors are positive and the direct effects are negative, as a result the sign of the multiplier is negative. Refering back to Figure 4.D-1, it can be seen that as bank loan rate increases from $\bar{r}_{L_1}$ to $\bar{r}_{L_2}$, the market equilibrium rate of return on capital decreases from C to F, and vice versa.

Alternatively, a simple diagram of demand for and supply of investment funds tells us why there is a negative relationship between (institutionally fixed) bank loan rate and the market rate of return on capital when the bank loan rate is fixed below the market equilibrium rate.

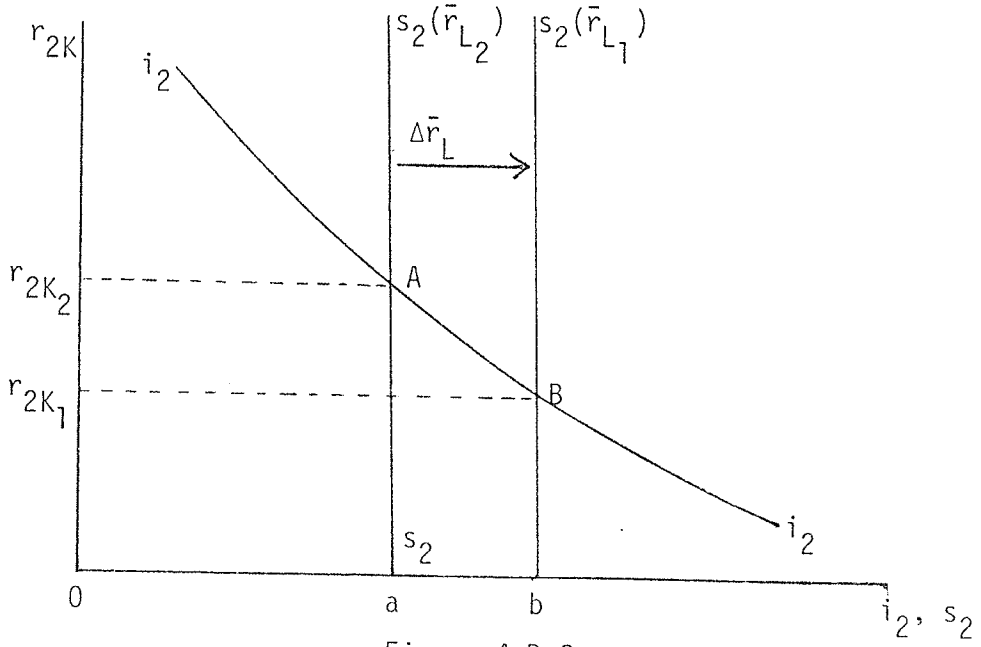

Figure 4.D-2

Demand for investment funds $(i_2 i_2)$ is a decreasing function of the rate of return on capital. Investors demanding investment funds compare the rate of return on investment and the cost of borrowing. As long

as the marginal rate of return on investment is greater than the marginal cost of borrowing, investment funds will be demanded. Therefore, the cost of borrowing is implicitly embodied in the demand curve (i_2i_2). The supply of investment funds (s_2s_2) implies the supply of financial savings. For a given bank loan rate ($\bar{r}_L$), the banks determine the amount of funds to be supplied. In a credit rationing case, the bank loan rate is usually fixed below the market equilibrium rate. s_2s_2 represents the supply of investment funds for a bank loan rate which has been fixed below the market equilibrium rate. At A, the demand for and supply of funds intersect to determine the rate of return on capital and the amount of funds transacted in the market. What appears to be crucial is that at A, since the $r_{2K_2} > \bar{r}_{L_2}$, a substantial edge exists for investment. An increase in the bank loan rate from $\bar{r}_{L_2}$ to $\bar{r}_{L_1}$, will shift the supply curve rightward because the banks will find it more profitable to substitute their excess reserves for income-earning assets. The new equilibrium point B reflects a lower market rate of return on capital and a higher level of investment funds transacted in the credit market. In short, a negative relationship between institutionally fixed bank loan rate and market rate of return on capital will exist as long as there is a discrepancy between the marginal rate of return on investment and the marginal cost of borrowing.

The last credit rate multiplier is the following:

$$(4.D\text{-}7) \qquad dB_2/d\bar{r}_L = \frac{1}{|A_2|}[\partial L_{2B}/\partial \bar{r}_L)(\alpha_{4,4}) - (\partial i_2/\partial \bar{r}_L)(\alpha_{1,4})]$$

$$(4.D\text{-}7a) \qquad = \frac{1}{|A_2|}[\{f_1(\partial B_2/\partial \pi_2) - (\partial B_2/\partial y_2)\}\{dy_2/d\bar{r}_L\}] > 0$$

Again, $\alpha_{4,4}$ and $\alpha_{1,4}$ are the cofactors of the (4,4) and (1,4) elements of A_2 coefficient matrix and the two components in the parenthesis are the direct effects: asset substitution and investment demand. Upon expanding the cofactors (4.D-7a) is obtained, which turns out to be a multiple of $(dy/d\bar{r}_L)$. $(dy/d\bar{r}_L)$ is the multiplier derived in (4.D-1) and it was found to be negative. The sign of the remaining component, $\{f_1(\partial B_2/\partial \pi_2) - (\partial B_2/\partial y_2)\}$, of (4.D-7a) is negative too.[1] As a result the multiplier is positive. It is an expected result because a tight credit policy improves the balance of trade.

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[1] See Appendix II for the signs of the various elements of the multiplier.

4.E Monetary Policy Effects in the Agricultural Sector

In an economy where investment is self-financed and there are no financial institutions, how can we expect the money supply to increase or decrease? Money supply is an explained variable which changes with the balance of trade. As suggested in Diagram 4.B-1 (page 84), monetary impulses are transmitted through the balance of trade. Any analysis of the monetary transmission mechanism must deal with, at least, two channels: (i) the horizontal (external) channel which indicates how the money stock is changed, and (ii) the vertical (internal) channel, which describes how the change in money stock affects the real flow variables.

The external channel of transmission is simply the balance of trade of the agricultural sector. Money supply increases(decreases) with a surplus(deficit) in the balance of trade. The internal channel of transmission is less simple because it deals with the methods of using the excess money stock. An increase in the money stock can be used in three ways: (a) increase in idle balances, (b) increase inflationary hedge asset holdings, and (c) increase in capital stock holdings through productive investment. The demand for any one asset depends on the return on each asset. Thus, for any wealth holder, the optimal investment in capital, inflation hedges, money or any other asset in the portfolio depends on the rates of

return of these assets[1]. Any change on the relative rate of return will induce the wealth holders to change their portfolio compositions.

At least two problems are associated with the internal transmission mechanism in the agricultural sector. First, since investment expenditure is self-financed, not all savings are available for productive investment. Under a "regime of self-finance" the prior accumulation of stock of money and/or inflation hedges is a necessary pre-condition for investment whenever the scale of an investment project exceeds the resources provided by current income flows of the individual investors. Even the portion of aggregate savings that do end up in investment in capital goods depends on the relative rate of return on capital as compared to the returns on competing assets. For example, if the rate of return on the inflation hedge is greater than the return on capital, the wealth holders will store all their additional wealth into inflationary hedge assets. Secondly, for savers the choice is limited between money and inflation hedge. This implies that savings in these forms contribute little of nothing to economic growth to the sector in which it is generated. Portfolio management for these savers depends on the relative rates of return on these assets.

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[1]According to Portfolio Theory, the absolute level of demand for any asset should depend on the investor's preference for risk and return, but under suitable conditions the optimal relative combination of non-monetary assets is independent of the investor's preference for risk and return. Tobin(1958) and Lintner(1965) have demonstrated this "separation property" where money is a riskless asset. It can be assumed that the risk premium is imputed into the returns.

These two problems highlight the importance of financial institutions in mobilizing and channelizing resources. The role of financial intermediaries is to establish a bridge between savers and investors. In the absence of financial institutions, savers and investors remain apart. In a situation where people save by keeping idle balances and/or by purchasing inflationary hedges, the leakage is usually substantial because a good part of the money supply remains outside the savings-investment stream.

Figure 4.E-1 illustrates a situation where not all savings are diverted into productive investment. Assuming that there is a

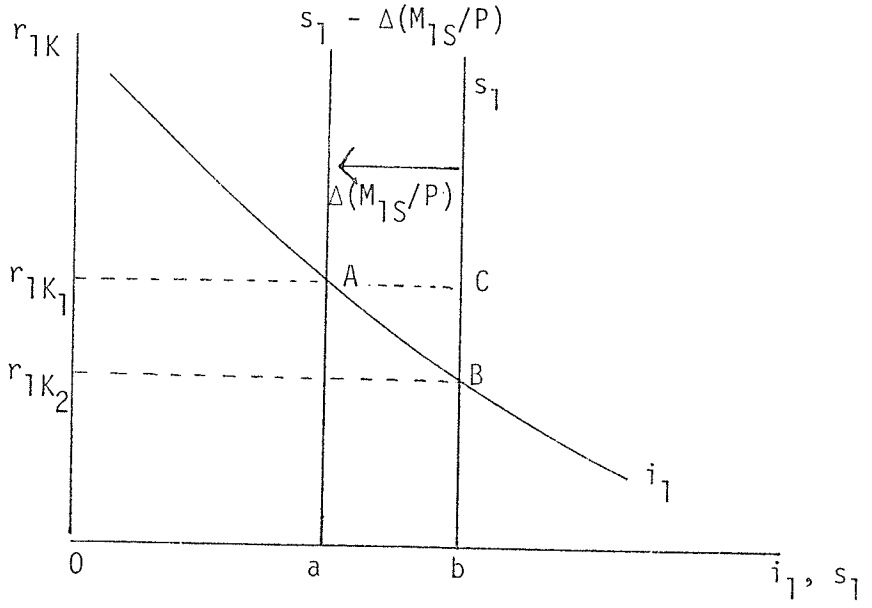

Figure 4.E-1

surplus in the balance of trade with the industrial sector, the

aggregate savings in the agricultural sector may be represented by the following equation:

$$(4.E\text{-}1) \qquad s_1 = i_1 + \Delta(M_{1S}/P)$$

where ΔM_{1S} is the increase in money supply resulting from a surplus in the balance of trade[1].

The horizontal axis measures the volume of investment funds financed from savings, and the vertical axis measures the rate of return on investment expenditure. The self-financed investment demand curve ($i_1 i_1$) is downward sloping with respect to rate of return on capital. The aggregate savings curve (bs_1) is vertical because supply of investment funds is insensitive to rate of return on capital. The amount of transferable savings is represented by as_1 curve. The horizontal distance (AC) between aggregate savings curve and transferable savings curve is the amount of excess savings. The equilibrium rate of return, r_{1K_1}, is determined by the intersection of demand for investment ($i_1 i_1$) and supply of transferable savings (as_1) at point A. On the other hand, if all savings were available for investment the market would have equilibrated at point B. It is clear that self-financed investment expenditure is less than what the sector is potentially capable of financing. AC is the

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[1] In an open economy (macro) model, ΔM would be equivalent to an increase in the international reserves under gold standard. In conventional IS-LM framework, ΔM would imply a rightward shift of the LM locus and hence would lower the interest rate and increase income.

amount of aggregate savings that is not transferred into productive investment but into inflationary hedge assets and/or held in the form of currency. For simplicity we shall identify the amount of non-transferrable savings (AC) with the increase in money supply resulting from a surplus in the balance of trade of the agricultural sector.

An increase in the money supply in the agricultural sector due to a surplus in the balance of trade might not reduce the rate of return on capital to induce investment expenditure in agriculture because the wealth holders might not substitute money for physical capital, rather they might substitute money for the other physical real asset (inflationary hedge asset) as illustrated in Figure 4.E-2 below.

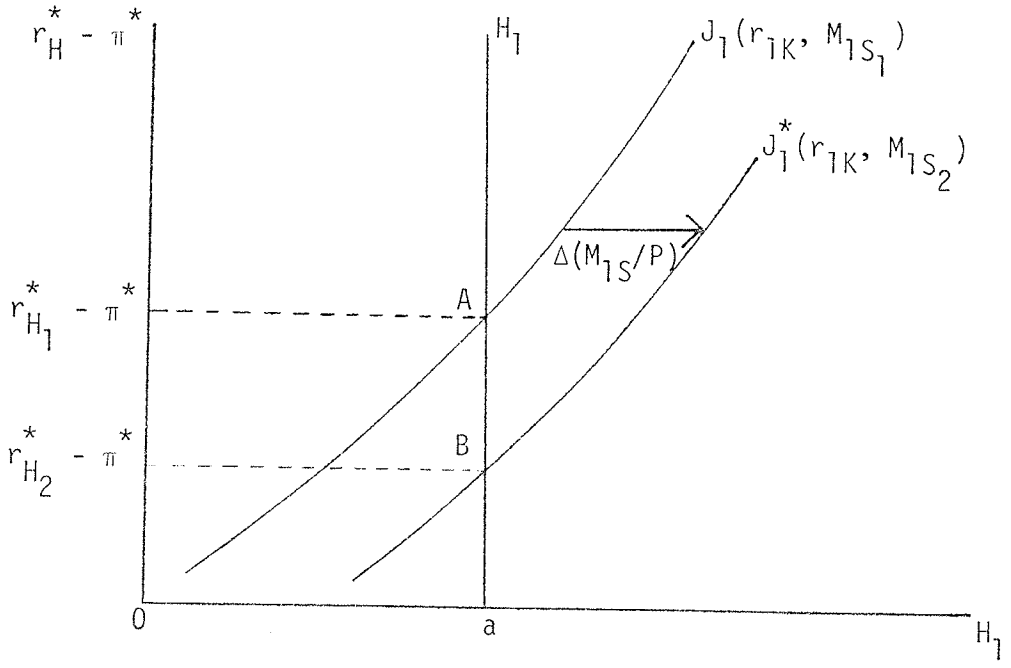

Figure 4.E-2

In the above figure, the rate of return on the inflation hedge asset is measured on the vertical axis and the volume of the assets on the horizontal axis. At any point in time, the supply is fixed and the demand is an increasing function of the rate of return (that is, a decreasing fucntion of the price of the asset). Initial equilibrium is determined at point A. An increase in the money supply increases the demand for inflationary hedge and hence, the demand curve shifts from J_1 to J_1^*. Shifting of the demand curve implies a switching from money into inflation hedge. An increase in the demand for inflation hedge lowers the rate of return, i.e., it increases the price of the asset. The inflation hedge market equilibrates through adjustment in the price of the asset, other variables held constant.

The above analysis implies that savings generated through a net surplus in the balance of trade has little or no subsequent effects on real (flow) variables in the agricultural sector because there is no mechanism for the distribution of this savings beyond the sector in which it is generated. In fact, this savings in the agricultural sector finances investment in the industrial sector at the initial stage. If the agricultural sector has a net surplus with the industrial sector the corresponding real resources would not be available to the agricultural sector. What appears to be crucial is the distribution of agricultural savings to productive investment within the sector rather than the initial effects of such savings on the industrial sector when it was generated.

In light of our discussion on self-finance and asset substitution, we will now analyze the comparative-static results of the model developed on pages 67-68 using relations (3.E-1) to (3.E-12). The comparative-static analysis of the model is similar to that of the industrial sector. Totally differentiating the system and setting it up in matrix form:

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$$\begin{bmatrix} a_{11} & -a_{13} & -a_{15} & 0 & 0 \\ -\alpha_1 & 1 & 0 & 0 & 0 \\ a_{31} & -a_{33} & 0 & 1 & 0 \\ a_{41} & a_{43} & a_{42} & a_{44} & a_{45} \\ a_{51} & -a_{53} & a_{52} & a_{54} & a_{55} \end{bmatrix} \begin{bmatrix} dy_1 \\ d\pi_1 \\ dr_{1K} \\ dB_1 \\ dr^*_{1H} \end{bmatrix} = \begin{bmatrix} a_{12} & a_{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\alpha_1 & 0 & 0 & 0 & 0 \\ a_{32} & -a_{34} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -a_{47} & a_{46} & 0 & -a_{49} & -a_{410} & -a_{411} & a_{48} \\ 0 & a_{57} & a_{56} & 0 & -a_{59} & -a_{510} & a_{511} & -a_{58} \end{bmatrix} \begin{bmatrix} dy_2 \\ d\pi_2 \\ d\pi^* \\ d\bar{y}_1 \\ dK_1 \\ dR_1 \\ dH_1 \\ dM_{1,t-1} \end{bmatrix}$$

which may be written as, $A_1X_1 = B_1Y_1$.

A_1 is a 5 x 5 coefficient matrix of the endogenous variables; X_1 is a 5 x 1 column vector of the endogenous variables; B_1 is is a 5 x 8 coefficient matrix of the exogenous variables; and Y_1 is a 8 x 1 column vector of the exogenous variables. Derivation of the equations and signs of the notations have been worked out in Appendix I. Given the elasticity of the import and export conditions, all signs of the elements of A_1 are unambiguous. The Jacobian of the system is the determinant of A_1 matrix, and it is positive[1].

An examination of the system reveals that monetary impulses may be transmitted from the industrial sector into the agricultural sector either through changes in industrial income and/or changes in industrial prices. Changes in industrial income impinges directly on the system via two channels. First, an increase in y_2 increases the demand for agricultural goods in the commodity market. Secondly, it will affect the balance of trade, thereby influencing the money supply in the sector. By the same token, changes in industrial prices directly affect the system via four channels. Firstly, increases in industrial commodity prices change the terms of trade, thereby affecting the demand for agricultural goods in the commodity market. Secondly, changes in the price ratio affect the balance of trade directly. The other two channels of transmission are connected with cost of living effects.

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[1]One of the stability conditions of the system suggests that the Jacobian of a 5 x 5 matrix should have a negative sign. However, multiplying any one of the equations with -1 will yield a negative of the determinant.

Since industrial price is one of the two prices in the CPI deflator, any change in the industrial price will change the CPI deflator, and consequently influence the real demand for monetary and non-monetary assets. We are primarily concerned with changes in the money supply, so we will concentrate with the direct balance of trade effect. For example, the solution for y_1 may be written in the following form:

$$(4.E\text{-}2) \qquad y_1 = y_1[B_1^*(y_2)]$$

which means that y_1 is some function of y_2 operating through the balance of trade function.

Using the matrix of the system, we can show that the overall effect of an increase in y_2 on y_1 is,

$$(4.E\text{-}3) \qquad dy_1/dy_2 = (dy_1/dB_1^*)(dB_1^*/dy_2)$$

The direct balance of trade effect of an increase in y_2 on the agricultural sector's money supply (where $M_{1S,t} = B_{1,t} + M_{1S,t-1}$) is measured by (dB_1^*/dy_2), and (dy_1/dB_1^*) is the effect of a unit increase in agricultural sector's money supply on agricultural income[1].

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[1] As far as the monetary transmission mechanism is concerned, the exact formulation of the equation should be,

$$(dy_1/d\gamma) = (dy_1/dB_1^*)(dB_1^*/dy_2)(dy_2/d\gamma)$$

where $(dy_2/d\gamma)$ is the effect of original monetary expansion policy on y_2. From Table 4.C-1 we know that $(dy_2/d\gamma) > 0$.

In other words, (dy_1/dB_1^*) is the (indirect) asset substitution effect[1]. The direct balance of trade effect is the horizontal (external) channel and the indirect asset substitution effect is the vertical (internal) channel we mentioned earlier.

We should stress that the indirect effects in our model refer to only those occuring within a single period, i.e., only the first-round effects are considered. These indirect effects are assumed to be completed within that (short-run) time interval, taking into account the interaction between the various markets of the model. The intrinsic dynamics of the system suggests that any change occuring in a given period will give rise to further second-round feedbacks throughout subsequent periods until a new state of long-run equilibrium is reached. For simplicity we will ignore these long-run repercussions from our analysis, although we do not deny their importance.

The multiplier is the following[2]:

$$(4.E\text{-}4) \qquad dy_1/dy_2 = (dy_1/dB_1^*)(dB_1^*/dy_2)$$

$$(4.E\text{-}4a) \qquad = \frac{1}{|A_1|}[-(\partial i_1/\partial r_{1K})\{(\partial L_1/\partial B_1)(\partial J_1/\partial r_{1H}^*) + (\partial J_1/\partial B_1)(\partial L_1/\partial r_{1H}^*)\}][(\partial B_1^*/\partial y_2)]$$

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[1]The indirect substitution effects are calculated by obtaining the appropriate cofactor of the determinant. For example, $(dy_1/dB_1^*) = (|A_{3,1}|)/(|A_2|)$ where $(|A_{3,1}|)$ is the cofactor of element (3,1) of determinant A_2.

[2]This is a simplified version of the multiplier. According to the matrix on page 113, $(dy_1/dy_2) = (1/|A_1|)[-a_{15}(a_{44}a_{55} + a_{54}a_{45})][a_{32}]$. From Appendix I, we substitute the elements for the derivatives.

The first bracket on the right hand side of (4.E-4a) is the indirect effect, and the second bracket is the direct effect of an increase in y_2 on the money supply, B_1. The sign of $[(\partial B_1^*/\partial y_2)]$ is positive because an increase in industrial income is going to improve the balance of trade for agricultural sector, given the income elasticity of import and export. However, the sign of the first bracket of (4.E-4a) needs some explanations. Money supply (currency) as represented in the model by B_1 (where $M_{1S,t} = B_{1,t} + M_{1S,t-1}$) is one of the assets in wealth composition of the wealth holders[1]. An increase in currency represents an increase in wealth of the individuals. $\partial L_1/\partial B_1$ and $\partial J_1/\partial B_1$ are the partial derivatives of demand for money and inflation hedge with respect to wealth (currency is a component of wealth). Both the signs are positive and

$$(4.E\text{-}5) \qquad (\partial L_1/\partial B_1) \geq (\partial J_1/\partial B_1)$$

because of the wealth constraint[2].

$(\partial J_1/\partial r^*_{1H})$ and $(\partial L_1/\partial r^*_{1H})$ are the partial derivatives of demand for inflation hedge and currency with respect to rate of return on inflation hedge, and the signs are positive and non-positive respectively.

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[1] Either M_{1S} or B_1 can be used as the endogenous variable, and the substitution has to take place either in money or balance of trade equation.

[2] From Appendix I, we know $(\partial L_1/\partial B_1) = (1 - L_{15})[1/(1+\pi)]$ and $(\partial J_1/\partial B_1) = (J_{15})[1/(1+\pi)]$. But $(1 - L_{15}) = J_{15} + F_{15}$ (see page 50). Therefore, $(1 - L_{15}) \geq J_{15}$, and $(\partial L_1/\partial B_1) \geq (\partial J_1/\partial B_1)$.

Again from the wealth constraint (page 50), we know that[1]

$$(4.E\text{-}6) \qquad (\partial J_1/\partial r^*_{1H}) + (\partial L_1/\partial r^*_{1H}) + (\partial F_1/\partial r^*_{1H}) = 0$$

where $(\partial F_1/\partial r^*_{1H})$ is the demand for capital stock with respect to r^*_{1H} and it is non-positive. Hence, we can conclude

$$(4.E\text{-}7) \qquad \left|\partial J_1/\partial r^*_{1H}\right| \geq \left|\partial L_1/\partial r^*_{1H}\right|$$

in absolute level. These inequalities[(4.E-5) and (4.E-7)] suggests that

$$(4.E\text{-}8) \qquad \{(\partial L_1/\partial B_1)(\partial J_1/\partial r^*_{1H}) + (\partial J_1/\partial B_1)(\partial L_1/\partial r^*_{1H})\} \geq 0$$

and $-(\partial i_1/\partial r_{2K}) > 0$, so we can say that $dy_1/dy_2 \geq 0$.

The economic interpretation of the multiplier is as follows: an increase in wealth due to an increase in currency will result in some increase in the demand for currency (money). For savers to hold additional cash balance, the rates of return on the alternative assets (namely, capital and inflation hedge) must go down. At the same time the increment in wealth will also induce some increase in the demand for inflation hedge. As a result, the rate of return

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[1] Again from Appendix I: $\partial J_1/\partial r^*_{1H} = J_{14} > 0$; $\partial L_1/\partial r^*_{1H} = L_{14} \leq 0$ and $\partial F_1/\partial r^*_{1H} = F_{14} \leq 0$. From page 51, we know $J_{14} + L_{14} + F_{14} = 0$ and therefore, $\left|J_{14}\right| \geq \left|L_{14}\right|$

on capital will tend to be "inflexible". The income determination of our model can be represented in a Keynesian IS-LM framework as illustrated in Figure 4.E-3.

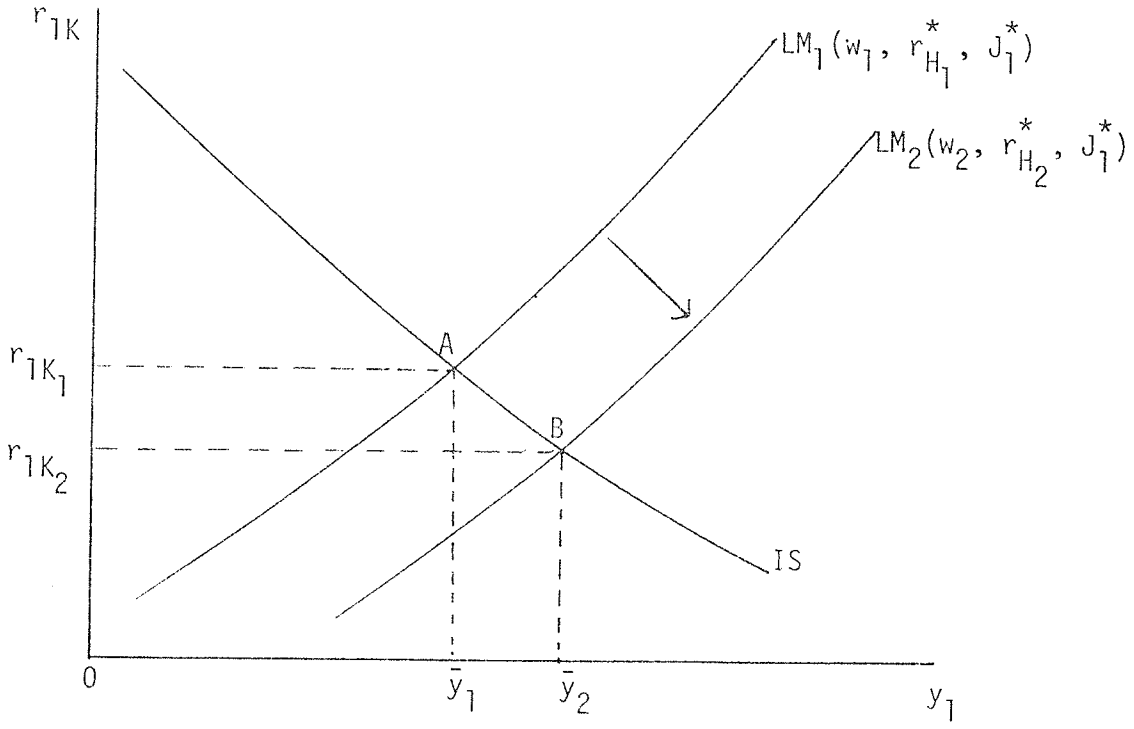

Figure 4.E-3

An initial increase in wealth should shift the LM locus rightward, but the new position of the curve will depend on how the wealth holders re-align their portfolio compositions. Movement from A to B is the result of asset substitution effect between money and capital. What will be the new position of the LM schedule? Or to put it differently, when will an increase in money stock fail to influence income and

investment in capital stock. Going back to the two inequalities (4.E-5 and 4.E-7), we can see that $dy_1/dy_2 = 0$ when (i) $\partial L_1/\partial B_1 = \partial J_1/\partial B_1$ and (ii) $\partial L_1/\partial r^*_{1H} = \partial J_1/\partial r^*_{1H}$. Condition (i) and (ii) will be fulfilled when $\partial F_1/\partial r^*_{1H} = 0$ and $\partial F_1/\partial B_1 = 0$, and that means the demand for capital stock is insensitive to changes in rate of return on inflation hedge (i.e., cross partial is zero) and wealth. Final equilibrium point will be determined by the value of $\partial F_1/\partial r^*_{1H}$ and $\partial F_1/\partial B_1$. The partial derivatives of demand for capital stock with respect to r^*_{1H} and B_1 will be zero or close to zero either (a) when the rate of return on capital is so low that investors do not want to invest in capital stock, or (b) when investors and savers are apart with no financial institutions in between. The second condition is likely to be more probable than the first because as we have explained earlier, the most crucial bottleneck in the agricultural sector is the unavailability of investment funds. Savings and investment are not properly linked and as a result, inspite of an increase in aggregate savings through a net surplus in the balance of trade, effective investible resources are scarce.

In any case, the most important message of the above arguments is that, as long as $\partial J_1/\partial B_1 > 0$ wealth holders may substitute only a portion of their additional wealth (money) for capital. A substantial portion of the additional wealth will be stored in the form of inflation hedge and/or currency which will contribute little or nothing to economic growth in the agricultural sector. The comparative-static equilibrium will be established at any point between A and B in Figure 4.E-3 depending

on the magnitude of $\partial J_1/\partial B_1$ (or $\partial F_1/\partial B_1$ since they are inter-dependent through the wealth constraint). As $\partial J_1/\partial B_1 \to 0$, the final equilibrium solution tends towards point B in Figure 4.E-3 and vice versa.

The signs of the other comparative-static results are the following:

(4.E-8) $$d\pi_1/dy_2 = (d\pi_1/dB_1^*)(dB_1^*/dy_2) \gtreqless 0$$

(4.E-9) $$dr_{1K}/dy_2 = (dr_{1K}/dB_1^*)(dB_1^*/dy_2) \lesseqgtr 0$$

(4.E-10) $$dB_1/dy_2 = (dB_1/dB_1^*)(dB_1^*/dy_2) > 0$$

(4.E-11) $$dr_{1H}^*/dy_2 = (dr_{1H}^*/dB_1^*)(dB_1^*/dy_2) \lesseqgtr 0$$

The explanations and economic interpretations of the results are similar to those cited for dy_1/dy_2. From the aggregate supply equation (3.E-2, p. 67) and the balance of trade equation (3.E-7, p. 67), it is clear that given our assumptions on the parameters of these equations,

(4.E-12) $$(\text{sign})(dy_1/dy_2) = (\text{sign})(dy_1/d\pi_2)$$

and similar sign patterns will hold for the other endogenous variables with respect to π_2.

The above analysis points out the ineffectiveness of monetary policy in a dual financial system. Lack of financial institutions inhibits the monetary authority from using any (direct) monetary policy in the agricultural sector, unlike the industrial sector.

When monetary policy is left to work itself via the modern (industrial) sector, the effectiveness for development of agricultural sector will be greatly reduced. It is clear that a well-developed financial system, and especially financial intermediation, is important for the efficient allocation of savings between competing uses and to ensure that savings is used for productive investment purposes.

CHAPTER 5 : FINANCIAL DEVELOPMENT AND MONETARY POLICY OPTIONS IN A DUAL ECONOMY

5.A Introduction

In assessing the role of money in the process of capital accumulation, the analysis in Chapter 4 suggests that the financial problem in a LDC is an institutional problem more than anything else. The emphasis of the theory of economic development must switch from savings-investment bottlenecks to that of financial development. The seminal work of Gurley and Shaw and their subsequent extensions and refinements by others[1] have attempted to demonstrate the intricate relationship between financial development and capital formation. Development of financial institutions encourages savings in the form of financial assets and ensures efficient allocation of resources. Thus, it is obvious that the policy implication of financial development is to adopt proper policies toward the development and expansion of financial institutions.

This Chapter will attempt to show that financial intermediaries are necessary but not sufficient for accelerating the overall rate of economic growth. It may be argued that formation and expansion of financial institutions is a must for any economic development

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[1] See Chapter 2 for a brief survey of some of the works on the subject.

program but whether it is sufficient or not is yet to be proven.

Bhatia and Khatkhate(1975) used a cross-section empirical study in a number of African countries to determine whether financial intermediaries are both a necessary and a sufficient condition for economic growth. The study did not reveal any systematic link between financial intermediation and growth and hence, concluded that "no definitive relationship is discerned between financial intermediation and growth in many of the African countries". The final judgement of the study is that it is too early for any empirical study to record any causal relationship between financial intermediation and capital formation. We plan to demonstrate (theoretically) that financial intermediation by itself may not help LDCs to achieve all of their goals.

5.B "Liberalization" of Money and Capital Markets in LDCs

Financial institutions play two major roles in the process of economic development: mobilizing resources and allocating those resources efficiently. Although these two roles are interconnected, the financial institutions' role in attracting surplus funds must be kept apart from their role of asset management. Manipulation of bank credit policies rather that their costs are of prime importance for the effectiveness of monetary policy in a developing country. The prevailing institutional and structural imperfections in a dual financial system prevent the market rate of interest from

performing its appropriate allocative role. A dual financial system requires a dual monetary policy, and how a dual monetary policy is going to be administered depends on economic priorities as perceived by the monetary authority. The risk of letting the market dictate the allocation of investible resources is very high and, at times, market allocation can be counter-productive.

Let us assume that both sectors of a LDC develop a reasonably good system of financial institutions and the two systems are properly integrated like that of any developed country. As a result, the financial systems in the two sectors will resemble very much like that of the industrial sector we developed in Chapter 3. Investment in the agricultural sector will not have to be self-financed anymore, and savers will have the opportunity to accumulate financial assets instead of unproductive assets. In such a fully integrated financial system it is expected that money and other financial assets will freely flow across the two sectors. The free flow of resources will be guided by the rates of return on the assets. In a dual economy, where the rates of return on physical capital are different in the two sectors, the process of financial intermediation will shift resources from the traditional low-return investments to investments in the modern technologically superior sector[1]. In short, as long as we start from an initial stage of

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[1]Galbis(1977, p. 69).

discrepancy in the rates of return on physical capital investment, resources will continuously flow out of the traditional sector into the modern sector. This process will exert even more pressure on the agricultural sector, the modern sector will grow rapidly at the cost of stagnation (and possibly repression) of the traditional sector[1]. However, it is true that in the long run market forces are expected to erase the discrepancy in the rates of return. Unfortunately, there has been no evidence of such phenomenon in LDCs.

Shaw(1973) and McKinnon(1973) have advocated for "liberalization" of the capital and commodity markets in LDCs as a measure for generating high rate of savings. It has been argued that withdrawal of unwise government intervention from the markets is necessary and sufficient to generate high rate of savings and investment which will accurately reflect social and private preferences. They considered uniformly high real interest rates on financial assets and high yields on physical assets to be indispensable for a successful development policy. In a single sector economy, the high interest rate strategy could yield only partial results in bringing about mobilization of resources with financial institutions. In a

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[1] India's First and Second 5-years Plans opted for the industrialization route of economic development and as a result agriculture lagged behind industry. Ultimately, the economy was engulfed in a two-pronged problem: (a) chronic food shortage, and (b) the relative income in the agriculture sector fell over the period, so that demand for manufactured goods was not forthcoming. See Streeten and Lipton(1968) for such a discussion.

two-sector economy, a policy to liberalize the markets will not ensure an economically desirable use of resources because of the inherent market imperfections. This is not so much to argue against the polciy of encouraging financial intermediation but to argue that a satisfactory condition of ensuring economically desirable allocation of resources requires some amount of intervention. By the term "economically desirable" we mean more growth in the agricultural sector than in the industrial sector. This notion of accelerated growth in the agricultural sector is very much along the school of thought of Myrdal(1968), Singer(1970) and others who have asserted that agricultural development needs to be viewed as the dynamic and "leading sector" in any overall strategy for economic development.

Figure 5.B-1 illustrates a case of financial intermediation in a dual economy where allocation of investible resources is left upto the market forces. We intend to show that the neo-classical (optimum) market solution is not economically desirable in the sense of stimulating growth in the agricultural sector. In this model we assume that both the sectors of a dual economy have a reasonably well developed financial system and all investment funds used by the industrial and agricultural sectors flow through the banking system. The demand and supply of investible funds used in this model are basically the same functions used for the industrial sector in Chapters 3 and 4. The demand and supply in these sectors can be represented in a back-to-back diagram as follows:

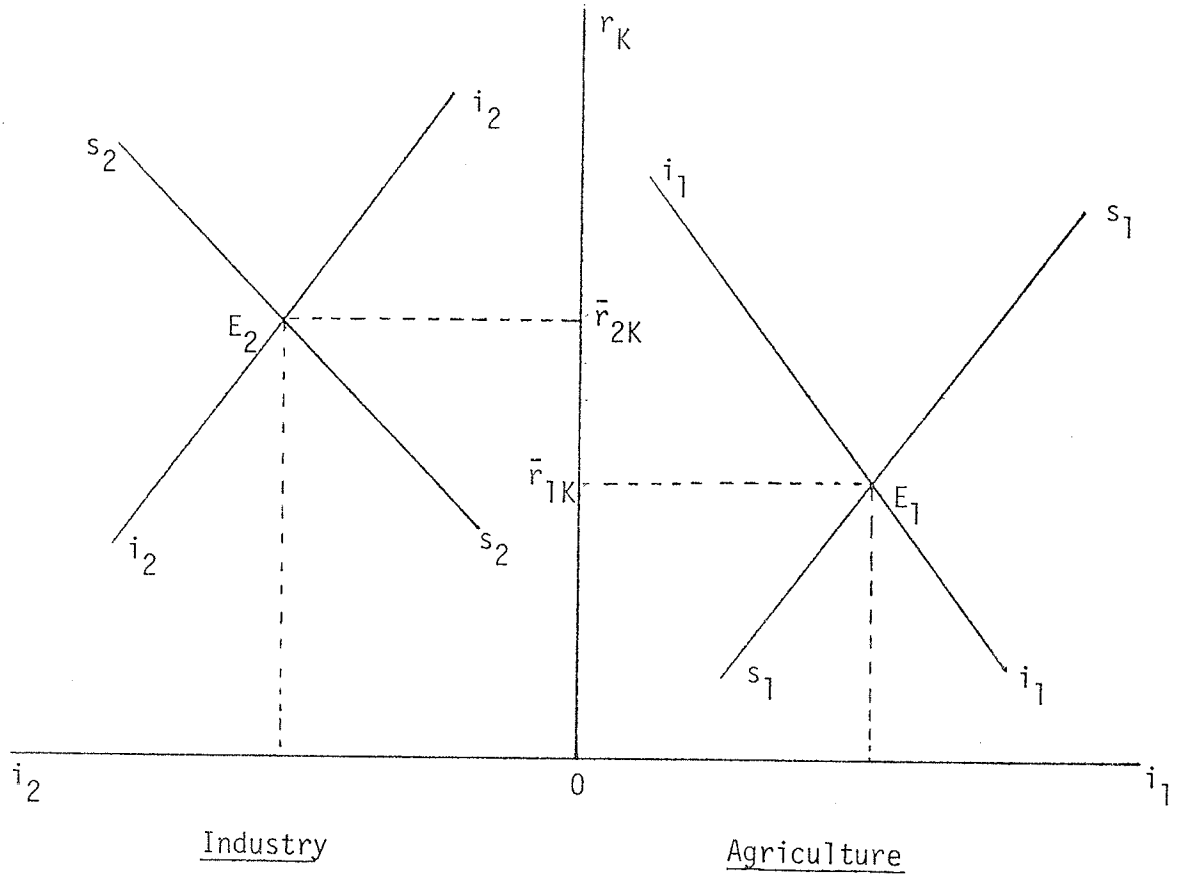

Figure 5.B-1

The volume of investment funded from savings is measured on the horizontal axis and the rate of return on investment expenditure is measured on the vertical axis. We assume that demand and supply of investible funds are functions of the rate of return, and the intersection of the two schedules determines the market equilibrium values. In equilibrium, the market rate of return on investment equals the cost of borrowing. $i_1 i_1$ and $s_1 s_1$ are the demand and supply

of loanable funds in the agricultural sector, and i_2i_2 and s_2s_2 are the demand and supply conditions in the industrial sector. The demand for investible resources is the marginal efficiency of investment curve and it represents the desired volume of investment in any given period which can be profitably undertaken at various rates of borrowing. E_1 and E_2 are the equilibrium points in agricultural and industrial sector respectively.

The equilibrium rate of return ($\bar{r}_{2K}$) in the industrial sector is expected to be higher than the equilibrium rate ($\bar{r}_{1K}$) in the agricultural sector because industrial sector is technologically superior to agricultural sector[1]. The greater the discrepancy between the levels of technology in the two sectors, the bigger is the gap between the two rates.

Financial intermediaries can observe that they can take advantage of the disparity in the two rates by transferring resources from the agricultural sector into the industrial sector and earn a higher rate of return on their assets. To determine the amount of resources to be transferred, let us calculate the excess curves. Figure 5.B-2 depicts the excess curve of agricultural sector (ES_1) and that of industrial sector (ES_2), calculated as $s_i - i_i$ for all rates of return ($i = 1, 2$).

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[1]Galbis(1977, p. 61). However, the disparity in the rates might be due to other factors like tariffs, exchange control, monoploy or oligopoly market structure in the industrial sector.

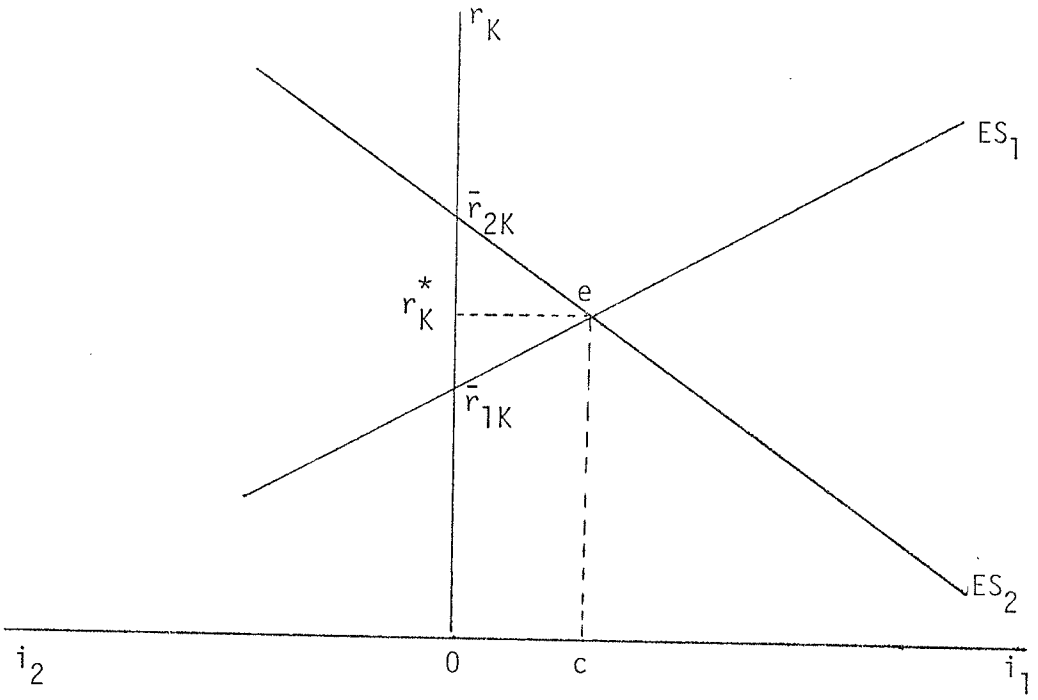

Figure 5.B-2

$\bar{r}_{2K}$ and $\bar{r}_{1K}$ are the pre-transfer equilibrium rates, and r_K^* is the post-transfer inter-sectoral equilibrium rate. At r_K^*, the excess supply (demand) of investible resources in the agricultural (industrial) sector is Oc. Therefore, the banks will transfer Oc amount of resources from the backward to the advanced sector[1], and the industrial sector will grow at the

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[1] Galbis(1977) demonstrated that somehow a transfer will take place only if the backward sector is self-financed, and a cheap credit policy operates in the advanced sector. We show that a cheap credit policy is unnecessary for the transfer. Our analysis is less restrictive than Galbis.

cost of the agricultural sector.

Myrdal(1957, Chapter 2) contends that in the context of regional development both economic and social forces produce tendencies towards disequilibrium, and that the assumption in neo-classical economic theory that disequilibrium situations tend towards stable equilibrium is false. Thus Myrdal replaces the assumption of stable equilibrium with what he calls the hypothesis of circular and cummulative causation, arguing that this hypothesis can go a long way towards explaining why interregional differences in development within nations, may persist and even widen overtime. Instead of leading to equality, the economic forces of demand and supply interact with each other to produce cummulative movements away from spatial equilibrium. Furthermore, the existence of dualism not only retards the development of the backward regions but can also slow up the development process of the whole economy.

Market solution in Figure 5.B-2 might be optimum in the sense of economic profitability but not economically desirable for a balanced sectoral growth. Private profitability behaviour of the intermediaries will be counter-productive as far as the agricultural sector is concerned because imbalanced sectoral growth will persist and/or may widen. This process of transferring resources from the underdeveloped to the developed sector will continue unabated as long as the financial intermediaries can observe the difference between their cost of borrowing in one sector and their lending rate in the other sector[1]. This is just a reflection of

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[1]This substantiates the argument against "spill-over effect". It was a common belief among earlier development economists that the market

(cont.)

of the inherent dualism characteristic of the economy which tend to strengthen the disequilibrium situation by leading to cummulative expansion in the favoured region at the expense of the backward region and the situation then becomes comparatively worse-off, retarding future development of the backward sector. Financial intermediation in such a context is a necessary condition for mobilizing but not a sufficient condition for allocating resources which are economically desirable.

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footnote #1 continued from page 134

will sooner or later equalize the rates of return between the two sectors, and some of the benefits of industrialization will "trickle down" to the agricultural sector. Evidence on LDCs runs counter to the hypothesis of market equalization theory.

5.C "Credit Dualism" Monetary Policy

It is obvious from the above discussion that financial intermediaries might play an effective role in mobilizing savings in the agricultural sector because given the choice of a marketable financial asset (eg., savings deposit) the savers might well be induced to save in the form of bank deposits rather than unproductive investment in tangible real assets. The free market role of mobilizing resources should be coupled with some methods of selective credit control for allocating resources. The technical aspect of selective credit control is that the cost and availability of financial credit to different sectors of the economy are differentiated by direct regulations by the monetary authority, such as by stipulating the amount of loans and bank loan rate etc. Generally, credit controls may be used to curtail or discourage excessive demand in a particular direction in favour of activities regarded essential for balanced growth[1].

A policy of selective approach to allocating resources hinges on the question of what kind of economic development the LDCs should strive for in respect both of feasibility and desirability. It would seem natural that the first objective of any LDC should be self-sufficiency in food, yet almost all the LDCs are net importers

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[1] Nassef(1972, p.44).

of food inspite of impressive of GNP growth rates in the last couple of decades. Newlyn(1977a) attributes the failure to produce sufficient food on "linear" concept of development policy adopted in these countries. The term "linear" development is identified with replication of the industrialization process by which the Western industrial nations transformed their mode of production and achieved a higher standard of living. The widening inequality of income within the LDCs in spite of satisfactory growth rates is one of the major defects in the "linear" concept of development and the "spill-over effect" assumption associated with it. According to a World Bank(1974) study, the Lorenz Curve in the LDCs is becoming increasingly skewed in favour of the industrial sector.

If the authority opts for a policy to accelerate the relative growth rate of the agricultural sector instead of the industrial sector, it must reject the conventional analysis of market determined equilibrium as an optimum solution. Some re-direction of financial resources on the basis of economic desirability rather than private profitability will best reflect the requirements of the "mixed economy" to which most of the LDCs approximate.

Here we propose that the appropriate development strategy for any LDC should be to promote growth in the agricultural sector before industrialization because agriculture is the biggest and most important industry in the economy. Hence, the monetary authority should adopt monetary policies that ensure the precedence of agricultural development over industrial development. We assume that

capital accumulation hinges on the availability of investment funds and it is the role of the monetary authority to mobilize and allocate investible resources[1].

The financial sector (combination of money and bank credit markets) determines the amount of investment or savings funds available in the agricultural sector or industrial sector. The models discussed below are not different from those developed in Section 3.E except that financial institutions operate in the agricultural sector like those in the industrial sector. In other words, unlike Section 3.E, we assume that both the sectors have reasonably well-developed financial systems and all investible funds in the economy flow through the banking system.

Savings and investment functions in the agricultural sector are as follows[2]:

(5.C-1) $$s_1 = y_1 - c_1 - x_1 + x_2$$ (total supply of investible funds)

(5.C-1a) $$s_1 = s_1(\bar{r}_{1L} - \pi^*) \quad \text{where} \quad s_{11} > 0$$

(5.C-2) $$i_1 = i_1(r_{1K}, \bar{r}_{1L} - \pi^*)$$ (total demand for investible funds)

where $i_{11} < 0$; $i_{12} < 0$

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[1] This might be a very simple assumption because in addition to unavailability of loanable funds there are a number of other institutional constraints like risk factors, level of education, ignorance, lack of better seeds and fertilizers, quality of livestock,etc., which limit growth. However availability of capital is assumed to be the most important stumbling block. Krishna and Raychaudhuri(1980, p. 32) have concluded (cont.)

In the above equation, $\bar{r}_{1L} - \pi^*$ is the real rate of return on bank loan, and r_{1K} is the rate of return on physical capital. Equation (5.C-1) assumes that total private savings have been financialized, and the interaction between demand and supply of bank deposits is implicit.

The decisions to invest and save in the modern sector is basically similar to that of the agricultural sector,

$$(5.C\text{-}3) \qquad s_2 = s_2(\bar{r}_{2L} - \pi^*) \qquad s_{21} > 0$$

$$(5.C\text{-}4) \qquad i_2 = i_2(r_{2K}, \bar{r}_{2L} - \pi^*) ; \qquad i_{21} < 0; \quad i_{22} < 0$$

Figure 5.C-1 depicts the markets for investible resources in both sectors. The schedules have been drawn on the assumption that elasticities of demand and supply are identical in both the sectors. Market equilibrium values are determined by the intersection of the demand and supply curves at E_1 and E_2. At E_1, $V_1 = \bar{r}_{1L} - \pi^* = \bar{r}_{1D} - \pi^* = r_{1K}$ and at E_2, $V_2 = \bar{r}_{2L} - \pi^* = \bar{r}_{2D} - \pi^* = r_{2K}$ because all the real rates of interest are (marginally) equal at the equilibrium point. But $V_2 > V_1$ because, as explained earlier, the marginal rate of

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continuation of footnotes from page 138

that for Indian farmers "the constraints on the growth of productive investment are obviously not due to lack of adaptiveness on their part, but to the low financial saving rate, inadequacy of external (i.e., bank) finance, lack of knowledge of profitable investment opportunities, and supply bottlenecks.

[2]We are using the savings and investment functions for the sake of simplicity. Complications arising from using the full models would not alter the essence of the arguments.

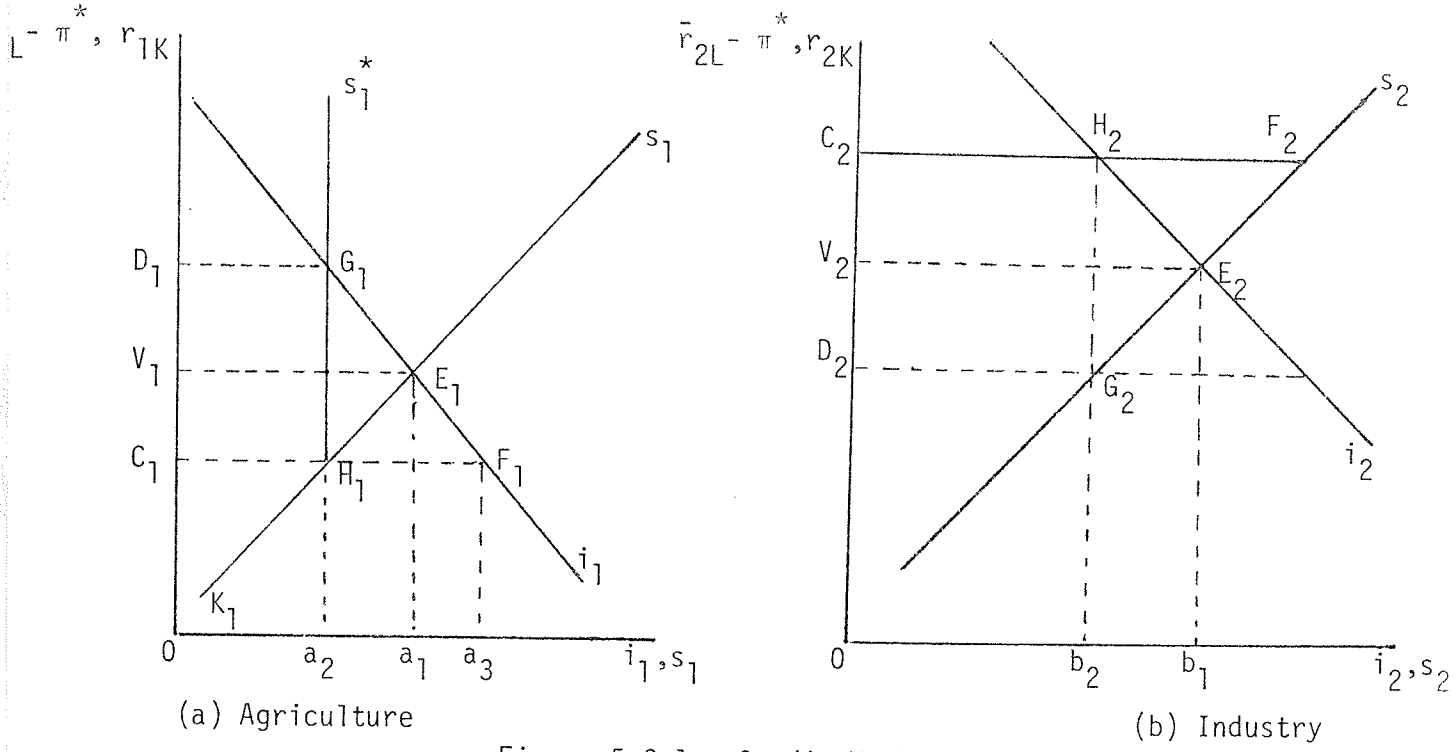

Figure 5.C-1 : Credit Markets

return on investment in modern sector is higher than that of the agricultural sector. Discrepancy in the rates of return will induce a flow of savings from agriculture into industry. To ensure, at least, a balanced growth of the economy, the monetary authority must intervene in the credit market. Intervention in the credit markets is pursued by implementing a policy of "credit dualism". By the term credit dualism we mean two different credit policies for the two sectors.

The need for a credit dualism policy in a LDC implies the need for monetary policy targets and indicators. The justification

for appropriate monetary policy targets and indicators is derived from the desire to pursue that particular monetary policy which is optimal in some sense. Monetary policy is defined as the manipulation of certain aspects of the economy that are under the direct control of the monetary authority, usually called "policy instruments". The term "optimal" is understood to be some objective function in the policy makers mind, and the objective function may be a single-valued function or a complicated function of many arguments. In a LDC, formulation of the objective function is the most crucial task of the policy maker. For example, the overall success of a monetary policy in a LDC depends on whether the target is to increase output(income) of the industrial sector or to increase output of the agricultural sector or a balanced combination of two. As far as this study is concerned, the ultimate goal of any policy maker is to accelerate the growth of agricultural output before industrialization because the majority of the population live in the agricultural sector, and it contributes a major share of the GNP. We may identify economic growth in a LDC with the economic growth of its agricultural sector. Nominal bank loan rate ($\bar{r}_L$) is the most potent monetary policy instrument because it helps in establishing a direct linkage between the financial and real variables. In short, the target and indicator of our "credit dualism" monetary policy are agricultural output(income) and bank loan rate respectively.

To ensure the flow of investible resources from the industrial sector into the agricultural sector (or, at least, restrict the

outflow from the agricultural sector), the authority must follow a credit policy to neutralize the discrepancy in the rate of return on capital in the two sectors. The monetary authority would have to fix the bank loan rate in the industrial sector at a higher level than in the agricultural sector. Let us assume that in Figure 5.C-1(b), the minimum bank loan rate is set at C_2, where savings exceed investment:

$$s_2 = i_2 + \Delta(D_{2P}/P) \tag{5.C-6}$$

and $\Delta(D_{2P}/P)$ is the accumulation of bank deposits by the individuals in the industrial sector. The supply schedule of loanable funds is the kinked curve($C_2F_2s_2$) which intersects with the demand curve at H_2. Amount of investment funds demanded falls from Ob_1 to Ob_2, and the corresponding rate of return on investment is OC_2. The inequality in savings and investment is explained by the fact that for Ob_2 amount of investment funds, the marginal rate of return on investment equals the cost of borrowing from the banks. But the bank's cost (i.e., the bank deposit rate) of mobilizing Ob_2 of savings is less than the equilibrium rate. To supply Ob_2 of loanable funds the banks need to charge only OD_2 of bank loan rate. Since the minimum bank loan rate is fixed at OC_2 and the bank loan rate equals bank deposit rate at the margin, the banks mobilize more savings than the market can absorb at that particular rate. H_2F_2 is the amount of excess financialized savings in the industrial sector.

To facilitate the flow of excess savings from the industrial sector into the agricultural sector monetary authority must adopt

a credit policy where the maximum bank loan rate is fixed at a level below the market equilibrium rate. Let us assume that the bank loan rate is fixed at OC_1 in Figure 5.C-1(a). At that rate, the demand for investment funds is greater than the supply:

(5.C-7) $$i_1 = s_1 + \Delta(H_{1P}/P)$$

and $\Delta(H_{1P}/P)$ is the amount of bank credit available for investment in the agricultural sector. The supply schedule of funds is the kinked curve($K_1H_1s_1^*$) which intersects with the demand curve at G_1. Oa_2 amount of investment financed from savings in the agricultural sector, and the corresponding marginal rate of return on investment is OD_1. Disequilibrium in the credit market is explained by the excess demand (a_2a_3) for investment at OC_1 bank loan rate. To ease the disequilibrium in the credit market, the financial intermediaries should extend the line of credit to the amount of H_1F_1. Total investment in the agricultural sector is Oa_3 of which Oa_1 is financed from own savings(non-consumed output) and a_2a_3 is the savings transferred from the industrial sector through the financial intermediaries.

The role of financial intermediaries in pursuing a credit dualism monetary policy is portrayed in Figure 5.C-2, which has been derived by superimposing Figure 5.C-1(a) on Figure 5.C-1(b). In Figure 5.C-2, the demand for investment funds schedules in the two sectors are assumed to be similar. The supply of loanable funds in the industrial sector is represented by the curve CF_2s_2, and the supply schedule for agricultural sector is represented by $K_1H_1s_1$. Dual credit policy

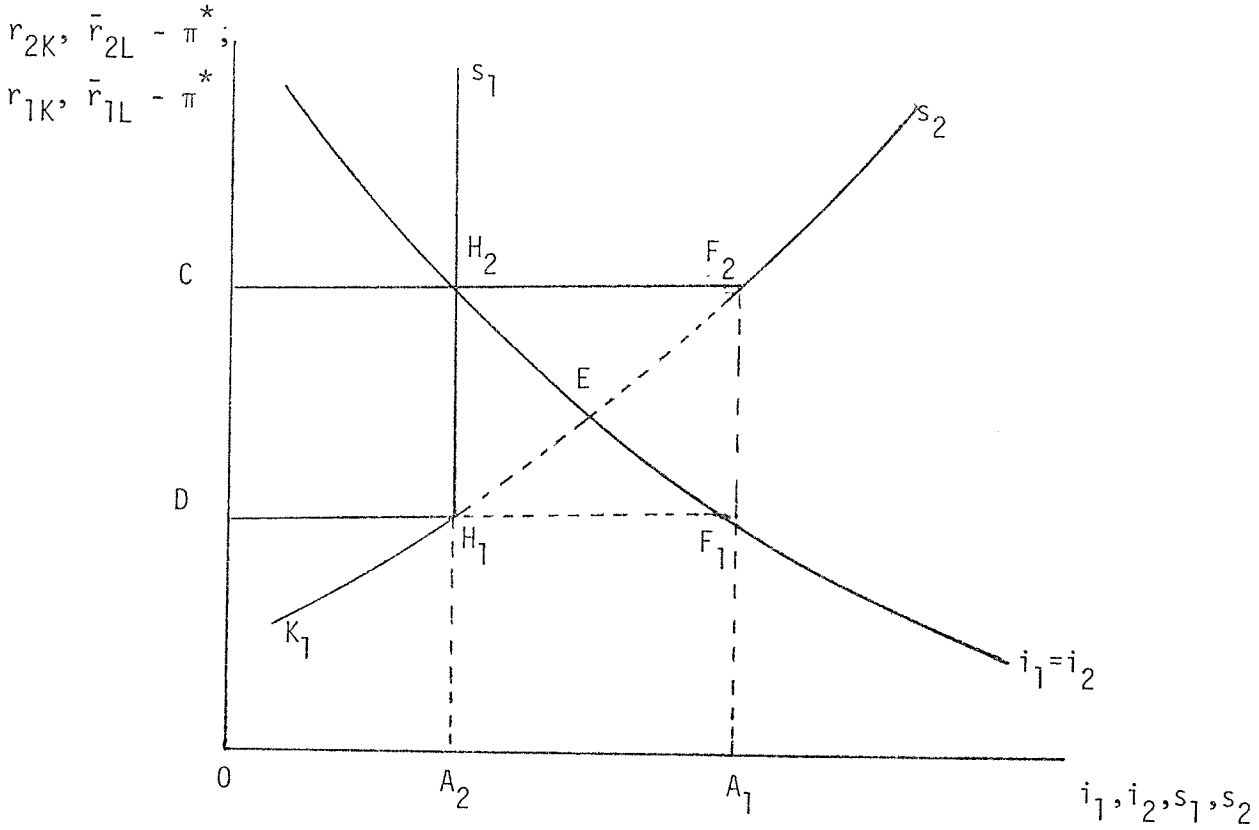

Figure 5.C-2

"Credit Dualism" Monetary Policy

is implemented by setting a minimum bank credit rate ($\bar{r}_{2L}$) in the industrial sector at OC, and a maximum rate ($\bar{r}_{1L}$) at OD in the agricultural sector. Intersection of the demand and supply schedules determines the equilibrium values. Industrial sector's excess savings is H_2F_2(= CF_2 - CH_2), and agricultural sector's excess demand is H_1F_1(= DH_1 - DF_1). It is upto the financial intermediaries to transfer excess savings of H_2F_2 from industrial sector to agricultural sector

to meet excess demand. At H_2, the marginal rates of return on investment in both sectors are equal and total investment in the economy is $OA_1 + OA_2$. A credit dualism policy increases (decreases) the supply of funds within the industrial (agricultural) sector, but decreases (increases) the demand for funds within the industrial (agricultural) sector. In equilibirum, savaings-investment identity for the economy is satisfied.

In light of the above discussion it is clear that a dual credit policy can be a very effective monetary instrument in mobilizing and allocating resources. However, we should mention that in addition to the opportunity cost associated with any resource allocation theory, there is a direct monetary cost associated with this approach. To equalize the rates of return on investment expenditure in the two sectors and to accelerate investment in agriculture, the financial intermediaries have to borrow from the non-bank private in the industrial sector at a higher rate than they charge from their borrowers in the agricultural sector. In terms of Figure 5.C-2, this means the intermediaries mobilize CF_2 amount of industrial savings at OC rate of bank loan (which equals the bank deposit rate at the margin) and after lending CH_2 portion of that savings to the investors in the same sector, they transfer H_2F_2 amount of savings into the agricultural sector. In the agricultural sector, H_2F_2 is loaned to the borrowers at OD rate of bank loan. Since $OD < OC$, the banks take a monetary loss given by the area $H_2F_2F_1H_1$, equal to the difference between the banks' borrowing and lending rates and multiplied by the volume of loanable funds. This

is the inevitable cost of ensuring, at least, an economically desirable growth of the economy, and the government must finance it from its budget in the form of subsidy[1]. The relative size of the rectangle, $H_2F_2F_1H_1$, will depend on the overall objective function of the policy maker.

The argument of credit dualism is analogous to infant industry (protection) argument in international trade. It is true that the credit dualism policy entails a departure from Pareto optimal solution, but such a departure is justified on the ground that the agricultural sector needs protection for its growth. Unless there is intervention, economic dualism will aggravate the disequilibrium situation and the (backward) agricultural sector will become comparatively worse-off for reasons discussed in Section 5.B.

CHAPTER 6 : SUMMARY, CONCLUSIONS, LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

6.A Summary

The effectiveness of monetary policy in a dual economy is the main subject of this study. To answer the question: how does money affect the real (flow) variables, this study examines the role of money in less developed countries. The function of money as a conduit of resources from savers to investors is more important in understanding its role in the development process than its other functions as medium of exchange and/or store of value.

The subject matter of the study is introduced in Chapter 1. Chapter 1 provides the necessary background of the economic structure in which monetary policy operates in less developed countries. Some pecularities of a LDC, especially economic dualism, are described in 1.A. The coexistence of a modern sector and a traditional sector makes the structure of LDCs quite different from that of developed countries. The level of dichotomization encompasses all aspects of the economy, such as output, consumption-savings patterns, technologies and financial systems.

The most important difference, as far as this study is concerned, between the two sectors of the economy is the structure of the financial system. Most underdeveloped countries operate under a dual monetary system - a small organized money market catering to the

financial requirements of a small percentage of the population in the modern sector and a large unorganized market in the traditional-rural sector.

Ineffectiveness of monetary policy stems from the duality feature of the economy. The apparent insufficiency of domestic savings to finance capital formation requirements is the result of inefficient mobilization mechanisms - not all of domestic savings are available for productive investment process because of the dual monetary system. The loanable funds market in a developing country is confined to the financial operations of the monetary institutions in the modern-industrial sector. Since the traditional sector has few or no financial institutions, the larger section of the population remains outside the influence of central bank's monetary policy. It is clear that one of the crucial problems in LDCs is the asymmetric development of financial institutions in the two sectors of the economy. As a result, the main emphasis for fostering capital accumulation should be not so much to increase aggregate savings but to enlarge the amount of transferable savings.

The purpose of the study is discussed in Section 1.B. This study stresses that economic growth and development are not independent of monetary phenomena. It suggests reasons as to why straightforward application of monetary policies designed for developed countries are unsuitable for developing countries. To examine the role of money and monetary policy in LDCs, this study addresses a number of interrelated questions. Answering these questions requires that we properly specify

the structure (both real and financial) of an underdeveloped economy, which is characterized by economic dualism. Since monetary theory seeks to answer how money affects the real (flow) variables, it is proper to construct a structural model showing how various parts of the model interact in response to exogenous disturbances. Section 1.C provides an outline of the study.

Chapter 2 describes and evaluates two broad classes of theories (models) of economic development: "real " and "monetary" models. This chapter is a review of the available literature on economic development and growth. The aim is to find, at least theoretically, a theory or a group of theories which have attempted to analyze the role of money in economic growth and development. Unfortunately, a survey of the literature reveals that most of the theories conceptualize economic growth as independent of monetary phenomena.

The first part presents three major schools of thought pertaining to "real" models of economic development: stages of economic growth; dependency theory of economic underdevelopment; and duality theory of economic development. These models are discussed and evaluated. Less emphasis is given to the theoretical contents of these three major strands of thought. For the purpose of the study, emphasis is given to the policy contents of these theories and they are found to be weak on various grounds.

The second part of this chapter emphasizes the importance of financial development and financial policies in the capital accumulation process. The process of economic development cannot

be properly understood without examining how the financial super-structure and the real infra-structure interact, and the effects of such interaction on development and growth. Of the two views of monetary phenomena ("demand-following" and "supply-leading") of economic development, "supply-leading" theory is presented at length for an important reason: the central argument of the theory is that creation of financial institutions and the supply of their assets, liabilities, and related services stimulate and promote productivity and entrepreneurial activity. The policy implication of this theory fits very well with the theme of this study. The rest of Chapter 2 provides a critical review of Gurley-Shaw-McKinnon view of "liberalization" of the financial system.

Chapter 3 starts the investigation of the effectiveness of monetary policy in developing countries. The aim of this chapter is to build a two-sectoral(complete) model which is used later to assess the importance of financial institutions in transmitting monetary impulses throughout the economy. Structural models are constructed because they provide a detailed picture of the structure of the economy. Section 3.A deals with the "real" component of the agricultural sector. This section points out that investment decisions are made by small self-financing units which have no access to the capital market in the modern sector. At the same time, a balance of trade linkage equation is built into the model to show how monetary influences flow across the two sectors of the economy. Economic units of the agricultural sector can obtain more money by running a

trade surplus with their neighbours.

Portfolio behaviour and composition of wealth in the agricultural sector is analyzed in Section 3.B. In the absence of a variety of financial assets, the asset choice of the owners of wealth is restricted to holding currency, unproductive real assets or productive real assets. According to the general portfolio theory a wealth owner's preference among assets will depend on his subjective estimates of the risk attached to holding each asset. A risk-averse wealth holder will generally diversify his portfolio, that is, hold assets that have different expected rates of return if the risks of the different assets are not perfectly correlated. At any point in time, a large part of agricultural savings is generally invested in unproductive physical assets such as gold (a relatively riskless asset) which contributes little or nothing to economic growth. The main reason for holding such an asset is that there is little or no alternative to such unproductive asset. Accumulation of savings in such a form contributes little or nothing to capital accumulation.

Sections 3.C and 3.D discuss the real and financial components of the modern sector respectively. Unlike the traditional sector, investment expenditures in the modern sector are externally financed. The range of assets the wealth owners are willing to hold in their portfolios include currency, productive real assets and bank deposits (a financial asset). The analysis of the financial component shows that lending and borrowing operations carried out by the banking system are far more effective in establishing the vital link between

savers and investors than those carried out directly among savers and investors in the traditional sector. Finally, Section 3.E describes the complete structural models of the agricultural and industrial sectors by using relevant information from the previous sections of this Chapter.

The monetary transmission mechanism is used as an analytical apparatus to evaluate the monetary policy effects. Using a flow diagram, Section 4.B depicts the first-round effects of monetary policy in a dual economy. It shows how monetary impulses are transmitted throughout the economy. The most important inference of this section is that two channels of monetary transmission mechanisms operate in the two sectors: credit rationing is mainly used in the modern sector and portfolio substitution channel in the traditional sector. The effectiveness of monetary policy in stimulating investment crucially depends on the level of financial development. An economy may have substantial aggregate savings, but unless these savings are efficiently and productively utilised they will contribute little or nothing to economic growth. Hence, money and financial assets in general stand at the very centre of this process as the vital link.

Section 4.C is an analysis of the comparative-static results obtained using the industrial sector model. The model is composed of four structural equations in four explained variables: income, rate of inflation, rate of return on capital and balance of trade. The relevant monetary policy instrument variables used in the

comparative-static analysis are central bank credit to commercial banks(γ); commercial bank deposit rate($\bar{r}_D$); reserve requirement ratio(RR) and commercial bank loan rate($\bar{r}_L$). An exogenous increase (decrease) in either γ or $\bar{r}_D$ increases(decreases) income and rate of inflation but decreases(increases) the rate of return on capital, and worsens(improves) the balance of trade. An increase(decrease) in banks' reserve ratio implies a contractionary(expansionary) monetary policy and hence has a negative(positive) impact on both income and rate of inflation, but a positive(negative) effect on rate of return on capital and balance of trade.

Section 4.D is an extension of Section4.C, and it deals with the bank loan rate multipliers. The signs of all the multipliers are negative except the effect of an increase(decrease) in bank loan rate on the balance of trade which is positive(negative). The objective of this section is to demonstrate that credit rationing is one of the powerful and effective channels of transmitting monetary impulses from the financial sector to the real sector of the economy. The outcome of credit rationing policy in LDCs is that it is "affluence biased" in the sense that it caters to the need of the affluent (modern) sector of the economy and it contributes to the inflationary tendencies in the economy.

Monetary policy effects in the agricultural sector are analyzed in Section 4.E. Monetary influence is transmitted to the agricultural sector through two channels: the external (or horizontal) and internal (or vertical). The external channel of transmission deals with the

balance of trade and shows how money supply changes. Money supply increases(decreases) with a surplus(deficit) in the balance of trade. The internal channel deals with the portfolio determination of the wealth holders. The effect of an increase in money supply on the endogenous variables depends on how the wealth holders are willing to hold their additional wealth. The signs of the multipliers depend on the absolute elasticities of demand for assets with respect to money supply. As long as savers are willing to divert some of their resources(i.e., savings) into unproductive investment the monetary multipliers will lose some of their potency in influencing the real (flow) variables. The most important conclusion of this section is that the lack of a variety of financial assets inhibits the monetary authority from effectively using its policies to stimulate investment.

Chapter 5 opens with a criticism of the widely circulated view that insufficiency of real savings to meet financial needs is the most important bottleneck in LDCs. It is clear from the analysis in Chapter 4 that one of the reasons for insufficiency of real savings is the result of inefficient mobilization mechanisms. Therefore, financial development is imperative for economic growth. This chapter attempts to show that financial development is necessary but not sufficient for accelerating an economically desirable rate of growth. By the term "economically desirable" it is meant more growth in the agricultural sector than in the industrial sector. This notion of accelerated growth in the agricultural sector was advocated by Myrdal(1968),

Singer(1970) and others. They have suggested that agricultural development needs to be viewed as the dynamic and "leading sector" in any overall strategy of economic development and growth.

The prevailing institutional and structural imperfections in a dual financial system prevent market forces from performing their appropriate allocative role. The role of financial institutions in attracting surplus funds must be kept apart from their role of allocating those resources. Manipulation of banks' credit policies is very important for the monetary policy to be effective in stimulating agricultural investment. A dual financial system requires a dual credit policy. The risk of letting a market dictate the allocation of investible resources is very high and, at times, can be counter-productive as far as the agricultural sector is concerned.

Section 5.B is a critical analysis of Gurley-Shaw-McKinnon hypothesis on non-interference in the market. They advocated liberal monetary policy as means of stimulating savings and investment in the economy. Withdrawal of unwise government intervention from the markets would raise the real yield on money (which would invariably mean raising the real cost of credit) and hence, would contribute to the pace of capital formation by forcing funds into higher yielding investment than typically results when credit is allocated by non-price means. Private profitability of intermediaries might induce growth in the industrial sector of the economy but in a dual economy it is counter-productive as far as agriculture is concerned. The reason being, market forces will shift resources from the (agricultural) low-return

investments to investments in the technologically superior industrial sector.

The main argument of Section 5.C is that manipulation of bank's credit policies rather than its cost is of prime importance for the effectiveness of monetary policy. The free-market role of mobilizing resources (savings) must be coupled with some methods of selective credit control. The technical aspect of selective credit control is that the cost and availability of financial credit to different sectors are differentiated by direct regulations by the monetary authority. This section suggests a credit policy for a dual economy: credit dualism. Credit dualism says that there should be two different credit policies for two sectors of the economy. Credit controls may be used to curtail or discourage excessive demand in particular direction in favour of activities regarded essential for "economically desirable" growth. Regulating credit flows in two sectors of the economy involves some kind of government subsidy. It may be argued that if the government needs to subsidize a sector of the economy as an inevitable cost of growth, it might as well be agriculture because it is the biggest and most important industry in LDCs.

6.B Conclusions

The main conclusions of this study are clear: (a) money and credit policies have the potentiality of playing a very effective role in the context of economic growth in LDCs; (b) a developed financial structure is a necessary pre-condition for effective operation of such policies; and (c) development of an integrated financial system in a dual economy needs to be supplemented by government intervention in the credit markets to attain economically desirable results.

The argument that monetary policy has its own limitations as a tool for economic growth and development because the real-monetary sectors are narrowly linked is only partially true. The absence of financial institutions in a LDC is confined to the agricultural sector where the link between real and monetary components is weak. The industrial sector has a reasonably well developed financial system and the link is quite strong. As a result, it is quite improper to say that in a LDC the real-monetary components are narrowly linked. Meaningful analysis of monetary policy in a LDC needs to be conducted within the framework of economic dualism because of the asymmetric characteristic of the link. Limitations of monetary policy ought to be examined in the light of availability of financial assets in two sectors of an underdeveloped economy.

The effects of changes in money stock are different in the two sectors. In the modern sector, monetary influences are transmitted

from its financial component to the real component in part by portfolio substitutions but primarily by credit rationing, which appears to have a higher effectiveness. To stimulate industrial investment, the monetary authority fixes the bank loan rate below the market rate, thereby creating a disequilibrium in the credit market. The excess of ex ante investment over ex ante savings is financed by bank loans (increase in the stock of money) through credit rationing. As a consequence of an increase in money stock, the income level will rise in the next period as the dynamic process continues.

Monetary impulses are transmitted from the industrial sector (where they originate) into the agricultural sector via the balance of trade equation - the only available linkage between the two sectors. In the agricultural sector, monetary impulses are transmitted to its real component by portfolio substitution channel. In the absence of financial assets, the link between the financial and real components of the sector is tenuous compared to that in the industrial sector. As a result, a substantial portion of agricultural savings is generally invested in physical assets which contribute little or nothing to economic growth and this greatly inhibits the effectiveness of monetary policy.

The asymmetric effectiveness of monetary policy in the two sectors of the economy is the result of asymmetric development of financial institutions. The importance of a developed financial environment for effective operation of monetary and financial policies has been demonstrated more clearly in this study than in any of

the previous studies mentioned in Chapter 2. Unlike other studies on the same subject, a "controlled experiment" approach is used to show that money and credit policies have the potentiality of playing a very effective role in the context of stimulating economic growth in LDCs. The fact that monetary policy is more effective in stimulating investment in industrial sector than in agricultural sector proves that financial institutions are imperative for effective operation of such policies.

The policy prescription is quite obvious: develop and expand financial institutions throughout the entire economy. Development of financial institutions encourages savings in the form of financial assets and helps in bringing the savings units and investing units together. However, an integrated financial system needs to be supplemented by some kind of selective credit control. This is in contrast to Gurley-Shaw-McKinnon hypothesis of optimal market solutions. As long as credit markets are imperfect (i.e., the rates of return on investment are different in the sectors), optimal market solutions are economically undesirable. The reason being, market forces will shift resources from the (agricultural) low-return investments to investments in the technologically superior industrial sector. Since agriculture is the more important of the two sectors, in terms of GNP contribution and employment, the monetary authority should intervene in the credit markets to ensure economic growth in agriculture. It is suggested that monetary authority should follow a policy of credit dualism: two different credit policies

for two sectors of the economy. The argument for credit dualism is analogous to infant industry (protection) argument in international trade.

6.C Limitations and Suggestions for Further Research

It may be claimed that the present study does shed some light on one of the most controversial topics in economic development: the role of money in LDCs. The structural models that have been constructed provide us with a detailed picture of the structure of the economy and tells us how the various components interact. The effectiveness of monetary policy has seldom been examined using structural (two-sectoral) models; the most serious and impartial works are either descriptive or make a very general analysis.

However this study suffers from a number of limitations:

(i) The structural models that have been constructed capture the general features of a LDC. In formulating models for developing countries, one must realize that the structural and institutional differences among developing economies are as varied as those among advanced countries. Therefore, it would be impossible to build a model appropriate to all developing countries.

(ii) The absolute asymmetric development of financial institutions in a dual economy might seem to be an extreme assumption to some readers. It is true that in some LDCs attempts

have been made to widen the scope of monetary policy by establishing institutions like Agricultural Development Banks, Rural Credit Cooperatives etc. Development of such financial institutions in the agricultural sector is undoubtedly a step in the right direction. The justification for assuming that there are no financial institutions in the agricultural sector is the hope that it may help in portraying the sharp contrast between the effectiveness of monetary policy in the two sectors.

(iii) For simplicity a partial equilibrium approach is used instead of a general equilibrium approach.

(iv) Again for simplicity only the first-round effects of monetary policy have been analyzed. Complications arising from analyzing the second-round effects would not provide any substantial new information on the workings of the models.

(v) The demand functions for assets have been proposed without going into their derivations because the purpose of this study is to examine the interaction between the real and financial components of a dual economy, and a detailed discussion of the theory of risk bearing would take us too far afield.

The models developed in this study could be extended further by incorporating other important factors, like government expenditure, bond market, and international trade. It is often argued that the main hope of raising the investment ratio in developing countries lay

in increasing government investment expenditure and the main source of finance for this is likely to be through an expansion of government taxation and savings. An increase in tax effort can lead to an increase in development effort but much depends on government expenditure policy. Obviously if the government itself carries out the investment (development) expenditure this ensures that the additional domestic savings, mobilized through taxation, result in additional investment (development) expenditure. It would be a fruitful exercise to examine the role of governments in a dual economy as investors and test the "crowding-out" hypothesis.

For the last couple of decades, almost all LDCs have been suffering from chronic (international) balance-of-payment deficit. An examination of the cause, effect and remedy of the balance-of-payment deficit is, particularly, important in the context of economic dualism. Most LDCs are net exporters of primary commodities like raw materials and agricultural cash crops, but net importers of secondary commodities like manufactured goods. In effect, the agricultural sector (producing primary commodities) subsidizes the modern-urban sector (producing manufactured commodities). Currency devaluation is one of the most widely used external stabilization policies in LDCs. Whether such an external stabilization policy is inconsistent with domestic stabilization policy in the context of a dual economy is an open issue.

It is hoped that the present study will stimulate research on the interactions between money and the level of economic activity in developing countries.

APPENDIX I : Agricultural Sector

I.a Commodity Market (Equation 3.E-1, p. 67)

$$(I.a\text{-}1) \qquad c_1\left(\frac{1+\pi_2}{1+\pi_1}, y_1\right) + i_1(r_{1K}) + x_1\left(\frac{1+\pi_2}{1+\pi_1}, y_2\right)$$

$$- x_2\left(\frac{1+\pi_2}{1+\pi_1}, y_1\right) - y_1 = 0$$

where $(\partial c_1/\partial \pi_1) = c_{11} < 0$; $(\partial c_1/\partial \pi_2) = c_{12} > 0$;

$(\partial c_1/\partial y_1) = 1 > c_{13} > 0$; $(\partial i_1/\partial r_{1K}) = i_{11} < 0$;

$(\partial x_1/\partial \pi_1) = x_{11}$? ; $(\partial x_1/\partial \pi_2) = x_{12}$? ; $(\partial x_1/\partial y_2) = 1 > x_{13} \geq 0$

$(\partial x_2/\partial \pi_1) = x_{21}$? ; $(\partial x_2/\partial\ _2) = x_{22}$? ; $(\partial x_2/\partial y_1) = 1 > x_{23} \geq 0$

From total differentiation we get the following:

$$(I.a\text{-}2) \qquad -(1 - c_{13} + x_{23})dy_1 + [c_{11} + (x_{11} - x_{21})]d\pi_1$$

$$+ [c_{12} + (x_{12} - x_{22})]d\pi_2 + x_{13}dy_2 + i_{11}dr_{1K} = 0$$

The signs of all the derivatives are umambiguous except x_{11}, x_{12}, x_{21} and x_{22}. These signs are uncertain because they depend on the elasticity of demand for imports and exports in the two sectors. Here we need to make some assumptions about the effects of variations in relative prices on balance of trade because we are not dealing with physical quantities, but with expenditure on the two goods.

An increase(decrease) in the price of manufactured goods, worsens (improves) the balance of trade for industrial sector, and conversely for the price of agricultural goods. We make some a priori assumption about the elasticity of demand for the two commodities because we know their characteristic features. For example, the price elasticity of demand for food is less than unity (in absolute sence) and the price elasticity of demand for manufactured goods is greater than unity(in absolute measurement). Cross-price elasticity of demand is non-negative because it allows for some degree of substitution through the (gross) budget constraint. In short,

$$\text{(i)} \qquad x_{21} = \xi_{21}(x_2/\pi_1) \geq 0$$

$$\text{(ii)} \qquad x_{11} = \xi_{11}(x_1/\pi_1) < 0$$

$$\text{(iii)} \qquad x_{12} = \xi_{12}(x_1/\pi_2) \geq 0$$

$$\text{(iv)} \qquad x_{22} = \xi_{22}(x_2/\pi_2) < 0$$

where ξ's are the elasticities, and $\xi_{21} \geq 0$; $\xi_{11} < -1$; $\xi_{12} \geq 0$; $\xi_{22} > -1$

We also assume that consumption expenditure responds to changes in relative price. Let us consider a fall in the price in manufctured goods, other variables being held constant. A fall in P_2 means an increase in real income (corresponding to any given level of money income) in agriculture, and a decrease in real income in industrial sector, i.e.,

$$y_1 = \frac{P_1 Y_1}{\Omega_1 P_1 + \Omega_2 P_2} \quad ; \quad y_2 = \frac{P_2 Y_2}{\Omega_1 P_1 + \Omega_2 P_2}$$

where Ω_1 and Ω_2 are the weights and the CPI is $P = \Omega_1 P_1 + \Omega_2 P_2$. Now, the short-run consumption function is non-proportional, so that the average propensity to consume decreases (increases) as real income increases (decreases). It follows that as P_2 fall and the real income in industry corresponding to a given money income falls, the amount spent on consumption expenditure our of any given money income will rise. In short, our basic premise is that, other things being equal, the consumption expenditure of any sector rises when import price rises and falls when import price falls. The opposite holds in case of its own price, hence, $c_{11} < 0$ and $c_{12} > 0$.

Let us use the following notations for the derivatives:

$$a_{11} = (1 - c_{13} + x_{23}) > 0$$

$$a_{12} = 1 > x_{13} > 0$$

$$a_{13} = [c_{11} + (x_{11} - x_{21})] < 0$$

$$a_{14} = [c_{12} + (x_{12} - x_{22})] > 0$$

$$a_{15} = i_{11} < 0$$

The commodity market equation as represented by first row of matrix on page 116 is the following,

(I.a-3) $$a_{11}dy_1 - a_{13}d\pi_1 - a_{15}dr_{1K} = a_{12}dy_2 + a_{14}d\pi_2.$$

I.b Price Adjustment Equation (3.E-2, p. 67)

(I.b-1) $$\pi_1 - \alpha_0 - \alpha_1(y_1 - \bar{y}_1) = 0$$

(I.b-2) $$d\pi_1 - \alpha_1 dy_1 = d\alpha_0 - \alpha_1 d\bar{y}_1 ; \qquad \alpha_1 > 0$$

Totally differentiated equation(I.b-2) is the second row of matrix on page 116.

I.c Balance of Trade Equation (3.E-7, p. 67)

(I.c-1) $$B_1 - (1+\pi_1)X_1\left(\frac{1+\pi_2}{1+\pi_1}, y_2\right) + (1+\pi_2)X_2\left(\frac{1+\pi_2}{1+\pi_1}, y_1\right) = 0$$

or $$dB_1 - (1+\pi_1)X_{13}dy_2 + (1+\pi_2)X_{23}dy_1$$

$$+ [-(1+\pi_1)X_{11} - X_1(\ ) + (1+\pi_2)X_{21}]d\pi_1$$

$$+ [(1+\pi_2)X_{22} + X_2(\ ) - (1+\pi_1)X_{12}]d\pi_2 = 0$$

where X_{ij} are the partial derivatives.

Assuming that initial trade conditions are given $\pi_1 X_1 = \pi_2 X_2$, we substitute the elasticity conditions derived on page 164.

(I.c-2) $$dB_1 - (1+\pi_1)X_{13}dy_2 + (1+\pi_2)X_{23}dy_1 - X_1[1 + (\xi_{11} - \xi_{21})(1 + \frac{1}{\pi_2})]d\pi_1$$

$$+ X_2[1 + (\xi_{22} - \xi_{12})(1 + \frac{1}{\pi_1})]d\pi_2 = 0$$

But we know that,

(I.c-3) $$dB_1/d\pi_1 < 0 \quad \text{if} \quad \left|(\xi_{11} - \xi_{21})(1 + \frac{1}{\pi_2})\right| > 1$$

where $(\xi_{11} - \xi_{21})(1 + \frac{1}{\pi_2}) < 0$ because $\xi_{11} < -1$; $\xi_{21} \geq 0$

Similarly,

$$(I.c\text{-}4) \quad dB_1/d\pi_2 = -X_2[1 + (\xi_{22} - \xi_{12})(1 + \frac{1}{\pi_1})] > 0$$

$$\text{if} \quad \left|(\xi_{22} - \xi_{12})(1 + \frac{1}{\pi_1})\right| > 1$$

where $(\xi_{22} - \xi_{12})(1 + \frac{1}{\pi_1}) < 0$ because $\xi_{22} > -1$; $\xi_{12} \geq 0$.

Let us use the following notations for the derivatives:

$$a_{31} = (1 + \pi_2)X_{23} > 0$$

$$a_{32} = (1 + \pi_1)X_{13} > 0$$

$$a_{33} = X_1[1 + (\xi_{11} - \xi_{21})(1 + \frac{1}{\pi_2})] < 0$$

$$a_{34} = X_2[1 + (\xi_{22} - \xi_{12})(1 + \frac{1}{\pi_1})] < 0$$

The balance of trade equation as represented by third row of matrix on page 116 is the following,

$$(I.c\text{-}5) \quad dB_1 + a_{31}dy_1 - a_{33}d\pi_1 = a_{32}dy_2 - a_{34}d\pi_2$$

I.d Money market (Equation 3.E-3, p. 67)

$$(I.d\text{-}1) \quad L_1(y_1, \bar{r}_{1M} - \pi^*, r_{1K}, r^*_{1H} - \pi^*, w_1) = \frac{M_{1S}}{1 + \pi}$$

where $$w_1 = \frac{M_{1S}}{1+\pi} + \frac{R_1K_1}{r_{1K}} + H_1$$

and $$M_{1S} = B_1 + M_{1S,t-1} \; ; \quad \pi = \Omega_1\pi_1 + \Omega_2\pi_2 \; ; \quad \bar{r}_{1M} = 0$$

After proper substitutions, we totally differentiate (I.d-1).

$$(I.d\text{-}2)\quad L_{11}dy_1 + (L_{13} - L_{15}\frac{R_1K_1}{r_{1K}^2})dr_{1K} + L_{14}dr_{1H}^{*} - (1 - L_{15})(\frac{1}{1+\pi})dB_1$$

$$+ (1 - L_{15})(\frac{M_{1S}}{(1+\pi)^2})(\Omega_1)d\pi_1 = (L_{12} + L_{14})d\pi^{*} + (1 - L_{15})(\frac{1}{1+\pi})dM_{1S,t-1}$$

$$- (1 - L_{15})(\frac{M_{1S}}{(1+\pi)^2})(\Omega_2)d_{2} - L_{15}\frac{R_1}{r_{1K}}dK_1 - L_{15}\frac{K_1}{r_{1K}}dR_1 - L_{15}dH_1$$

Let us use the following notations for the coefficients:

$$a_{41} = L_{11} > 0$$

$$a_{43} = (1 - L_{15})(\frac{M_{1S}}{(1+\pi)^2})(\Omega_1) > 0$$

$$a_{42} = (L_{13} - L_{15} \cdot R_1K_1/r_{1K}^2) \leq 0$$

$$a_{45} = L_{14} \leq 0$$

$$a_{44} = (1 - L_{15})(\frac{1}{1+\pi}) > 0$$

$$a_{46} = (L_{12} + L_{14}) > 0 \qquad \text{where } L_{12} \geq L_{14}$$

$$a_{47} = (1 - L_{15})(\frac{M_{1S}}{(1+\pi)^2})(\Omega_2) > 0$$

$$a_{48} = (1 - L_{15})(\frac{1}{1+\pi}) > 0$$

$$a_{49} = L_{15}(R_1/r_{1K}) > 0$$

$$a_{410} = L_{15}(K_1/r_{1K}) > 0$$

$$a_{411} = L_{15} > 0$$

Equation (I.d-2) may be written as,

$$(I.d\text{-}3)\quad a_{41}dy_1 + a_{43}d\pi_1 + a_{42}dr_{1K} - a_{44}dB_1 + a_{45}dr^*_H = a_{46}d\pi^* - a_{47}d\pi_2 + a_{48}dM_{t-1} - a_{49}dK_1 - a_{410}dR_1 - a_{411}dH_1$$

and this is the fourth row of the matrix on page 116.

I.e Inflationary Hedge Market (Equation 3.E-5, p. 67)

$$(I.e\text{-}1)\quad J_1(y_1, \bar{r}_{1M} - \pi^*, r_{1K}, r^*_{1H} - \pi^*, w_1) = H_1$$

Expansion similar to (I.d-1) gives us the following:

$$(I.e\text{-}2)\quad J_{11}dy_1 + (J_{13} - J_{15}\frac{R_1K_1}{r^2_{1K}})dr_{1K} + J_{14}dr^*_{1H} + (\frac{1}{1+\pi})J_{15}dB_1 - J_{15}(\frac{M_{1S}}{(1+\pi)^2})(\Omega_1)d\pi_1 = (J_{12} + J_{14})d\pi^* + J_{15}(\frac{M_{1S}}{(1+\pi)^2})(\Omega_2)d\pi_2 - J_{15}(\frac{1}{1+\pi})dM_{1S,t-1} - J_{15}\frac{R_1}{r_{1K}}dK_1 - J_{15}\frac{K_1}{r_{1K}}dR_1 + (1 - J_{15})dH_1$$

Let,

$$a_{51} = J_{11} = -L_{11} < 0$$

$$a_{52} = [J_{13} - J_{15}(R_1K_1/r^2_{1K})] \leq 0$$

$$a_{53} = (J_{15}\Omega_1)[M_{1S}/(1+\pi)^2] > 0$$

$$a_{54} = J_{15}[1/(1+\pi)] > 0$$

$$a_{55} = J_{14} > 0$$

$$a_{57} = (J_{15}\Omega_2)[M_{1S}/(1+\pi)^2] > 0$$

$$a_{56} = (J_{12} + J_{14}) > 0$$

$$a_{58} = J_{15}[1/(1+\pi)] > 0$$

$$a_{59} = J_{15}(R_1/r_{1K}) > 0$$

$$a_{510} = J_{15}(K_1/r_{1K}) > 0$$

$$a_{511} = (1 - J_{15}) > 0$$

Using these notations of the coefficients, equation (I.e-2) may be written as,

$$\text{(I.e-3)} \quad a_{51}dy_1 - a_{53}d\pi_1 + a_{52}dr_{1K} + a_{54}dB_1 + a_{55}dr_H^* = a_{56}d\pi^* + a_{57}d\pi_2 - a_{58}dM_{t-1} - a_{59}dK_1 - a_{510}dR_1 + a_{511}dH_1$$

which is the fifth equation of the matrix on page 116.

APPENDIX II : Industrial Sector

II.a Commodity Market (Equation 3.E-13, p. 70)

$$(II.a\text{-}1)\quad c_2[(1+\pi_2)/(1+\pi_1),\ y_2,] + i_2(r_{2K},\ \bar{r}_L - \pi^*) + x_2[(1+\pi_2)/(1+\pi_1),\ y_1,] - x_1[(1+\pi_2)/(1+\pi_1),\ y_2,] - y_2 = 0$$

Using techniques similar to those used in (I.a-1), the commodity market equation may be expanded as,

$$(II.a\text{-}2)\quad -(1 - c_{23} + x_{13})dy_2 + [c_{21} + (x_{21} - x_{11})]d\pi_1 + [c_{22} + (x_{22} - x_{12})]d\pi_2 + x_{23}dy_1 + i_{21}dr_{2K} + i_{22}d\bar{r}_L - i_{22}d\pi^* = 0$$

Coefficients are signed using the elasticity conditions formulated on page 160. Let us denote the coefficients by the following:

$$b_{11} = (1 - c_{23} + x_{13}) > 0$$

$$b_{12} = 1 > x_{23} > 0$$

$$b_{13} = [c_{21} + (x_{21} - x_{22})] > 0$$

$$b_{14} = [c_{22} + (x_{22} - x_{12})] < 0$$

$$b_{15} = i_{21} < 0$$

$$b_{16} = i_{22} < 0$$

The commodity market equilibrium condition may be written as

$$(II.a\text{-}3)\quad b_{11}dy_2 - b_{14}d\pi_2 - b_{16}dr_{2K} = b_{12}dy_1 + b_{13}d\pi_1 + b_{16}d\bar{r}_L - b_{16}d\pi^*$$

and this is the first equation of the matrix on page 89.

II.b Price Adjustment Equation(3.E-14, p. 70)

(II.b-1) $\pi_2 - f_1(y_2 - \bar{y}_2) - f_2\pi^* \qquad f_1 > 0; \quad 1 \geq f_2 \geq 0$

(II.b-2) $d\pi_2 - f_1 dy_2 = f_2 d\pi^* + f_1 d\bar{y}_2$

which is the second equation in the matrix.

II.c Balance of Trade Equation (3.E-19, p. 70)

(II.c-1) $B_2 - (1+\pi_2)X_2[(1+\pi_2)/(1+\pi_1), y_1,] + (1+\pi_1)X_1[(1+\pi_2)/(1+\pi_1), y_2,] = 0$

Following procedures used in I.c, the above balance of trade equation may be reduced to,

(II.c-2) $dB_2 - (1+\pi_2)X_{23}dy_1 + (1+\pi_1)X_{13}dy_2 - X_2[1 + (\xi_{22} - \xi_{12})(1 + \frac{1}{\pi_1})d\pi_2$

$+ X_1[1 + (\xi_{11} - \xi_{21})(1 + \frac{1}{\pi_2})d\pi_1 = 0$

Equation (II.c-2) may be denoted as,

$b_{31} = (1 + \pi_1)X_{13} > 0$

$b_{32} = (1 + \pi_2)X_{23} > 0$

$b_{33} = X_2[1 + (\xi_{22} - \xi_{12})(1 + \frac{1}{\pi_1})] < 0$

$b_{34} = X_1[1 + (\xi_{11} - \xi_{21})(1 + \frac{1}{\pi_2})] < 0$

therefore, third row of the matrix on page 89 is,

(II.c-3) $dB_2 + b_{31}dy_2 - b_{33}d\pi_2 = b_{32}dy_1 - b_{34}d\pi_1$

II.d Money Market (Equation 3.E-15, p. 70)

(II.d-1) $L_{2B}(r_C, r_L, D_{2B}, RR) + L_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P}) = M_{2S}/(1+\pi)$

where $D_{2P} = D_{2P}(r_C, r_L, r_D, r_{2K}, y_2, w_{2P})$

and

(i) $\therefore D_{2B} = D_{2P}$

(ii) $w_{2P} = M_{2S}/(1+\pi) + R_2K_2/r_{2K}$

(iii) $M_{2S} = B_2 + \gamma + M_{2S,t-1}$

(iv) $1 > (\partial L_{2B}/\partial D_{2B}) > 0$

(v) $1 > (\partial L_{2P}/\partial w_{2P}) > 0$

(vi) $i > (\partial D_{2P}/\partial w_{2P}) > 0$

(vii) $\pi = \Omega_1\pi_1 + \Omega_2\pi_2$

With proper substitutions and expansion, we get the following,

$$(II.d\text{-}2)\quad (L_{2B5} + L_{2P5})dy_2 + \{(L_{2B4} + L_{2P4}) - (L_{2B6} + L_{2P6})(R_2K_2/r_{2K}^2)\}dr_{2K}$$

$$+ \{[1 - (L_{2B6} + L_{2P6})][\Omega_2/(1+\pi)^2][B_2 + \gamma + M_{2S,t-1}]\}d\pi_2$$

$$- \{[1 - (L_{2B6} + L_{2P6})][1/(1+\pi)]\}dB_2 = -(L_{2B2} + L_{2P2})d\bar{r}_L$$

$$- (L_{2B3} + L_{2P3})d\bar{r}_D - L_{2B7}d(RR) + \{[1 - (L_{2B6} + L_{2P6})][1/(1+\pi)]\}d\gamma$$

$$+\{[1 - (L_{2B6} + L_{2P6})][1/(1+\pi)]\}dM_{2,t-1}$$

$$+ \{[1 (L_{2B6} + L_{2P6})][\Omega_1/(1+\pi)^2][B_2 + \gamma + M_{2S,t-1}]\}d\pi_1$$

$$- [(L_{2B6} + L_{2P6})(R_2/r_{2K})]dK_2 - [(L_{2B6} + L_{2P6})(K_2/r_{2K})]dR_2$$

$$+ [(L_{2B1} + L_{2P1}) + (L_{2B2} + L_{2P2}) + (L_{2B3} + L_{2P3})]d\pi^*$$

To sign the coefficients, we need to make the following comments:

(i) $(L_{2B2} + L_{2P2}) \leq 0$, because L_{2P2} is most likely zero, and L_{2B2} is the partial derivative of demand for currency reserves with respect to bank loan rate.

(ii) $(L_{2B3} + L_{2P3}) \gtrless 0$, depending on whether $L_{2B3} \gtrless L_{2P3}$. An increase in the bank deposit rate will induce public to shift their currency holdings in favour of bank deposits. However, as public increase their demand for bank deposit, the bank's demand for currency reserves may simply increase because they have more deposits. Here we assume that since the bank's demand for currency as reserves is only a fraction of the total deposit, whereas public's reaction is usually greater than unity, L_{2B3} increases by less than the decrease in L_{2P3}. Therefore, public's reaction dominates the sign.

(iii) $(L_{2B4} + L_{2P4}) \leq 0$, because an increase(decrease) in the real rate of return on capital will cause public to decrease (increase) both their demand for bank deposit and currency. Moreover, $L_{2B4} = 0$ because banks do not hold capital in their portfolio.

(iv) $(L_{2B5} + L_{2P5}) > 0$, where an increase(decrease) in real income increases (decreases) the demand for bank deposits and currency for transaction purposes.

(v) $1 > (L_{2B6} + L_{2P6}) > 0$. From the bank's balance sheet we know that $L_{2B} + H_{2B} = D_{2B}$. Because of the wealth constraint we know how deposits and demand for currency changes with change in wealth.

Following notations are used for the coefficients:

$$b_{41} = (L_{2B5} + L_{2P5}) > 0$$

$$b_{42} = \{[(L_{2B4} + L_{2P4}) - (L_{2B6} + L_{2P6})(R_2K_2/r_{2K}^2)]\} < 0$$

$$b_{43} = \{[1 - (L_{2B6} + L_{2P6})][\Omega_2/(1+\pi)^2][B_2 + \gamma + M_{2S,t-1}]\} > 0$$

$$b_{44} = \{[1 - (L_{2B6} + L_{2P6})][1/(1+\pi)]\} > 0$$

$$b_{45} = (L_{2B2} + L_{2P2}) \leq 0$$

$$b_{46} = (L_{2B3} + L_{2P3}) \leq 0$$

$$b_{47} = L_{2B7} > 0$$

$$b_{48} = \{[1 - (L_{2B6} + L_{2P6})][1/(1+\pi)]\} > 0$$

$$b_{49} = \{[1 - (L_{2B6} + L_{2P6})][1/(1+\pi)]\} > 0$$

$$b_{410} = \{[L - (L_{2B6} + L_{2P6})][\Omega_1/(1+\pi)^2][B_2 + \gamma + M_{2S,t-1}]\} > 0$$

$$b_{411} = (L_{2B6} + L_{2P6})(R_2/r_{2K}) > 0$$

$$b_{412} = (L_{2B6} + L_{2P6})(K_2/r_{2K}) > 0$$

$$b_{413} = [(L_{2B1} + L_{2P1}) + (L_{2B2} + L_{2P2}) + (L_{2B3} + L_{2P3})] \leq 0$$

The fourth equation of the matrix on page 89 is,

(II.d-3) $$b_{41}dy_2 + b_{42}dr_{2K} + b_{43}d\pi_2 - b_{44}dB_2 = - b_{45}d\bar{r}_L$$

$$- b_{46}d\bar{r}_D - b_{47}d(RR) + b_{48}d\gamma + b_{49}dM_{t-1} - b_{410}d\pi_1$$

$$- b_{411}dK_2 - b_{412}dR_2 + b_{413}d\pi^*$$

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