THE RELATIONSHIP BETWEEN MONETARY POLICY AND INVESTMENT IN SOUTH AFRICA

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ABSTRACT

This thesis examines the relationship of monetary policy and investment in a theoretical framework in which monetary and real economic forces are intrinsically interlinked. The full shift from a money–real dichotomy in historical economic thought to the notion of money being an essential determinant of economic outcomes is traced to the work of Keynes, partly in the *Treatise* (1930), but more completely in the *General Theory* (1936). The treatment of monetary forces in economic growth models is examined. It is found that the money–investment relationship, with close money–real interaction, is appropriately pursued in the approach to monetary theory adopted by those who could broadly be characterised as Post Keynesian. The operation of monetary forces through the banking system is examined using this theoretical backdrop. A symbolic model is developed of the influence channels implied by the theoretical analysis, using the South African monetary system as the specific focus. The symbolic model is expressed in a form which enables empirical examination. South African data are compiled and used to determine the nature and statistical significance of hypothesised relationships. The implications of the theoretical analysis and empirical examination are drawn out both for monetary theory within the Post Keynesian mould, and for the conduct of monetary policy, in South Africa in particular.

Key terms: Monetary policy, investment, South Africa, Post Keynesian monetary theory, structuralism, accommodationism, credit structure, credit rationing, monetary analysis, monetary equilibrium.

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CONTENTS

INTRODUCTORY PREVIEW

This thesis examines the relationship between monetary policy and investment from a theoretical departure point in which monetary and real economic forces are not dichotomised and segregated by assumption. The conduct of monetary policy has been subject to strong underlying presumptions and conceptual notions as to how a modern economy is influenced by its monetary system, and these have changed materially over the history of money and banking. Economic theories concerning money have been advanced and heavily contested since the emergence of economics as a distinct subject of discourse and study. This thesis seeks the grounding for a theoretical approach to analysing monetary effects on investment, and consequently on the economy more widely, through key contributions in monetary theory in which money–real economy effects are recognised. The theoretical foundations are taken through stages in more specific development, towards formulation of a symbolic model which posits the nature of the relationships explicitly. The symbolic model is expressed in such a form that it can be empirically examined, and econometric analyses are conducted to consider its behaviour and plausibility in the case of the South African monetary system and economy. This leads to conclusions which have implications both for certain contested issues in monetary theory, and for possible improvement in the conduct of monetary policy.

The pursuit of a theoretical approach in which monetary variables are inextricably bound into the determination of real economic magnitudes leads the study inexorably into the realms of Post Keynesian monetary theory, together with the broader set of economic precepts which underpin the economic analyses which can be categorised under the Post Keynesian rubric. The viewpoints and approaches of the Post Keynesian economic grouping differ sharply with those which could be regarded as 'mainstream', and even with those that carry the 'Keynesian' portion of the label in common. This certainly applies to economics carrying the label 'neo-Keynesian', but even to the more recent, widely adopted economic approach frequently described as 'New Keynesian'. In a sentence, Post Keynesian economics seeks to capture and expand what it regards as the essential elements of Keynes' contribution of the

General Theory (1936), involving a principle of effective demand, sustained departure from a Say's Law macroeconomic equilibrium, and money being integrally bound into the economic process. There is of course far more to it than so brief a glimpse conveys, and this is taken up in the course of the study. It needs to be stated that the focus on Post Keynesian monetary analysis does not stem from any unquestioning adherence on the part of the writer. The reasons for the approaches adopted are systematically argued and justified. As it turns out, the analysis of the study lends support to a minority strand of thinking within Post Keynesian monetary theory rather than that held by most Post Keynesian monetary theorists. Recognition is given also to ideas and approaches which have a useful contribution in the scope of the issues being examined, even though these stem from outside the Post Keynesian grouping. A theoretical framework is important to the analysis, but this is not pursued at the expense of the realities and relationships which are revealed through the analysis.

Chapter 1 seeks to determine when and in what manner the notion of an integral connection between money and real economic magnitudes arose in the course of economic thought from the time of Ricardo in the early 1800s. It traces the foundation of some of the issues in the Banking and Currency School controversies, and the contributions by various economists over the course of the 1800s, such as Mill, Marx, Marshall, Bohm-Bawerk and Wicksell. The transition of thinking into the work of Keynes in the early 1900s is examined, with separate consideration of the *Treatise* (1930) and *General Theory* (1936). This provides a backdrop for monetary theory in the mould of Schumpeter's Monetary Analysis classification (Schumpeter 1954).

Chapter 2 examines from the time of early formal models of economic growth, starting with that of Ramsey (1928), the role which was accorded to monetary variables and what this might contribute to analysing the relationship between monetary variables and investment. The relationship between finance and growth which formed part of the economic development literature of the 1970s and early 1980s is considered from this perspective. The role accorded to monetary variables in new or endogenous growth theory from around 1986 is

contemplated as a possible source of more recent inputs on this issue. The implications for the pursuit of monetary issues in this study are drawn together.

Chapter 3 assembles and clarifies the main elements of what could be described as Post Keynesian monetary theory. The writers who could be categorised as 'Post Keynesian' span considerable diversity in their approaches, views and emphases adopted. The chapter therefore makes references to a number of economists who would widely be regarded as Post Keynesian, and who address monetary issues, to piece together the most essential elements of a Post Keynesian monetary theory. This serves as a theoretical departure point for more in-depth examination of the central topic of the study.

Chapter 4 considers the implications of Minsky's financial instability hypothesis (1982) together with the broader notion of the bank credit structure as a source of monetary effects in the economy. The behaviour of banks in relation to credit structures could serve both as a potential source of economic variations and as a channel with changing characteristics in the transmission of monetary policy to the economy. These issues are important to considering how monetary policy variables are translated into investment effects in the economy and are therefore examined in some depth from a theoretical viewpoint.

Chapter 5 embarks on assembling a symbolic representation of the core relationships identified from the theoretical analyses, involved in the channels of transmission from monetary variables which are under the actual or potential control of monetary authorities, through the bank credit structure, to investment in the economy. The representation is expressed as a multi-equation model which can then be taken forward for empirical examination.

Chapter 6 provides the econometric methodologies, addresses data issues, expresses relationships in the form of econometrically testable equations, and examines the statistical characteristics of the equations estimated. Possible causal relationships are considered using Granger causality tests, and comparisons are made to other econometric models. The empirical examination makes use of data for the South African economy, so is strictly speaking

applicable to that economy, but gives an indication of relationships which might exist in other economies with monetary structures that have similarities in key characteristics to those of South Africa.

Chapter 7 considers the implications of the theoretical construction of potential relationships, and the results of the empirical examination, both for monetary theory pursued in the Post Keynesian mould, and for the conduct of monetary policy, in South Africa in particular. It seeks to demonstrate the significance of the analysis and empirical relationships shown for alternative approaches to monetary analysis within the Post Keynesian monetary discourse. It also seeks to show the possible avenues through which monetary policy (in South Africa in particular) could be pursued in such a manner as to have a more benign or beneficial effect on investment in the economy, through recognising more comprehensively the nature of the relationship from monetary policy actions to investment.

A Concluding Perspective is provided to draw together the main strands arising from the thesis and to indicate the overall implications for monetary theory, research and debate within the Post Keynesian discourse, as well as for the conduct of monetary policy in the South African context.

CHAPTER 1

MONETARY EFFECTS ON INVESTMENT FROM RICARDO TO KEYNES

1.1   Introduction

Many ideas and alternative approaches in the sphere of monetary theory have their antecedents in the theoretical contributions and controversies which arose in the history of economic thought. Writers such as David Hume and Adam Smith in the 1700s included as part of their discourse early expressions of the quantity theory of money, in which the general price level was related to the quantity of money in circulation. The writings of David Ricardo in the early 1800s are however generally recognised as a milestone in the comprehensive examination of economic issues using an analytical framework (Blaug 1996:132-133). This chapter provides an examination of the economic ideas of leading contributors to economic thinking, from Ricardo in the early 1800s to Keynes in the first half of the twentieth century, in respect of their portrayal of the relationship between money and investment. Ricardo is recognised for use of the long period as an analytical device in which capital adjusts through investment between uses in such a way as to equalise the rate of profit between alternative allocations (Barber 1967:87-89). But the Classical[1] conception of money was that of a facilitating fluid behind which real magnitudes were determined (Dennis 1981:42-48). Is there evidence that Ricardo portrayed monetary variables as having at least some influence on investment? When and through which economic writers did this connection emerge? These questions are examined through viewing the writings of prominent economic thinkers over the course of the nineteenth century, in particular Ricardo, Thornton, John Stuart Mill, Marx, Marshall, Bohm-Bawerk and Wicksell, relating to monetary influences on investment. This is of course not an exhaustive list of economic writers making significant contributions concerning monetary issues over this period. It serves though to capture the key perceptions and innovations concerning monetary influences on real economic magnitudes over this period, to examine

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[1]   The term Classical is typically used to refer to economic writers and views from approximately the mid eighteenth to mid nineteenth century, even though there were many differences in views and approaches surrounding those perceptions which were held to a degree in common.

the emergence of thinking concerning monetary influences on investment. It provides a historical foil of the development of monetary thinking from which the innovative ideas of Keynes (1930, 1936) concerning the relationship of monetary variables and investment can be examined. The chapter explores the conceptual shift pursued by Keynes, relative to previous thinking, in which monetary variables are regarded as closely bound with investment, consumption spending, employment and other real economic variables.

A crucial distinction in examining monetary theories for the purposes of this thesis is the distinction between Real Analysis and Monetary Analysis as put forward by Schumpeter (1954). A monetary theory in the tradition of Real Analysis may incorporate various monetary variables, but in equilibrium the magnitudes in the economy are precisely as they would be if only real economy magnitudes were involved. There is an underlying assumption that all essential features of an economy can be captured through the interaction of real magnitudes: "Money enters the picture only in the modest role of a technical device that has been adopted in order to facilitate transactions." (Schumpeter 1954:277). Under the Monetary Analysis tradition, on the other hand, monetary variables are inextricably involved in determining real economic magnitudes. Monetary variables lead to real outcomes which differ from the magnitudes which would arise if only real magnitudes were determinants. Monetary phenomena are reflected as persistent forces which combine with real forces in determining long-period equilibrium positions; they are not confined to transitory effects[2]. The importance of the distinction in examining the relationship between monetary variables and investment (a real magnitude in this context) lies in that it requires a theory with the characteristics of Monetary Analysis to allow the possibility of such a relationship on a persistent and significant basis within its theoretical structure. Adoption of a theory in the Real Analysis tradition excludes the possibility of such a relationship *ab initio* in view of its underlying assumptions.

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[2]   Blaug (1996:22-23) provides a less comprehensive portrayal, though in the same vein: "By 'monetary analysis', we mean any analysis that introduced the element of money at the outset of the argument and denies that the essential features of economic life can be represented by a barter model."

Three strands of particular importance to monetary theory which were introduced and examined by economic writers in the eighteenth and first half of the nineteenth centuries, relate to: the quantity theory relationship between money in circulation and the general price level as well as real economic magnitudes, the question of whether there is an automatic tendency of an economy to remain at or return to an aggregate supply–aggregate demand equilibrium level as captured by Say's Law, and the economic effects of non-commodity money arising through the bank system, as expressed in the Currency School versus Banking School alternative viewpoints and debates. These three strands served as foundation stones on which increasingly advanced economic analyses were developed through the remainder of the nineteenth century and most of the twentieth. They remain as underlying theoretical departure points in alternative schools of thought and approaches to monetary theory to the present. Their origins in Classical economics are highlighted below, especially since they are frequently used, both in this thesis and in writings on monetary theory in general, to identify the theoretical foundations of alternative approaches and arguments concerning the economics of money.

1.2 Ricardo and the early Classicals

Examination of Ricardo's analysis of economic issues suffers the dangers arising from his work having been so extensively re-cast and re-formulated. It is an accolade to Ricardo that his analytical method came to form the core of much of economic teaching for a period of almost seven decades after his death in 1823. But it is an indication of a great economic conception with many flaws and inconsistencies that subsequent economists have felt the need to re-examine the analyses in more clearly formulated and corrected terms, with mathematical expression that Ricardo himself did not use. Blaug (1996:140) for instance suggests that Ricardo operated with three models at different times : "(1) a Pasinetti-type, constant wage model; (2) a disequilibrium variable-wage model; and (3) a genuine dynamic equilibrium growth model." It is tempting to rely on one or other of the subsequent formulations of Ricardo's analytical ideas, but

these inevitably carry the danger that the writer has placed greater depth, or even slight differences in concepts, than was actually present in the writings of Ricardo. At the same time, the original writings of Ricardo are widely regarded as some of the most difficult to contend with and interpret. Under these circumstances, it is desirable to cast back to Ricardo's own writing on key points to corroborate that he did in fact hold and put forward the view attributed to him.

Although not considering the relationship between monetary variables and investment explicitly, Ricardo (1821) in his *Principles* does reveal views on the relationship indirectly through his coverage of Currency and Banks (Chapter 27) and of the relationship between capital accumulation and interest rates (mainly Chapter 21 of the *Principles*). In accordance with the Classical tradition of which he formed part, Ricardo was broadly an adherent to the main tenets of the quantity theory of money, as expressed by Hume and taken forward by Smith in the eighteenth century (Blaug 1996:128). This is shown for instance in his description of the expected effects of an increase in note and coin currency by the Bank of England, "The demand for money is regulated entirely by its value, and its value by its quantity." (1821:173). From this departure point however he undertakes a more comprehensive account of the effects of monetary changes on production activities.

A major theme of Ricardo's *Principles* (1821) is the isolation of the profit element of production activities from rent, through the device of marginal productivity of the lowest-yielding land brought into use, which provides zero rent. On such land, all revenue not allocated to workers (labour) constitutes profit and indicates the equilibrium rate of profit in the economy, to which other industries and forms of production will tend through a gradual process of capital redeployment. Although Ricardo doesn't spell out how it is that the profit rate in agriculture determines the rate for the entire economy, subsequent writers infer that it results from agriculture being the only sector in which capital inputs and output (e.g. corn) can be measured in the same physical units, together with agricultural outputs serving widely as inputs to other sectors. Adjustment therefore occurs though a shuffling of agricultural prices together with re-allocation of capital

investment (Barber 1967:79-81). But Ricardo posits a close and inexorable relationship between the profit rate and interest rate. He regards the equilibrium profit rate as being an inherent characteristic of the economy to which the interest rate charged by banks must approximate, since "If they charge less than the market rate of interest, there is no amount of money which they might not lend, – if they charge more than that rate, none but spendthrifts and prodigals would be found to borrow of them." (1821:352). This is an early echo of the 'natural' rate propounded by Wicksell (1898a, 1898b) and contrasts sharply with the interest rate view put forward by Keynes (1936) in which the interest rate is determined separately from the profit rate.

Ricardo (1821) does put forward the view that changes in the quantity of money will have a temporary effect on interest rates. The transmission mechanism he describes operates through the prices of commodities. With a reduced quantity of money, the prices which a manufacturer faces are reduced. The manufacturer withholds finished goods to some degree due to reluctance to accept the lower price for them, and expectation that prices will revert to the previous levels. This leads to an accumulation of finished goods, and lower sales by the manufacturer. In order to meet ongoing payments, the manufacturer seeks to borrow funds, and because this is occurring widely, the rate of interest at which the credit is advanced is increased. Ricardo maintains that the effect is only temporary, because either the expectation of the manufacturer is confirmed and prices of his goods revert to the previous higher levels, or the lower price and demand is sustained, he accepts the new state of affairs, sales proceed but prices fall in general, the credit obtained is repaid, and the interest rate returns to its previous level. In a similar manner, an increase in the quantity of money would have a temporary effect of lower interest rates, but would have the eventual effect of a generalised increase in prices in accordance with the quantity theory (Ricardo 1821:282).

This implies that monetary policy on the part of a central bank would have no role to play via the interest rate as an instrument variable, other than possibly for a short duration, and this is the view that Ricardo (1821) adopts. His focus is on

the quantity of money issued by the central bank and banking system and the danger of the parties concerned lapsing into over-issue. Ricardo was writing at a time when full commodity convertibility (using gold and silver) had been in place for a long historical period (in the case of the Bank of England, since its establishment in 1694) but had been suspended in 1797 following heavy demands placed on the Bank of England for conversion of bank notes to gold coins (in conjunction with liquidity pressures on London and country banks) in public reaction to a possible invasion by France. It was also a period which spanned the occurrence and conclusion of the Napoleonic wars, during which the British government had undertaken extensive borrowing through bonds (stocks in Ricardo's terms) to fund the war effort. The extent to which paper money should be backed by gold or silver, and the danger of excessive note issues linked to government financing, were matters of considerable concern. (Blaug 1996:127-129; Galbraith 1975:43-48). The Bank of England had assumed the role of primary bank in England, but was not subject to a legal control structure as is the case for a modern central bank. The monetary system and appropriate action by the Bank of England were extensively examined in the "Committee of Secrecy" set up by parliament directly after the suspension of cash (gold coin) payments by the Bank of England in 1797, and subsequently in the "Bullion Committee" of 1810. (Hayek 1962:52-55).

An active debate of the time was that between adherents to the subsequently termed Banking and Currency views concerning the effects of additional note issues by banks. The Banking School maintained that additional note issues which were in excess of the needs of trade would simply be paid back into the banking system, referred to as the Law of Reflux, with negligible consequence to the economy. Associated with this, a distinction was frequently made between notes or bills issued in respect of business transactions (e.g. import by a merchant), termed 'real bills', and those issued purely as promises to repay money borrowed, termed 'fictitious bills'. Some argued that it was only notes and bills of the 'fictitious' category that could be excessive and have consequences for the general price level. Adherents to the Currency School view maintained that excessive note issues, whether associated with trade or not, would increase

the quantity of money in circulation and thereby the general price level, i.e. there would be inflationary consequences. (Makinen 1977:54-55).

Although not labelling the alternative lines of thinking in these terms, Ricardo is clearly in the Currency School camp. He expresses concern that banks may not maintain adequate control of the issue of notes in circulation, and advocates closer government or societal control over this process to ensure restraint. He maintains that, "neither a State nor a Bank ever had the unrestricted power of issuing paper money, without abusing that power." (1821:344). For this reason, he advocates that the issuers of paper money carry the obligation to pay their notes in gold coin or bullion, i.e. a fully gold-convertible currency. He advocates that the issuer of notes be a separate entity from government itself, because of the greater risk that government would misuse this role, but that the issuing entity be managed by commissioners who are responsible only to parliament (1821:350). It was partly attributable to the exhortations of Ricardo that convertibility of Bank of England notes to gold was re-introduced in 1821, and that more stringent controls were eventually placed on the Bank of England through the Bank Charter Act of 1844.

Ricardo's notion of capital investment was so strongly tied to his analytical framework for determining value and distribution between economic classes (workers, projectors[3] and rentiers) that monetary variables scarcely entered the arena as a possible influencing factor. The profit rate, and consequently the closely associated market rate of interest, were functions of structural relationships in the economy, through the generation of value using direct labour together with indirect labour embodied as capital. Once these structural relationships had determined the rate of profit through his marginal productivity analysis, the banking system would inevitably provide the financing required for capital formation at the structurally determined market rate of interest. He focussed on a long-period equilibrium determination of the rate of profit, and

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[3] 'Projectors' would be close in meaning to 'entrepreneurs' in modern usage. They would be owners of capital serving as initiators, decision makers and risk takers in business endeavours. As Blaug (1996:80) recognises, Classical economists generally regarded rent as confined to payment to rentiers (landlords) for the use of land.

viewed any short-period deviation from these relationships as no more than a transitory episode on the path to the long-period levels. Although he cites cases where interest rates had been set by law for extended periods at levels which must inevitably have been at variance with the profit rate, he maintains that such interest rates simply have the effect of either full utilisation of the source of funding if the interest rate is below the market rate, or the substitution of other sources of funding if above the market rate: "The rate of interest, though ultimately and permanently governed by the rate of profit, is however subject to temporary variations from other causes." (1821:282).

A noteworthy contributor to the debate on monetary effects in the early 1800s was Henry Thornton, a banker and contemporary of Ricardo. He was likewise an adherent to the Currency view, but provided a full and well-expressed account of the operation of credit through the activities of banks and business proprietors at that time (Thornton 1802). He recognised a direct effect of excessive note issue on prices, but also put forward an indirect transmission mechanism through the differential between profit rates attainable by business proprietors (merchants and manufacturers) and the interest rate payable on borrowing obtained from banks. The excessive note issue would lead to lower interest being charged by banks, which would result in greater expenditure by business proprietors on working and fixed capital in view of the greater profit attainable. Through the excessive note issue being re-circulated repeatedly, the additional expenditure would be far greater than the original magnitude of excess notes issued. The excess notes would have an immediate though transitory effect of increasing the pace of business activity (including investment in working and fixed capital), but an eventual effect of a return to the original pace of activity, at a higher price level, once the general price level had risen to be commensurate with the extent of notes and coins in circulation (Thornton 1802:236-243, 251-255).

Thornton was regarded as a leading thinker in issues of money and finance, and presented his analysis and views to both the 1797 parliamentary committee and 1810 Bullion Committee. He advocated control by the Bank of England over the

extent of note issue, but that this needed to be set by judgement at a level which was neither excessive nor unduly restrictive. He regarded the 'rapidity' or velocity of money usage as subject to considerable variation, so that the appropriate level of note issue could not be determined with any precision. He proposed that the Bank of England "allow of some special, though temporary, encrease in the event of any extraordinary alarm or difficulty, as the best means of preventing a great demand at home for guineas . . . " (1802:259). The indirect mechanism through increased business activity posited by him was accepted by Ricardo and taken forward by John Stuart Mill, Marshall and Wicksell with some variation (Makinen 1977:59). As Hayek (1962:56) points out, he also supplemented his emphasis on interest rates relative to the rate of mercantile profits with the effect of rising prices on interest rates, in speeches subsequent to his book publication and formal evidence submissions, which was an early recognition of a nominal/real interest rate distinction. Although having only a transitory effect in his exposition, the indirect mechanism put forward by Thornton does foreshadow the possibility of a more substantive non-neutrality of money.

Also prominent in the early part of the nineteenth century, though in France, was the formulator of Say's Law, Jean Baptiste Say. Ricardo, Malthus and other British economists of the time were acquainted with his work and its implications. In identity form, Say's Law depicts an economy in which the very fact of the production of one commodity serves as the demand for other commodities, so that no general over-production or glut is possible, but money is omitted from consideration, other than in its medium of exchange function. Commodities essentially are produced and used to acquire other commodities. Ricardo (1821:290-291) characterises it as "Productions are always bought by productions, or by services; money is only the means by which the exchange is effected." Money may be included in an equality formulation of the law, but the end result is still that the economy tends to a state in which demand occurs on balance commensurately with the value of goods produced, with deviations from this being temporary and self-correcting. The law was absorbed into the thinking of Classical economists such as Ricardo and J S Mill and allowed little possibility

of a role for money in determining real economic magnitudes in equilibrium.[4] It was for this reason that later economists needed to re-examine the nature of Say's Law in considering the effects of monetary variables on the economy.

1.3   J S Mill and Marx : the mid Nineteenth century

John Stuart Mill's *Principles of Political Economy* of 1848 draws openly and fully on the analytical framework of Ricardo in its primary coverage. Mill does however offer new approaches on various subjects as well as reformulations, and these do include issues pertaining to money. Contrary to Ricardo, Mill lends some support to the real bills doctrine and the Law of Reflux as being "far nearer to being the expression of the whole truth than any form whatever of the currency theory" (Mill 1848: Book III, 653). However, in his more detailed analysis, he accommodates both a Banking School and Currency School approach by distinguishing a quiescent and speculative state of the economy. In the quiescent state, referring to a situation where markets are close to equilibrium and not overheated, the Law of Reflux would be operative and would prevent an over-issue of notes. However, in the speculative state, corresponding to high relative economic activity, note issue could expand excessively without being automatically curbed by reflux, even if banks are cautious enough to follow a 'real bills' doctrine. The note issue could feed an inflationary spiral, with higher prices leading to still further note issues, in accordance with the quantity theory and Currency School view (Mill 1848: Book III, 652-654). As with the earlier Classicals, in respect of production, Mill was "steadfast in his defense" of Say's Law (Sowell:1972:160).

J S Mill was acquainted with the work of Thomas Tooke, whose major book, *History of Prices*, was first published in 1838 (Makinen 1977:64-65). Tooke had undertaken statistical analyses of interest rates and prices which showed that changes in the general level of commodity prices and interest rates were

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[4]   Sowell (1972) provides a full account of the development of thinking concerning Say's Law from the time of its initial formulation, and confirms the widespread agreement among Classical economists of its implications for aggregate production: "The proposition that there was no secular limit to the expansion of aggregate output was one on which there was complete agreement between the Say-Ricardo school and the Sismondi-Malthus general glut school." (1972:13).

positively correlated. This meant that increasing interest rates were accompanied by increasing general price levels, decreasing interest rates by decreasing price levels. Tooke's explanation of this was that interest rates constitute an input cost for production, so that increasing interest rates raise production costs which in turn are passed on in the form of higher prices. Tooke also maintained from his statistical analysis that rises in the price level generally preceded rises in the quantity of money in circulation rather than vice versa. These two findings were strong ammunition against the Currency School view, and it appears that Mill sought to incorporate their consequence in the monetary theory that he expressed.

Adoption of a Banking School viewpoint, even if only partially, opens up the possibility of a link between money and investment in Mill. The Banking School recognised a broad range of financial instruments as constituting 'money' for analytical purposes in addition to bank notes and gold. Short-term forms of credit such as trade bills, self-liquidating commercial paper and notes based on goods in process were considered close substitutes for narrowly defined money, since they were negotiable instruments which could be used to effect payment, even though they bore a discount or implicit interest rate. These were the very instruments that could be used directly or indirectly as a vehicle to finance investment expenditure. Thus both the extent of availability of these instruments and the effective interest rate at which they could serve to raise funds could be sources of a causal mechanism between money and investment. Mill did not however pursue this line of inquiry.

The economic thinking of Marx as expressed in *Capital* (Volume 1, 1976)[5] was notable in the development of an analytical framework in which money could be inherently bound into determining real economic outcomes. In this respect, there was common ground between Marx and the subsequent work of Keynes, as recognised by Rogers (1989:167-169). Marx focused on the capitalistic mode of production, for which different assumptions were necessary compared with those

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[5] First published in German in 1867: the reference is to an English translation published in 1976.

of an agrarian or 'co-operative' economy. Torr (1988) draws out the importance of the distinction between the two modes of production. The occurrence in Marx' analysis of capitalist motivation to deploy workers in order to generate surplus value and thereby continuously accumulate capital leads to a causal chain which certainly breaks Say's Law[6] but also brings in money as a substantive factor. This at least introduces the possibility of a causal connection between money and real economic activity. Marx (1976:247-269) describes the sequence through which capitalistic motivation is pursued which can be summarised with the following symbolic representation:

$$M \rightarrow C \ldots. P \ldots. C' \rightarrow M' \rightarrow M''$$

Money (M) flows from the banking system to the industrial capitalist by way of interest-bearing loans; the capitalist deploys labour with capital equipment (C is combined circulating and fixed capital) to generate potential surplus value (P) in excess of the value of physical capital and materials acquired; profits are realised when the produce including potential surplus value is exchanged for money (sold); the capitalist pays interest and borrowing back to the banking system and is left with a monetary surplus (profit, M'') for use in further rounds of capital acquisition and profit generation. Marx therefore introduces money at the ground floor of the capitalist analysis. But the connection between money and investment was not an issue on which Marx focused directly. He was concerned with structural economic relationships, including capital formation and accumulation, of a long-period, societal rather than transitory nature. His concern was with the entire capitalist structure and its replacement, rather than monetary effects and monetary policy considerations.

It is noteworthy that the Bank of England had commenced practising monetary management at the time when Marx was writing. The Bank Charter Act of 1844 provided a legal framework in which the Bank's discount rate could be used as an instrument of credit regulation. The Bank did also engage in a form of open market operations through borrowing against Consols (Blaug 1996:272). It was therefore eminently possible that Marx could have explored the possible effects

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[6]   Marx directly challenged Say's Law and "rejected the necessary equality of supply and demand …" (Sowell 1972:181-182).

of the new monetary approaches on capital accumulation. He however regarded the interest rate as a purely monetary phenomenon, with very little connection to rates of profit. He rejected the notion of a 'natural' rate of interest and did not accept the argument of Thornton and Ricardo that there is in principle a long-period rate of interest which tends to equality with the long-period yield on real capital. He did maintain that the interest rate, along with profit rates on physical capital, would have a secular tendency to decline, but this was as much through the continued concentration of saving in the hands of an expanding banking sector as through falling capital yields as a result of relentless capital accumulation. His views were broadly in line with the Banking School, with the Law of Reflux operating, and monetary usage being determined by the requirements of commerce. He was explicitly opposed to the quantity theory, possibly regarding it as contrary to his labour theory of value (Blaug 1996:271-272). But with this combination, he viewed the monetary sector as providers of funds in his analysis of capitalistic production, rather than regarding money as a significant issue for examination from a theoretical viewpoint for his purposes. Marx' conception of the workings of a capitalist economy could possibly be placed in the category of Monetary Analysis rather than Real Analysis in terms of Schumpeter's distinction (1954), but this would be somewhat tenuous since he did not consider monetary effects in depth.

1.4   The Neoclassicals of the late Nineteenth century

The neoclassical economists in the last decades of the nineteenth century could once again best be categorised in the Real Analysis rather than Monetary Analysis tradition. These years saw the rapid advancement of the marginalist approach, applied to utility on the part of consumers and to revenue, costs, capital productivity and the like on the part of the firm. Walras was one of the discoverers and initiators of the principle of diminishing marginal utility and its implications, though he is most closely associated with the system of equations depicting an economy in general equilibrium which has come to be associated with his name. As taken up in Chapter 3, such a system of equations, even when one of the variables is allocated as a numeraire to represent money,

provides no essential role for money, and therefore lies in the Real Analysis tradition (e.g. Rogers 1989:45-67; Clower 1999:399-413).

The marginalist approach enabled extensive and more rigorous analyses to be undertaken compared to those of the Classical economists, but most of the advances related to microeconomic questions rather than monetary and other macroeconomic issues. Marshall himself, a major contributor over this period in formulating and expressing economic theory arising from the marginalist approach, recognised that it had little to offer on broader macroeconomic issues, which had yet to be adequately addressed: "The Mecca of the economist lies not in comparative statics, nor even in dynamic analysis, but rather in 'economic biology'" (Marshall 1920:xii). Marshall was using the latter term to refer to the study of the economic system as an organism, analogous to a living entity, evolving in historical time. He regards the marginalist approach as providing building blocks towards the 'Mecca'. Although the interest rate enters into his analyses at various points, it is as a cost of funds borrowed, or similar, which forms part of the marginal analysis of a representative firm, rather than as a policy variable with economy-wide influence, and money as a macroeconomic aggregate likewise receives scant attention.

At a methodological level, Marshall introduced some notions which serve as important pointers in examining subsequent theories. One was his widely-adopted differentiation of market period, short-run and long-run, with the last allowing for full adjustment of capital deployed. But perhaps more crucial to subsequent monetary theory was his establishment of the partial equilibrium approach to economic reasoning, which serves to examine the interaction of a limited group of variables, while all other variables are left unchanged (ceteris paribus). This was the method of analysis favoured by Keynes, and others in a similar mode of thinking to Keynes, as against a general equilibrium approach to economic thinking as favoured by Walras and his analytical successors. The differentiation is important to the development of economic theory in the Monetary Analysis tradition, as noted by Rogers (1989:183-200), in view of the difficulty in finding a role for money in a general equilibrium framework.

It was perhaps Bohm-Bawerk in this period prior to the work of Wicksell who came closest to putting forward a theory of money and its relationship to the real economy. In *Capital and Interest* he disputed the abstinence view of interest and put forward three reasons for the existence of interest: (1) differences in circumstances and needs of people between the present and future, (2) underestimation of the future, including that arising from limited and uncertain duration of life, (3) technical superiority of present over future goods in the sense that present goods could be invested for longer than future goods and therefore lead to a greater resulting product (Blaug 1996:482-486). Bohm-Bawerk was seeking to formulate a 'roundaboutness' theory of capital and relate this to a time preference view of the interest rate. He expressed capital as a derived factor of production which required the deployment of the primary factors of production, land and labour, over time for its creation. The time preferences of the society combined with the productivity of factors of production would thereby determine an optimum level of capital, or degree of 'roundaboutness', in long-period equilibrium. Bohm-Bawerk equates the degree of roundaboutness with the average period of production in the economy, from first utilisation of labour and raw materials to completion of consumption goods. He (Bohm-Bawerk 1888:381-394) subsequently put forward a theory of determination of the rate of interest which differentiates the characteristics of capitalists and workers, with the interest rate determined by the marginal productivity of lengthening the average period of production. The interest rate becomes the factor which balances the consumption-over-time preferences of the workers with the accumulation-over-time preferences of the capitalists. Although Bohm-Bawerk does not bring monetary aggregates into the analysis, nor treat the interest rate as a monetary policy variable, he does at least put forward a theory in which there is a clear relationship between the interest rate and the accumulation of capital, and hence investment: "The rate of interest … is limited and determined by the productiveness of the last extension of process economically permissible …" (Bohm-Bawerk 1888:393). In his analysis, the interest rate has moved significantly from being considered as the equilibrating factor between the supply

and demand of loanable funds towards being a factor in the capital accumulation process.

1.5   The Innovation of Wicksell

A much greater stride occurred in linking money to investment in the work of Wicksell concerning monetary theory (e.g. Wicksell 1898a, 1898b, 1901). Wicksell sought to extend the quantity theory of money to an economy which has moved beyond commodity money to the widespread use of bank credit and loans. His most noteworthy innovation was the distinction between a natural rate of interest and the money rate. The natural rate is the marginal productivity or yield on real (physical) capital, as against financial capital or capital value-in-exchange: "if capital was lent in kind, there would undoubtedly develop, through the supply and demand for the available capital a certain rate of interest on the lending market, which would be the natural rate of interest in the strictest sense." (Wicksell 1898b:84).   Wicksell contemplates an equilibrium situation in the economy in which movements between alternative uses of capital have led to a uniform yield on capital. The gist of Wicksell's argument is that an adjustment process occurs through the medium of money whereby the market rate of interest adjusts towards the natural rate. "If the actual rate of interest on money corresponds with this figure, the intervention of money will cause no change in the economic equilibrium; …" (Wicksell 1898b:84). If the market rate is below the natural rate, prices will rise continuously, and conversely if the market rate exceeds the natural rate, they will fall continuously. "A low rate of interest must lead to rising prices, a high rate of interest to falling prices." (Wicksell 1898b:78). Furthermore, the falling prices "cannot cease at this first stage, but must constantly be repeated as long as the low rate of interest continues." (Wicksell 1898b:79). The rising prices reduce the level of money balances and this leads to an increase in the market interest rate. Correspondingly, falling prices lead through increased money balances to a decreased market interest rate, which has the effect of moving the market rate toward the natural rate. Wicksell (1898b:83) maintains that "what is lent *is* money and nothing else; …". However, as Rogers (1989:27) points out, Wicksell's analysis still lies in the tradition of Real Analysis, since the natural rate is determined by real rather than

monetary forces and it is the market interest rate which adjusts to this. Wicksell envisages the natural rate being constantly subject to change as technology, labour supply and wage levels alter. The banking sector would not be able to observe the natural rate directly, so that the market rate could diverge from the natural rate "for a long period" (Wicksell 1898b:84), though being gradually brought back into line with it through the abovementioned adjustment process.

Wicksell's derivation of the natural rate can be criticised on the basis that he treats physical capital as homogeneous, as being convertible from one form of use to another, leading to deployment of capital at uniform marginal productivity in equilibrium. Clearly physical capital is not malleable in this manner. Walras had treated capital as purely physical in form, which implies that a rent or yield must be determined for each item or homogeneous group of physical capital. Walras' system of equations enabled each instance of physical capital to be treated separately in principle. However, no common yield on capital can be expressed since capital items or groups cannot be combined in a single measure. It was this malleability issue which was at the core of the subsequent capital debate or Cambridge controversies of the 1950s and 1960s, in which Cambridge England maintained that use of capital as if it could be treated as homogeneous with an identifiable value magnitude, in the determination of an interest rate or yield, was tantamount to circular reasoning, since an interest rate or yield was necessary to determine the value magnitude of capital (Harcourt 1976:26-42). Wicksell sought to address this issue through arguing that all physical capital, however different, could be resolved into saved-up labour and saved-up land.

Wicksell (1901) portrays the natural rate as the difference between the marginal productivities (combined) of saved-up labour and land, and those of current labour and land. This would apply to a single business enterprise, but Wicksell (1901:155) extends the analysis to successive aggregation of the marginal productivities to arrive at an exchange value for capital in the economy, i.e. a value magnitude. Through this means he seeks a universal value magnitude of capital, to render a single interest rate or yield possible across alternative usages

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of capital, as well as to equalise the yield on saved-up labour with that of saved-up land. However, his transition from individual instances of physical capital to an aggregate of capital in value terms for the economy does not avoid the charge of circular reasoning, and can be criticised as being tantamount to an imposed model closure condition, i.e. an arbitrary condition to attain model solution (Rogers 1989:32). Later attempts by neoclassical economists to aggregate heterogeneous capital instances to form an overall capital value magnitude likewise entail conditions which imbue all goods in the economy with equivalent characteristics. Rogers (1989:43) maintains that this amounts to assuming a single-commodity economy. Wicksell's natural rate can therefore be criticised as only strictly speaking being definable in a one-commodity economy.

It is noteworthy that Wicksell did not seek to depart from a quantity theory view of money[7]. Although he recognised that money to a large extent occurred in the form of credit money, his posited transmission mechanism between the natural rate and market rate of interest operates through a real-balance effect. It is changes in real economic activity resulting from differences between natural and market rate that lead to changes in the quantity of money which in turn cause the market rate to adjust. Wicksell therefore did not break from the quantity theory tradition of the Classicals and neoclassicals, nor did he put forward a theory in which monetary magnitudes are clearly able to affect real economic activity, which could be placed in the Monetary Analysis category of Schumpeter. He did however put forward a concept in which the market interest rate could differ from the natural rate outside long-period equilibrium, and this served as the embryo on which Keynes in particular developed his theoretical framework in which money and monetary magnitudes can have substantive and enduring effects on the real economy. Keynes was strongly influenced by the work of Wicksell, and explicitly propounded his own theories on the workings of the interest rate in contrasted reference to those of Wicksell. In his *Treatise* (1930:186), he recognises that: "In substance and intention Wicksell's theory is closely akin …

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[7]   Referring to the theory as expressed by Ricardo, Wicksell (1898b:68) indicates, "I for my part am convinced that this theory is fundamentally sound and correct …".

to the theory of this Treatise …, though he was not successful, in my opinion, in linking up his theory of Bank-rate to the Quantity Equation."

1.6   Keynes of the Treatise

Keynes in *A Treatise on Money* (1930) developed a comprehensive theory of the transmission mechanism between the interest rate and economic magnitudes through price level effects and the behaviour of grouped economic actors. He refers to bank rate in order to use a single reference to short-term interest rates, but regards bank rate and short-term rates to inevitably move closely together through market forces in respect of short-term monetary instruments. From the outset, even before exploring the transmission mechanism, he explicitly recognises bank rate as an important policy variable under the control of the central bank, e.g. as "a means of regulating the *quantity* of bank money. This is the basis on which the practical method of bank rate as the characteristic instrument of the bank of England was developed in the middle of the nineteenth century." (1930:187). He proceeds to describe three ways in which bank rate policy could be considered to affect the economy. This places a foundation pillar for a theory in which monetary policy actions can have significant effects on real economic magnitudes.

Although Keynes (1930:15-22, 185-200) traces the first recognition of bank rate as a policy variable to the mid-nineteenth century, to the period in which vigorous debates on monetary effects gave rise to the Bank Charter Act of 1844, he recognises that virtually no previous writers had given a clear account of the effects of bank rate on the economy. For a period of 76 years from 1746, the rate in England remained at 5%; from 1822 to 1839 there were small fluctuations between 4 and 5%; and in 1839 the rate was increased to 5½, then 6%. Over this historical period it is therefore perhaps not surprising that the possibility of bank rate as a policy variable did not arise in economic discourse. As indicated above in considering early Classicals, a primary concern was issue of notes by the Bank of England and the independent 'country' banks which were not under its control, and the role of gold or silver convertibility, as well as preserving the country's gold reserves. But even in the decades following the Bank Charter Act,

the interest rate charged by the central bank was viewed as little more than one possible means to influence the supply of bank money in circulation. Keynes traces the continuation of this strand of thinking through to the publications of Marshall in the late nineteenth century and Pigou in the early twentieth. To the extent that they and other writers make any reference to interest rate effects on real economic magnitudes, it is through the actions of speculators or traders. It is only Wicksell, in Keynes' view, who breaks decisively from this mode of thought prior to his own analysis. Keynes recognises two other strands of thinking: that of 'practical bankers' in which bank rate serves as a means of protecting the country's gold reserves by influencing the volume of lending to foreign countries, and that in which bank rate in some way influences the rate of investment. The former he confirms as being used at various times from the 1840s. The latter he maintains had not been clearly expounded in a theoretical framework, other than by Wicksell, and it is this strand that he sought to develop further.

It is apparent that Keynes' Fundamental Equations of the *Treatise* have as a backdrop in his mind the quantity theory in its various forms (1930:146-150). Keynes seeks to delve behind the quantity theory to analyse monetary transmission channels in greater depth by examining effects on conceptual aggregates in the economy. He separates out the production of consumption and investment goods as a key distinction which can be interrelated to saving and investment. He uses price as a primary decision variable, reminiscent of the quantity theory and the microeconomic tradition in which he was steeped. The first Fundamental Equation (1930:133-136) relates the price of consumption goods (P) to expenditure aggregates in the economy. Where E is earnings of the factors of production, O is total output, I' is the cost of production of investment goods, R is the volume of consumption goods purchased, C is net investment, and S is saving: O = R+C, and P.R represents spending on consumption goods. Because P.R = E - S = E. (R+C)/O - S = R.E/O + E.C/O - S, the first equation can be expressed as:

$$P = \frac{E}{O} + \frac{I'-S}{R} \qquad\qquad E1.6.1$$

This is purely an identity, but provides a basis for price effects to be explored in terms of shifts in saving, investment and consumption expenditure.

Keynes (1930) derives his second Fundamental Equation as an identity which shows the price level for the economy as a whole, which he designates Π, combining consumption as well as new capital goods. He assumes initially that the price level of investment goods is given as P', so that investment value I (as contrasted to investment cost I') is equal to P'.C. Combining consumption and investment goods, the overall price level can then be expressed as:

$$\Pi = \frac{P.R + P'.C}{O} = \frac{E - S + I}{O} = \frac{E}{O} + \frac{I - S}{O} \qquad \text{E1.6.2}$$

which can also be written as:

$$\Pi = \frac{W}{e} + \frac{I - S}{O} \qquad \text{E1.6.3}$$

where W is the rate of earnings per unit of human effort and e is the coefficient of efficiency which expresses output per unit of human effort (1930:136-137). The latter formulation provides a basis for considering wage rates and productivity as contributors to the overall price level.

Although neither of the Fundamental Equations contains an interest rate variable, they can nevertheless be used to explore the effects of interest rate changes, and Keynes pursues this analysis in the *Treatise*. The initial effect is through the price level of capital goods. Entrepreneurs have expectations of the future trajectory of revenues that will be generated by acquiring and utilising a new capital good. The expected levels of these revenues will be only indirectly affected by a change in interest rate. However, the expected net present value of the revenue stream will be directly and materially affected by a change in interest rate. A relatively small interest rate change leads to a significant change in the present value since the discounting occurs over a number of future years. Through this means, an increased interest rate has the consequence of reducing the demand price of capital goods (P'), and the volume of capital goods acquired, so that fewer capital goods are produced, and the value of investment (I) declines. At the same time, an increased interest rate leads to a higher saving level in the economy. This occurs at the expense of consumption, so that

the price level of consumption goods also declines, in accordance with the first Fundamental Equation. "By the scale and the terms on which it is prepared to grant loans, the banking system is in a position … to determine – broadly speaking – the rate of investment by the business world." (Keynes 1930:153).

Keynes (1930:154-155, 196-199) relates this process to a natural interest rate which he characterises in a similar manner to that of Wicksell. The natural rate is that which would prevail in equilibrium if all saving and investment were to take place in physical goods rather than through a monetary system. It is the rate at which saving is maintained in balance with the value of investment. But as soon as the market rate of interest departs from the natural rate, the above described causal sequence occurs in terms of the Fundamental Equations, leading to reducing prices of both capital and consumption goods for as long as the market rate exceeds the natural rate, and increasing prices for so long as it is below the natural rate. "According, therefore, as the banking system is allowing the rate of investment to exceed or fall behind the rate of saving, the price-level … will rise or fall." (Keynes 1930:158). In this respect, his fundamental equations are a more comprehensive depiction and expansion of the essential concept put forward by Wicksell.

Keynes (1930:206-209) warns of the danger of policy makers not recognising the protracted effect of an interest rate change. Although an interest rate increase has the effect of a reduction in capital and consumption goods prices, which could be perceived by monetary authorities as a beneficial effect, there may be incipient negative consequences still to unfold. If I', the cost of investment goods, is unchanged, the profit margins of firms is eroded, and their continued existence may be threatened. To the extent that entrepreneurs reduce employment to avoid losses, an ongoing situation may prevail in which the "monetary equilibrium will continue to require the indefinite prolongation of chronic unemployment" (1930:208). This presages the analysis put forward by Keynes in the *General Theory*.

Keynes (1930:209-212) maintains that, if the market interest rate change is sustained, the natural rate itself will be affected. This arises from the changed revenue stream expectations of entrepreneurs. For instance, an increased market rate, after having its effect through the Fundamental Equations described above, leaves profit margins at reduced levels, which entrepreneurs will expect to continue in the case of new investments to be undertaken. The natural rate is thereby decreased when the market rate has been increased, driving the gap between the two wider. Attainment of a new equilibrium in the economy is prolonged, unless the natural rate happens to move to equality with the market rate as a result of factors outside this analysis. The reduced prices and profits experienced by entrepreneurs lead inevitably to their offering a lower volume of employment and decreased earnings levels. These reductions eventually enable profits to be restored at the lower activity and price level. Expectations of profits on new investment hence increase, and thereby the natural rate likewise increases. Whether this adjustment process is able eventually to bring the natural and market rate into alignment at a lower economic activity level depends on the degree of divergence between the two when the market rate change is instituted. It could lead to a continual price and activity deflation spiral, as propounded by Wicksell, until such time as the market rate is re-adjusted to alignment with the natural rate. There could also be an adjustment process through international flows resulting from a relative change of the domestic interest rate. Keynes (1930:213-216, 326-363) examines the latter possibility and maintains that this is not likely to occur without central bank intervention to bring about a new equilibrium.

Keynes (1930:213-216) assumes that the central bank adheres to an international gold or similar objective standard, and regards the external equilibrium problem faced by the central bank as being to maintain $B = L$, where B is the foreign balance (current account balance in typical modern terms) and L is the net value of foreign lending. B greater than L will lead to increasing gold reserves, less than L to a diminution. Changes in bank rate operate both directly on B and L, but also indirectly through saving and investment in the domestic economy. Keynes characterises the direct effect as rapid in the case of L, where

an increased bank rate relative to other countries renders foreign lending less attractive and reduces L. He characterises the effect on B as more gradual, occurring through a reduction in domestic investment consequent on a higher interest rate, with investment falling below saving having the effect of decreasing prices, reduced profits and earnings, which then increase B as a result of production costs domestically falling relative to those abroad. Through this means, provided the changed bank rate is held sufficiently long for the effects on B to take their course, a new equilibrium can be reached in which B = L, but at which saving and investment are once again in equilibrium. It is a combination of the bank rate and the price level (of consumption goods in Keynes' exposition) which enable both external equilibrium and equilibrium of saving and investment to be reached simultaneously.

However, it is the adjustment of bank rate that has enabled external equilibrium to be achieved, rather than non-equilibrium on the foreign balance serving as a mechanism to move the domestic economy towards equilibrium.[8] Curiously, Keynes gives an example (1930:216) in which an automatic international gold system operates, gold holdings increase when B is greater than L, bank rate finds its level through free competition between borrowers for the money available based on the increased gold holding, prices and earnings adjust through competitive forces, and hence the flow of gold leads to establishment of a new equilibrium both external and in saving to investment. This is more in line with a monetary theory of the balance of payments and deviates from Keynes' treatment in most of the *Treatise* of bank rate as a policy variable determined by the central bank.

The most crucial aspect of Keynes' Fundamental Equations and his analysis of the *Treatise* for the purpose of this study is that it introduced a theory in which investment is integrally connected with monetary variables. If one adopts the

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[8]   Keynes maintains that the domestic economic situation can be enhanced if the central bank is able to influence the exchange rate as well as interest rates: "If the Central Bank is free to vary both the rate of foreign exchange and its market-rate of interest, … there is much less risk of the loss of wealth and output due to the prevalence of unemployment." (1930:362).

Fundamental Equations as a theoretical framework, it is no longer possible to consider money as a veil behind which the real forces of the economy play out, as portrayed by J S Mill and other Classical economists, which 'like many other kinds of machinery only exerts a distinctive and independent influence of its own when it gets out of order.' (Rogers 1989:281). The veil is pierced, the monetary dichotomy evaporates, and a monetary theory in which real and monetary forces are inextricably linked becomes a logical necessity. It was at this point that Keynes was embarking on a new assumption set which, when followed through with further analyses, led to the establishment of new foundations for macroeconomic theory. Although Keynes still sought to bind his theory of money in the *Treatise* to the quantity theory and to the market/natural rate distinction of Wicksell, the linkage appears as a wish to give due recognition to the theories of antecedents, and to incorporate prevailing economic thinking, rather than as a logical adjunct of his own theory. In the *General Theory*, Keynes overturned these linkages.

1.7   Keynes of the General Theory

Keynes' *General Theory* systematically assembled concepts, measures and mechanisms to analyse the major aggregates of an economy as a whole, in which monetary factors are bound into the analysis throughout. At the core of the connection between monetary variables and real magnitudes is the Marginal Efficiency of Capital (mec) concept he introduced, and its interaction with the interest rate. The mec represents the <u>expected</u> yield of capital assets which entrepreneurs could deploy, expressed as a discounted stream of future net revenues relative to the acquisition price of the asset. Aggregated from higher to lower yielding assets, this gives rise to a downward sloping schedule with yield shown vertically and capital value horizontally. The interest rate (simplifying from the spectrum of interest rates in an actual economy) establishes the value of new capital which it will be worth the while of entrepreneurs to acquire and bring into production, since the yield expected exceeds the interest rate to be paid. Important to note is that the mec is a schedule based on entrepreneurial expectations, and all the factors on which such expectations may be based, and can therefore shift without any changes of the significant variables in the actual

economy (Keynes 1936:143-145): "The schedule of the marginal efficiency of capital is of fundamental importance because it is mainly through this factor … that the expectation of the future influences the present." (1936:145). The mec could possibly be better termed the Marginal Efficiency of Investment, since it is concerned with the production and deployment of new or additional capital. It provides the link between interest rates and investment behaviour on the part of entrepreneurs in Keynes' analysis.

Keynes (1936:74-85) adopted changed definitions of saving and investment in the *General Theory*, whereby saving and investment are always and necessarily equal, which differed from that of the *Treatise* where the difference between the two was part of the mechanism of the Fundamental Equations. The *Treatise* uses a definition of income based on the 'normal profit' of entrepreneurs, rather than their actually realised profit. This implies that profits above the normal profit level have their counterpart in investment being in excess of saving, so that entrepreneurs are expanding output. Similarly, profit levels below normal correspond to investment being below saving and contracting output. As Keynes (apologetically) recognises in the *General Theory*, the changes in definition can generate confusion, but were necessary to convey the arguments of the *General Theory* accurately (Keynes 1936:78). The two definitions can be connected by adopting the differentiation between actual and expected magnitudes (the *Treatise* did not distinguish the two clearly) so that the <u>expectation</u> of an "excess of investment over saving, given the former volume of employment and output, will induce entrepreneurs to increase the volume of employment and output" (1936:78). In developing the definitions of saving and investment in the *General Theory*, Keynes takes saving to be the residual of income after consumption, and combines business income with household income, so that it stems from his treatment of these aggregates that saving and investment are necessarily equal. In his approach to these definitions, Keynes takes a broad sweep aggregation of the essential income and production variables in the economy, without a monetary system or flows being taken into account in the definitions. It is conceivable that a monetary system could be a source of dislocation between saving and investment, even with definitions of the two closely aligned to those

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of the *General Theory*. This matter is taken up in subsequent chapters in connection   with the mechanism through which saving is reconciled to investment.

Keynes (1936:175-185) characterises the classical[9] theory of the rate of interest as viewing the interest rate as the price or equilibrating mechanism between the willingness to save and the demand for investment. Saving and investment represent respectively the supply of and demand for investible resources. He points out that this cannot possibly be correct, since any interest rate change will affect the level of investment, which in turn affects income and thereby the level of saving. The classical theory is therefore indeterminate, due to its not taking account of the effects on saving through income. A separate causal mechanism is required for the interest rate, which then renders investment, income and saving determinate.   Keynes' liquidity preference theory provides this mechanism. It is a major conceptual departure from the classical view in that the interest rate becomes the reward for not hoarding (rather than not spending), i.e. for sacrificing full cash liquidity for financial assets (e.g. debt, bonds) which provide a yield but which carry elements of uncertainty as to the value at which they can be realised and of waiting before the value can be utilised. Keynes visualises the interest rate as being the 'price' which brings into equilibrium "the desire to hold wealth in the form of cash with the available quantity of cash" (1936:167). Because the speculative motive for holding money (as against transactions and precautionary motives) is strongly influenced by the interest rate, the essential nature of the monetary effect on the economy is through the liquidity preference of economic actors being brought to equality with the quantity of money through interest rate adjustment.

In Chapter 13 of the *General Theory*, Keynes assumes without discussion that the quantity of money is given and the interest rate adjusts to equate the quantity of money which the public wish to hold to this, through the liquidity preference

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[9]   Keynes uses the term 'classical' to refer sweepingly to earlier Classical theories (in the sense used in sections 1.1 to 1.3 above) as well as theories prior to his own which would more usually be referred to as 'neoclassical'. It is used here (as in Keynes' *General Theory*) without the initial capital to distinguish the two senses.

function. This seems to suggest an exogenous money supply, set by the monetary authorities or resulting from structural parameters of the economy. The monetary influence on the economy would therefore occur through an (exogenous) change to the money supply, which would in turn change the interest rate through the liquidity preference function, and the interest rate would in turn have effects on the economy through investment in terms of the mec schedule. This has caused much controversy amongst followers of Keynes, since he assumes in the *Treatise* and in certain discussion papers subsequent to the *General Theory* that the money supply is endogenous, i.e. that it adjusts to money demand conditions for a given interest rate. It is possible to argue, as Moore (1988a:195-199) has done, that Keynes' treatment of the money supply as exogenous in the *General Theory* was by way of explanatory convenience, or possibly a careless lapse in his manner of exposition. In any event, the fact that it is the interest rate which is crucial in the transmission mechanism from monetary to real economic magnitudes, perhaps makes it less central as to whether the interest rate is determined directly by exogenous means, or whether it attains a level as a result of the quantity of money being determined exogenously. Also, Keynes refers to the interest rate in Chapter 15 of the *General Theory* as a "highly conventional phenomenon" (1936:203) so that any interest rate accepted with conviction is likely to be durable, and to the case where "the monetary authority would have lost effective control over the interest rate" (1936:207) so he clearly regarded the interest rate as exogenously determined in parts of the *General Theory*.

In Chapter 17 of the *General Theory*, Keynes seeks to show why the interest rate on money is particularly or uniquely significant in its widespread effect in an economy. He points out that all commodities (e.g. wheat, silver) have an own-rate of (own) interest, being the relative difference in the quantity of the commodity at a future time (say three months hence) which could be exchanged for a quantity of the same commodity in the present. Own rates can also be expressed in terms of money rates. But Keynes maintains that the characteristics of money are such as to ensure that it has a higher own-rate of

interest than any other commodity (with possible rare exceptions). This arises from the very low (near zero) elasticity of production and substitution of money, together with its high liquidity premium and low carrying cost. His argument is that, as increased production of commodities having a higher yield than that of money decreases their yield, money inevitably comes to have the highest yield (interest rate) and therefore "rules the roost". Various writers have criticised the arguments of Chapter 17 as being arcane or unconvincing (e.g. Lerner 1952; Turvey 1965)[10]. It is perhaps unnecessary to justify the role of the money rate of interest by comparison to own-rates of other commodities, when it is clear that money has been adopted as a medium *sui generis* by virtue of the very fact that it is the money of the economy. Lerner (1952:382) for instance asserts as part of his argument that "The essential superiority of a monetary economy over a barter economy is the saving of mental effort made possible by money." Another commodity (e.g. wheat) would be most unlikely to provide the pervasive interest rate in the economy, even if its own-rate of interest was greater than that of money, because it is not the medium traversing the financial system and cannot therefore influence entrepreneurial decisions throughout the economy. The analysis is also criticised on the grounds that Keynes appears to be seeking to develop a theory of the interest rate on alternative commodities, one of which would be money, on an equivalent basis to the mec put forward for expenditure on capital. Yet he elsewhere in the *General Theory* strongly emphasises that the interest rate and the mec have entirely separate origins. An analysis of returns or yields on commodities, however formulated, would therefore seem to be inappropriate for the examination of interest rate determination.

The analysis of Chapter 17 does however provide a framework for considering the transmission of the money interest rate through all assets on a widespread basis in the economy. It is a framework in which acquisition and production of capital assets is adjusted in accordance with their expected yields, so that the level of investment which eventuates is in accordance with the money interest

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[10]   Van Eeghen (1999:240-250) provides a full range of critical arguments of Keynes' *General Theory* Chapter 17. Barens and Caspari (1997:298) maintain that "in Chapter 17 Keynes gave an invalid answer to the wrong question …".

rate, and brings the expected yield on alternative forms of capital towards the money interest rate in long-run equilibrium. This monetary equilibrium point may not be at full-employment level of the economy, nor may there be any forces which will move it closer to full employment. The macroeconomic equilibrium in which involuntary employment persists, which lies at the heart of the *General Theory*, is thereby shown to be closely bound with the monetary system of the economy and interest rate in particular through monetary equilibrium and the principle (and point) of effective demand. Keynes regards the characteristics of money as so essentially bound to attainment of equilibrium below the level of full employment that he maintains that "in the absence of money … [and] of any other commodity with the assumed characteristics of money, the rates of interest would only reach equilibrium when there is full employment." (1936:235).

Keynes recognises in the *General Theory* that the development of the notion of a 'natural' rate of interest as undertaken in the *Treatise* and corresponding to the concept introduced by Wicksell, was no longer valid in terms of the monetary equilibrium of the *General Theory*. Instead, there would need to be a different natural rate for each level of employment. At the currently existing level of employment, the 'natural' rate would be simply that which would preserve the status quo. The interest rate which would be of greater significance is that which would correspond to full employment in the economy. Keynes suggested the term 'neutral' or 'optimum' rate to distinguish it from the natural rate (1936:243). But in the monetary theory of the *General Theory*, there would be no economic forces, short or long run, drawing the market rate towards this optimum rate. Monetary equilibrium could be sustained indefinitely at a level below full employment.

With the interest rate being a key factor in macroeconomic equilibrium remaining below full employment in Keynes' *General Theory* analysis, the question arises of whether monetary policy could be used to move the economy towards full employment equilibrium. It is clear that this possibility did occur to Keynes at the time of writing the *General Theory*, though he did not regard monetary policy as having a sufficiently strong influence on the economy to achieve such an

outcome, "it seems unlikely that the influence of banking policy will be sufficient by itself to determine an optimum rate of investment." (1936:378). He then embarks on advocating a "somewhat comprehensive socialisation of investment" which he considers the only means likely to achieve full employment equilibrium or a state close to it. This emphasis on measures which are in the realms of fiscal policy stems from his recognition that there are a number of interrelated determinants of investment, of which the interest rate is only one. Furthermore, he regards the interest rate as depending "partly on the state of liquidity-preference (i.e. on the liquidity function) and partly on the quantity of money measured in terms of wage units" (1936:246). Since he regards the quantity of money as the primary monetary policy variable in the *General Theory*, and the interest rate indirectly determined, the monetary authorities would not in any event be able to institute an interest rate of their choosing with any degree of precision. But further than this, the investment function is so influenced by the psychological expectation of future yields from capital assets on the part of entrepreneurs that even if a 'correct' interest rate were able to be determined and instituted, this would be unlikely to have sufficient bearing on the investment function to bring the economy to full employment equilibrium. Keynes did not explore the full scope of possible effects on the economy through the monetary system, which could be influenced by monetary policy measures, and these are examined more fully in subsequent chapters of this thesis.

1.8   Concluding remarks

It is apparent that Classical economists such as Ricardo and J S Mill did not contemplate the possibility of monetary effects on investment, other than in the broad context of money affecting economic activity in general, as portrayed in the issues and arguments of the Currency School and Banking School viewpoints. They generally held a loanable funds view of interest, in which the interest rate serves as an equilibrating variable between funds made available for investment (i.e. saving) and investment activity. Marx concentrated on the broad forces of capital accumulation and labour utilisation, with little consideration of money in its own right. Marshall's contribution to economics, though massive, was focussed towards the marginalist analysis of

microeconomics. The Walrasian general equilibrium equation system provided little scope for monetary effects. It was only towards the end of the nineteenth century that modes of thinking were pursued from which linkages between money and investment could be examined. Although several writers began to address monetary aspects of capital accumulation at that time, the work of Bohm-Bawerk was shown to have useful insights for such a task. It was however Wicksell, with his conceptualisation of natural and market rate interaction, that made a significant advance in this aspect of monetary theory. It was this conceptualisation that lay at the heart of Keynes' examination of the link between monetary variables and investment using the Fundamental Equations in the *Treatise*. The *Treatise* provided a well-formulated theoretical framework for examining monetary effects on the economy, including investment. In the *General Theory*, Keynes provided a more comprehensive framework in which monetary and real variables are interrelated, and in which the monetary system is an essential element in demonstrating the possibility of the economy remaining at below full employment level on a sustained basis. In doing so, he found it necessary to abandon Wicksell's conceptual framework, and formulate a new approach, even though he had been strongly influenced by Wicksell's analysis.

Given that Classical economists were steeped in the dichotomy between monetary forces and the real economy, accepted the quantity theory with little question, and had few reservations towards the precepts of Say's Law, it has been important to examine when in economic thought a new strand emerged which allowed the possibility of a connection between monetary and real forces. It is apparent that this strand began to emerge with Wicksell, though even in his case, examination of the causal direction between natural and market rate shows his approach to be more correctly classified in the Real Analysis rather than Monetary Analysis tradition (Rogers 1989:27). It is only with the work of Keynes in the *Treatise* that a decisive break is made into a conceptual structure in which monetary and real economic forces are integrally bound, which can be

classified in the tradition of Monetary rather than Real Analysis.[11] This structure was taken forward and revised in the *General Theory* with major implications for economic theory. In order to examine the possible relationship between monetary policy and investment in an economy, the theoretical underpinnings used need to allow in principle for the existence of such a relationship. The initiation of such a theoretical framework in economics can be largely attributed to the ideas of Keynes put forward in the *Treatise*, *General Theory* and related discussion articles, though bearing the influence of prior economic writers from the time of Ricardo and Thornton.

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[11] Rogers (1989:164) regards Keynes' *Treatise* analysis as being still best classified as Real Analysis, and that the break into Monetary Analysis came with the *General Theory*, but this is contestable.

CHAPTER 2

MONETARY VARIABLES AND INVESTMENT IN GROWTH THEORY

2.1   Introduction

Investment is inevitably a key aspect in growth theory, in its relationship to capital accumulation and potential output, and this was recognised in the early modern growth theories put forward, such as those of Ramsey (1928), Harrod (1939), Domar (1946), Solow (1956), Swan (1956) and Kaldor (1960). Monetary effects on growth were raised as an issue of concern subsequent to these earlier contributions to growth theory, and contributions by Tobin (1965a), Sen (1965) and Johnson (1967) sought to include a monetary component.   Theories concerning the role of finance in economic development, such as those of McKinnon (1973), Thirlwall (1978), Kapur (1976) and Mathieson (1980), examined issues relating to money in a developing economy context.   After relative quiescence in the late 1970s and early 1980s, growth theory expanded significantly from the mid-1980s in the form of new (or endogenous) growth theory (Romer 1994).   But to what extent and in what manner have monetary variables been incorporated into the growth models of endogenous growth theory, and to what extent do these accord with the integral role of money as posited by Keynes (1936) explored in Chapter 1?

This chapter examines the theoretical basis on which money and monetary effects were addressed in a spectrum of key and innovative growth models and theories, starting with the contribution of Ramsey (1928).   It traces the approaches to money adopted in leading growth models in the early and mid twentieth century, then in the related field of economic development theory in the 1970s and 1980s.   This provides a context against which endogenous growth theory is examined from the perspective of its consideration of monetary effects. Since the resurgence of growth theory in the form of endogenous growth theory was partly based on considering a far wider range of factors in economic growth than earlier models, one might expect that monetary factors would be contemplated with similar emphasis to other such factors. Although coverage of monetary issues in endogenous growth theory is found to fall short of this

expectation, the approach taken to monetary effects is nevertheless examined through the coverage which it has been given. Some specific economic writers on money and its relationship to economic growth from recent times, such as Fry (1988, 1995), are examined to piece together the issues concerning money and investment arising from growth theories, and their relationship to the theoretical framework in which these theories are set. The work of Palley (1996d) is used to indicate a response to endogenous growth theory from a writer who adopts the view of money put forward by Keynes (1936) and is an adherent to economic thinking in the Post Keynesian mould. This shows the minimum characteristics which need to be present, in his view, for a growth model to capture the essential elements of a monetary economy based on the economic precepts initiated by Keynes (1936). From the examination of alternative models and approaches, the most useful insights and concepts concerning money and its relationship to investment are identified from the field of growth theory, for consideration in developing a more comprehensive model of monetary effects on investment, in a framework in which monetary effects are an essential element in reaching real economic outcomes.

Some of the key characteristics of the alternative growth models which are examined to determine the nature of their treatment of monetary issues are the following. Consideration is given to which monetary variables are included: this could vary from money-in-exchange only, money reflected only in price level changes, monetary aggregates, interest rates, money as arising through credit extension, central bank quantitative influences such as open market operations, and monetary effects of government behaviour in terms of taxation, borrowing and spending. A backdrop of Monetary Analysis versus Real Analysis, as defined in Chapter 1, is maintained to consider whether monetary variables are such as to have real economic consequences. In respect of investment, a consideration is whether a model examined has an investment function which is separate from and independent of the determination of saving. This is an important feature if a model is to reflect an entrepreneurial conception of investment, as put forward by Keynes (1936), as against an automatic link from saving to investment. In similar vein, separation of aggregate demand from

aggregate supply is necessary to reflect an economy in which aggregate demand can remain below aggregate supply on a sustained basis. Specifically examined are the nature of the relationship from monetary variables to investment, especially monetary variables which could be controllable as monetary policy instruments by monetary authorities, implying that monetary policy actions could be examined through the model.

The focus is on identifying the underlying assumptions and relevant relationships in the context of the above framework for considering money-investment characteristics. It is not the intention to fully describe each model or derive equations step by step. Full descriptions and derivations can of course be found in the original sources referred to. Models have been selected for consideration both to provide a sweep of the manner in which money was considered in growth models, from the early formal models to models arising in recent approaches to growth theory, and to capture the innovations to the treatment of money which were introduced by particular writers. It is therefore not intended to be an exhaustive coverage of economic growth models. Economic growth models of Kaldor (e.g. 1957, 1960) for instance are not explicitly covered, on the basis of their not putting forward a significant innovation in the treatment of money at the time, even though recognised as innovative in other respects. However, it was considered necessary to include paradigm-setting models, those of Harrod-Domar (1939, 1946) and Solow-Swan (1956, 1956) in particular, to consider their characteristics prior to their being extended in respect of monetary influences. Similarly, the nature of endogenous growth theory is briefly indicated as a backdrop to examining its treatment of monetary issues.

In referring to underlying model assumptions, the term 'neoclassical' is used in several instances. Since it is a widely-used term, which may be used in different contexts, it is perhaps desirable to indicate the sense in which it is used here. It refers to underlying assumptions in which all markets, including the labour market, either clear continuously or move towards clearing (equilibrium) within a short to medium time period. It broadly embraces the marginalist and general equilibrium approaches to economics pursued by Marshall and Walras from the

late 1800s, and the many theoretical developments subsequently built on similar underlying precepts. In economic growth models and production functions, it is often associated with the Inada conditions that: a function exhibits positive and diminishing marginal products in respect of each input variable, displays constant returns to scale, and the marginal product of each input variable approaches infinity as the variable approaches zero (Barro and Sala-i-Martin 1995:16-17).

2.2   Growth Theory in the early Twentieth century

Although classical economists were concerned with economic growth issues in broad terms at least from the time of Adam Smith's *Wealth of Nations*, the origins of modern growth theory can be attributed to the significant contributions by Ramsey (1928), Harrod (1939) and Domar (1946). Ramsey's contribution (1928:543-539) was concerned with determination of saving levels, based on household utility optimisation over an extended period of time, in which the household is sustained indefinitely, even though older generations give way to their offspring. He put forward a mathematical time-based utility function and showed the conditions which would lead to its maximisation, which "determines bliss, the maximum rate of utility obtainable." (1928:548). Households may borrow, or provide loans, and accumulate assets, with a single interest rate or yield applicable to debt or assets, which contributes to their future income stream. The household's objective is to maximise time-discounted consumption less the disutility of labour provision, over a long time horizon. Ramsey derives the rule that, "The rate of saving multiplied by the marginal utility of money should always be equal to the amount by which the total net rate of enjoyment of utility falls short of the maximum possible rate of enjoyment." (1928:543).[1] The saving rate may vary over time to attain this. Saving translates immediately and equivalently into capital investment. The time preference discount rate and the interest rate are distinct, which carries a glimmer of the possibility that the difference between the two could serve as a monetary effect on saving or on investment. Ramsey however does not pursue this line of thought, even though

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[1]   Ramsey uses the term 'enjoyment' to refer to the flow of net utility (1928:544).

both variables appear in the equations which maximise household utility over a long period. The assumption is that both remain constant over time, as parameters of the model. The model is essentially neoclassical in nature in which all markets including the labour market clear; there is no involuntary unemployment or mechanism through which this could occur. Albeit mathematically rigorous, Ramsey's model is essentially a consideration of household choice between consumption and saving over time, incorporating the disutility of labour provision, without an investment function separate from saving. Monetary factors are confined to the pre-set parameters of the interest rate applicable to saving, and the discount rate applicable to the time-value placed on future relative to present consumption and utility. Inclusion of an interest rate in the model could be considered as providing a monetary aspect to the model, but the fact that it is included as a parameter only, and that there is no productive sector or investment function in the model, renders its monetary aspect rudimentary.

Harrod (1939:14-33) and Domar (1946:137-147), on the other hand, put forward their growth models in the aftermath of Keynes' *General Theory*, and sought to use some of Keynes' precepts to show that the growth dynamics of a capitalist economy could result in extended periods of output being below full-employment, as well as not being inherently stable. The models of the two have similar essential characteristics, though Domar (1946) focuses on capital utilisation effects. Harrod deliberately seeks to formulate a dynamic model "constituting the marriage of the accelerator principle and the multiplier theory." (1939:16). It is assumed that a constant proportion (s) of national income (Y) is allocated to saving. It is further assumed that the amounts of capital and labour required to produce a unit of output are fixed and given, i.e. fixed factor proportions in the production of output, and that the labour force grows at a constant rate (n) over time, given by demographic forces. He then explores the steady state growth path (i.e. constant growth rate) to which such a model economy will tend. In respect of labour, the growth rate of the labour force (in conjunction with capital stock, state of technology and work/leisure preferences) serves as an upper limit which output and income growth cannot exceed due to

the fixed labour requirement per unit of output. Harrod (1939:30-31) thus termed n the <u>natural</u> growth rate of the economy. In respect of capital, the ratio of investment (I) to capital stock (K), I/K, must be equal to the growth rate of output or income (Y), since the capital stock must grow at the same rate as output due to the fixed requirement per unit of output. Using the capital-output ratio v, the dynamic equilibrium growth rate (<u>warranted</u> growth in Harrod's terminology (1939:16-17))[2] can be expressed as $g_w = I/K = I/Y.Y/K = s/v$. Steady growth requires both $g = n$ and $g = s/v$, so that $n = s/v$ describes the situation of long-period steady state growth. But, since these three variables are independent, there is no inherent reason for this equality to be achieved. The economy is therefore likely to proceed along a precipice where a saving rate below the steady state level leaves labour resources unemployed and a saving rate above this level leads to full employment for a period, but which is unsustainable as the amount of capital accumulated is in excess of the level which can be utilised by the labour force; increasing underutilisation of capital prevails, which leads to a reduction in saving and new capital formation. Periodic involuntary unemployment is therefore endemic in terms of the model. To address cyclical instability, Harrod suggests that "it may be desirable to have a long-range policy designed to influence the relation between the proper warranted rate of growth and the natural rate." (1939:32). Harrod does mention the rate of interest as "a long-range weapon for reducing the warranted rate of growth" to attain greater stability, through a lower interest rate reducing the saving rate and increasing capital stock relative to output (1939:33). However, there is no interest rate, capital yield, time preference or other monetary variable present in the formally expressed model itself.

The widely acclaimed growth model introduced by Solow (1956), typically jointly accredited to Swan (1956)[3], is firmly in the neoclassical mould, to the extent that it is often referred to as "the neoclassical growth model". Solow (1956:65-66)

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2   Harrod (1939:16) characterises the warranted growth rate as "that rate of growth which, if it occurs, will leave all parties satisfied that they have produced neither more nor less than the right amount."

3   Hence frequently referred to as the Solow-Swan model.

was strongly critical of the assumption by Harrod and Domar that "production takes place under conditions of *fixed proportions*", i.e. with no possibility of substitution between labour and capital in production. He therefore proposed and developed a growth model in which production takes the form of a continuous function having neoclassical properties, with capital and labour being continuously substitutable. The production function (F) exhibits positive but diminishing marginal products with respect to both capital and labour. Production exhibits constant returns to scale, so that increasing capital (K) and labour (L) by a multiple (λ) gives rise to increased production by the same multiple, i.e. $\lambda.F$. Also, the marginal product of each factor approaches infinity as the other approaches zero and vice versa, so that initial additions to a factor have very high marginal products, and additions when the factor is abundant have negligible marginal products. The production function hence satisfies the neoclassical Inada conditions mentioned in Section 2.1 above. The saving level is assumed to be a constant proportion (s) of income. Capital is assumed to depreciate at a constant relative rate (δ), and the labour force is assumed to grow at a constant rate (n). Because of the constant returns to scale, output can be expressed through the production function in intensive form by dividing by L:

$$Y = F(K, L) = L.F(K/L, 1) = L.f(k) \quad \text{where} \quad f(k) \equiv F(k, 1) \qquad \text{E2.2.1}$$

With y defined as Y/L, $y \equiv f(k)$ from this equation. The dynamic growth behaviour of this model economy can be expressed using the relationship that the time rate of change of capital $(\dot{K})$[4] is equal to investment less depreciation. Investment is assumed identical to saving, so that the relationship is $\dot{K} = s.F(K, L) - \delta.K$. Dividing this through by L and using the derivative $\dot{k} \equiv \dfrac{dK/L}{dt} = \dot{K}/L - nk$ (using the rule for differentiating a quotient), gives the equation:

$$\dot{k} = s.f(k) - (n + \delta).k \qquad \text{E2.2.2}$$

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[4] A diacritical dot above a variable is used to indicate its time rate of change, e.g. $\dot{K} = dK/dt$.

which is the fundamental differential equation from which the behaviour of the model can be examined. Solow is explicit that this refers to full employment of the labour force: "Its solution gives the only time profile of the community's capital stock which will fully employ the available labor." (1956:68). In steady state (i.e. $\dot{k} = 0$), using equation E2.2.2, $f(k) = (n + \delta).k/s$, and since n, δ, s and k are constants in the steady state, y ($\equiv f(k)$) is likewise constant. This means that the economy moves in the long run to a situation in which output Y, capital stock K, as well as consumption (C, calculated as $(1 - s).Y$) are all growing at the rate of labour force or population growth, n. The model can be used to determine an optimum saving rate, such as to provide the greatest consumption per capita level in long run equilibrium (the 'golden rule') as well as to explore the transitional dynamics of alternative saving rates, depreciation rates and labour force growth rates. Alternative functional forms of the production function can be examined, such as the widely-used Cobb-Douglas form ($Y = A.K^{\alpha}.L^{1-\alpha}$ with parameters A and α) or use of Constant Elasticity of Substitution (CES) between capital and labour (Barro and Sala-i-Martin 1995:25, 42-45).

However, the model remains bound to its neoclassical assumptions in respect of monetary effects. There is no explicit investment function. The immediate and full translation of saving into investment carries the tacit assumption that there is an interest rate which adjusts immediately at every instant to ensure this equality. The interest rate appears nowhere in the model, nor does any other monetary variable. It reflects an economy in which entrepreneurs carry out investment which is equal to full employment saving, without an explicit interest rate to serve as a signalling device or possible hindrance (Hahn and Matthews 1964:790). The Solow-Swan model is in any event a relatively simple model which may be best regarded as illustrating certain broad issues concerning growth under neoclassical assumptions rather than capturing causative economic relationships.

Solow (1956:91-92) was fully cognisant that the model he was putting forward was an idealised model using strong neoclassical assumptions: "it is full employment economics – in the dual aspect of equilibrium conditions and

frictionless, competitive, causal system." It was not his contention that rigidities and variations from the neoclassical assumptions do not occur in practice. His purpose was rather to establish a core model from which modifications and alternative assumptions could be examined. He did give some consideration to how monetary variables, the interest rate in particular, could relate to the core model. He regards the real return on capital as an 'own-rate of interest', in the sense used by Keynes (1936:222-235). He expresses the relationship between the interest rate and real return on capital as occurring through change in the price level: with the two being equal if the price level is unchanging, and the interest rate falling below the real return on capital to the extent that prices are falling (and conversely). This induces people to hold capital assets in the face of declining prices (Solow 1956:79-82). His focus though in examining the growth model behaviour under alternative assumptions, is on the real return or yield of capital, rather than the interest rate. One alternative which he considers is that in which the saving rate is a function of the real yield on capital (1956:88-90). However, this is a relationship between real magnitudes in the economy, and he concedes that the model as put forward by himself is not able to bring into account monetary factors as a possible separate influence on real consumption and investment, for example through a liquidity preference approach: "it is exactly here that the futility of trying to describe this situation in terms of a 'real' neo-classical model becomes glaringly evident." (1956:92-93). He regards the money-capital asset holding approach, which was being posited by Tobin (1955) at that time, as holding promise of a "penetrating analysis of the dynamics connected with asset preferences." (1956:92-93). The growth model put forward by Solow (1956) therefore remained essentially a neoclassical model, with idealised assumptions, relating real economic magnitudes, and without a mechanism through which monetary variables could influence real magnitudes such as consumption and investment.

The introduction by Tobin (1965a:671-684) of money as an asset through which portfolio selection occurs relative to capital assets was arguably a significant step in incorporating money in a growth model in which money does have an independent effect on model behaviour. He criticised non-monetary growth

models on the basis that "They admit only one type of asset that can serve wealth owners as a store of value, namely reproducible capital." (1965a:672). Rather than saving being translated fully into investment in reproducible capital, Tobin allows accumulated saving (wealth) to be held in a combination of money balances and physical capital. Although the portfolio selection could cover a spectrum of alternative assets with differing yields and risks, Tobin uses a simplified split between a monetary asset supplied by government with a fixed yield (possibly zero) and real or physical capital with a yield determined by the profitability in deploying the capital. At one extreme, the fixed yield on money could serve as a lower limit, whereby a yield on physical capital below this would result in (new) saving being held as money rather than being converted into capital. At the other extreme, a yield on physical capital above a certain rate could give rise to a flight from money into physical capital. More realistically, though, wealth-holders would maintain a spread between money and capital in accordance with their liquidity, yield and risk preferences. The spread would be influenced by capital yields relative to that of money as well as income and changing risk perceptions. A conclusion which Tobin (1965a:679) derives from this analysis is that "capital deepening in the economy requires monetary deepening in portfolio holding"[5]. This arises from the higher capital intensity requiring an increased yield on physical capital. For a given yield on money, the stock of money per unit of capital needs to rise to maintain the higher yield on physical capital. Tobin envisages this occurring through government deficit spending, with the consequence of increasing the money stock. This however could only proceed until an equilibrium is reached, beyond which too little saving would be generated to allow further capital deepening.

Tobin (1965a:680-684) extends the analysis to examine the effects of general price changes, i.e. changes in the value of money relative to goods, through the portfolio selection mechanism. He explores transmission from money to physical capital through Pigou (wealth) and Wicksell (yield differential) effects. He

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[5] Capital deepening refers to an increased capital level accompanied by increased capital intensity. Capital widening would depict an increased capital level without greater capital intensity.

concedes though that the modelling framework is subject to a major assumption concerning perceptions of the actors in the economy: that total wealth comprises the sum of physical (capital) goods together with monetary assets, between which they can allocate their existing wealth holding and new saving: "as viewed by the inhabitants of the nation individually, wealth exceeds the tangible capital stock by the size of what we might term the fiduciary issue." (1965a:676). The inclusion of monetary assets entails an illusion (that monetary wealth holding is equivalent to asset wealth holding, i.e. that money is 'outside' money in the sense of not having an offsetting liability) on the part of the asset holders unless the money stock comprises purely a commodity money, which would not be consistent with the rest of the analysis. Without this illusion assumption, the portfolio selection between monetary and capital assets would not occur in the manner of the analysis, and the monetary component would not give rise to results which differ from a similar model without the monetary component.

H G Johnson (1967:161-178) seeks to extend an analysis of money in growth which clearly has much common ground with that of Tobin (1965a), to trace effects of price inflation or deflation on growth in a manner similar to that of the Phillips curve in respect of employment. His main emphasis is on "the 'neutrality' of money in the context of economic growth, and the possibility of using monetary policy to influence the growth of the economy." (1967:163). He explores the possible effects of monetary expansion in the short run. He assumes a level of desired real cash (money) balances which is a function of per capita incomes or wealth, the rate of return on material (physical) capital and the expected rate of return on money balances. He takes the expected rate of return on money to be the negative of the expected rate of change of prices, i.e. the return on money is directly affected by inflation expectations. He assumes that inflation expectations are realised, and that these are determined by the rate of growth of real output. The monetary authority controls the supply of money, so that the interaction between this and demand for real balances gives rise to price level changes as well as determining the rate of return on real balances. Johnson is able to show with these assumptions and an underlying model of the Solow-Swan structure, that a more rapid expansion of the money supply by the

authorities gives rise to a higher economic growth rate on the path towards a 'golden rule' equilibrium. Johnson (1967:175-178) maintains that the model exhibits long-run as well as short-run non-neutrality in the sense that, if the long-run equilibrium differs from the 'golden rule' growth rate, money supply change is still able to alter the growth rate of the economy until the 'golden rule' rate is attained.

Johnson's model (1967) and analysis serves to illustrate possible money supply and inflation effects on the growth path of the economy, but this is based on a neoclassical (Solow-Swan) underlying growth model together with assumptions that lead fairly directly to the money supply–inflation–growth behaviour of the model. As with Tobin's model (1965a), the money supply is entirely 'outside' money in that it is analysed as an addition to real wealth which actors can hold in accordance with their preferences by comparison with the holding of physical capital. It is a useful illustrative model of how monetary influences could be incorporated to give both transitory and long-run effects on real economic magnitudes.   The treatment of money as 'outside' money however entails a conceptually similar underlying monetary mechanism to that of Tobin (1965a), with the associated weaknesses as described above.

2.3   Sen's introduction of money in growth theory

A more concerted effort to bring money into a theory of growth prior to the emergence of endogenous growth theory was that of Sen (1965:267-280). Sen seeks to build on the growth models of Harrod and Domar, and Solow-Swan, in this endeavour. It is apparent in his approach that he is well steeped in the conceptual framework of the *General Theory*. He assumes a one-commodity economy and focuses on the interest rate mechanism as the channel through which monetary factors influence growth. He develops a nine-equation model in which there are ten unknowns, so that there is one degree of freedom. He uses the degree of freedom to set the growth rate of labour employed (g_L), which occurs in conjunction with Harrod's warranted growth rate of output, equal to the growth rate of the working population (n). From this he is able to combine the equations of the model to derive a relationship which indicates the rate of

change of money wages required to attain equality in growth rates of labour employed and of the working population. The structural form of the model is essentially in accordance with the Solow-Swan approach, with a Cobb-Douglas production function, and investment (I) a proportion (saving rate s) of income. However, Sen's innovation is to introduce monetary effects through equations which use the profit rate defined as the marginal productivity of capital ($r \equiv \frac{\partial Y}{\partial K}$), an own rate of interest on the one-commodity assumed (r_c) as well as the money rate of interest (i). Sen (1965:272) maintains that, in a one-commodity world, the own rate of interest of the commodity will be equal to the money interest rate minus the expected rate of price increase of the commodity, i.e. r_c = i - x, where x is the rate of increase of the commodity price. Sen explores the attainment of labour employment growth relative to warranted growth, and resulting unemployment, on the basis of the profit rate tending toward the commodity own-rate in competitive equilibrium. The influence of Chapter 17 of the *General Theory* is apparent in his adopting this notion of the commodity own-rate to which the return on capital tends. He bases his analysis on the notion that "in our one-commodity world the rate of profit in physical terms of that commodity can be expected to equal, or tend towards, the own rate of interest of that commodity and not the money rate of interest." (Sen 1965:272).

Sen (1965:274-276) then explores what would happen if the rate of change of money wages ($\acute{w}$)[6] is given exogenously, and therefore differs from the required rate ($\acute{w}^*$) for the growth rates of labour employed and working population to be equal. He finds that, if the rate of change of money wages is less than required for such equality, i.e. $\acute{w} < \acute{w}^*$, then the growth rate of labour employed will be greater than that of the working population ($g_L > n$). Similarly, $\acute{w} > \acute{w}^*$ results in $g_L < n$. The implication of this is that unemployment will steadily increase if wage rates are rising more rapidly than the critical rate $\acute{w}^*$, and will fall if they are below

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[6] This is the proportional rate of change, i.e. $\acute{w} = \dot{w}/w$, where $\dot{w} = dw/dt$. In general in this thesis, the upward sloping diacritical mark is used to indicate a proportional rate of change.

the critical rate. A wage rate increase (or fall) at the critical rate does not necessarily lead to full employment: it more generally leads to a constant level of unemployment. In Sen's model, the market interest rate i is a key determinant of the required rate of change of money wages $\acute{w}^*$, in order for employment growth to equal working population growth. It is through this required rate that the warranted growth rate of the economy is determined, and the actual rate of change of money wages in relation to the required rate determines the extent (and increase or decrease) of unemployment. The interest rate therefore has a fairly direct effect on labour employed (hence unemployment) in conjunction with changes in money wage rates.

The role of investment in this interest rate–growth relationship is surprisingly muted, and Sen (1965:276) concedes this. The investment function simply describes a direct relationship between investment and income, $I = sY$, as in the Solow-Swan model, and the resulting investment is that required to attain an economic growth rate equal to the growth rate of the working population. Entrepreneurial expectations and 'animal spirits', as considered crucial by the likes of Keynes and Joan Robinson, do not enter the framework. Sen (1965:276-277) notes the difficulty that introduction of an independent investment function can lead to over-determination of the equation system. He does nevertheless seek to "introduce an independent investment function based on an expected rate of growth, which is not necessarily equal to the warranted rate." (1965:277). In this investment function, entrepreneurs plan to invest just enough to give rise to expected profits which equal the own rate of interest on the one-commodity (r_c). If their expected exponential growth rate of income per unit of time is j, and Y_0 is the present income level, then the income level at a short interval into the future is $Y_0.e^{jt}$. Under neoclassical assumptions, competition will drive entrepreneurial activity to a point where the profit rate on capital is equal to the commodity own-rate of interest, so that:

$$r_c = \frac{Y_0.e^{jt}.\alpha}{K_t} \ . \qquad\qquad E2.3.1$$

where α is the exponential coefficient of capital in the Cobb-Douglas production function, indicating the proportion of income accruing to capital. Expressing the

above with K_t as the dependent variable, differentiating to obtain an expression for investment, and substituting in $Y_t = 1/s \cdot I$, gives:[7]

$$Y_t = Y_0.e^{jt} \cdot j \cdot \frac{\alpha}{r_c.s}$$ E2.3.2

From this it is apparent that actual income (Y_t) will only be equal to expected income if $j \cdot \frac{\alpha}{r_c.s} = 1$, i.e. $j = \frac{r_c.s}{\alpha}$. But deviation of actual from the expected growth rate gives rise to instability of the Harrodian 'knife-edge' variety. If the expected growth rate (j) is greater than $r_c.s/\alpha$, then the actual growth rate (g) will be greater than the expected rate (i.e. $g > j$); if j is less than $r_c.s/\alpha$, the actual growth rate will be less than the expected rate. Expected growth rates below the warranted rate (in Harrod's sense) could lead to progressively lower actual rates as the expectations being under-fulfilled gives rise to successively lower expectations. This would apply conversely to growth expectations above $r_c.s/\alpha$. The tendency to move away from the warranted growth rate would need to be relieved by a change in the capital-output or saving ratio.

For a given state of expectations, a rise in commodity own-interest rate (r_c), which could occur as a result of an increase in the money rate, results in a reduction in actual income using equation E2.3.2 above, and conversely for a fall. The model is intuitively plausible in this sense. Sen (1965:279) points out, that, if an independent investment function is not introduced, as is the case in a Solow-Swan type model, interest rate changes would show anomalous effects. This arises from the Solow-Swan model assumption that the actual growth rate is continuously equal to the warranted rate. Under this assumption, a higher real interest rate implies a lower capital-output ratio (K/Y), so that a given saving rate is able to support a higher output growth rate. Sen uses this to draw attention to the limited nature of the Solow-Swan model, in which actual growth is assumed to occur at or very close to full employment equilibrium, and to the importance of introducing an independent investment function, with expectations taken into account. The inclusion of an interest rate variable, together with an independent

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[7] Since $\frac{d}{dt} e^{jt} = j.e^{jt}$, $I = Y_0.e^{jt} \cdot j \cdot \frac{\alpha}{r_c}$.

investment function, gives rise to a model in which output growth may be below a warranted or full-employment equilibrium rate, without any tendency to move towards the warranted or full employment rate. Nevertheless, "if a not too implausible assumption is made about the relationship between unemployment and the rate of change in money wages, the 'own' rate of interest will move in a way to make the warranted growth rate equal to the natural rate of growth …" (1965:280).

Sen's effort to bring a monetary variable into the models of economic growth as they existed at that time, although in a limited manner, illustrates some of the issues arising in doing so as well as flagging possible weaknesses in the neoclassical assumption set of growth models such as that of Solow-Swan. He was able to show that the introduction of a monetary variable could have the consequence of output remaining below full-employment levels, and that recognising an independent investment function with an expectation element could lead to significantly different outcomes compared to those under neoclassical assumptions, including Harrodian instability. The monetary component therefore had significant potential effects on the behaviour of such growth models.

The monetary component in Sen's model is however confined to interest rate effects, and this issue was raised at the conference at which the paper was presented (Brechling 1965:355). The possibility of including one or more quantitative monetary variable, such as one or other monetary aggregate, was discussed. The argument was put forward that this could have a stabilising effect, leading to different conclusions. Sen maintained that his model approach assumed that the monetary authorities varied the money supply in such a manner as to produce the interest rate with which the model is concerned, so that money supply changes were represented in that sense through the interest rate. Further, he maintained that the introduction of one or more monetary aggregate could equally plausibly introduce other forms of instability rather than being stabilising. In any event, it was conceded that a more comprehensive treatment of monetary variables could be a desirable avenue for further research

work (Brechling 1965:359-360). Sen's model did nevertheless demonstrate the layers of additional complexity which are likely to arise as monetary factors are introduced into growth models, and this extra complexity is a possible reason for the hesitation to extend the coverage of monetary effects in growth models.

2.4   Money and capital in economic development

A useful innovation in the relationship between money and economic growth was put forward by McKinnon (1973). He was concerned with the circumstances of less-developed economies in which financial markets are fragmented and any assumption of frictionless flows and continuous clearing of markets is clearly not valid. However, the approach could also be applicable to more developed economies under a view which holds, contrary to neoclassical assumptions, that markets, and financial markets in particular, do not continuously maintain equilibrium. McKinnon (1973:44-46) questions the neoclassical assumption that monetary balances and capital serve as substitutes (as exemplified in the models of Tobin and Johnson above), with flows from one to the other according to relative utility and returns. McKinnnon (1973:57-61) replaces this with the assumption that monetary balances and capital are complementary, which he justifies on the basis of accumulation of monetary balances being a prerequisite to expenditure on investment at the micro level, translating into complementarity at the aggregate level. An adjunct assumption to this is that investment expenditures are not continuously divisible so that saving cannot translate immediately and fully into investment without accumulation of monetary balances. A further assumption is that government does not intervene through fiscal policy to attain a level of saving and investment in accordance with macroeconomic objectives. On this basis, he maintains that, "*if the real return on holding money increases, so will self-financed investment over a significant range of investment opportunities.*" (1973:60).

McKinnon (1973:59) expresses the money-demand function in the economy under these conditions as:

$$(M/P)_D \ = \ L(\ Y, \ I/Y, \ d - \acute{P}^e \ ) \ . \hspace{3cm} \text{E2.4.1}$$

The left hand expression refers to the demand for real balances. The three influencing variables on the right are income (Y), the investment to income ratio (I/Y) and the real return on money balances (d - $\acute{P}^e$)[8], expressed as the nominal interest rate on deposits (d) less the expected inflation rate ($\acute{P}^e$). Here, the partial derivative of the money demand function with respect to I/Y is positive, reflecting the complementarity between money balances and investment. This compares with a neoclassical money demand function which would include r, the real return on capital, having a negative partial derivative with respect to it, reflecting the portfolio balance substitution assumption. McKinnon (1973:60-61) uses an expression for I/Y to elaborate on the operation of his posited relationship expressed in E2.4.1:

$$I/Y = F(\underline{r}, d - \acute{P}^e). \hspace{3cm} E2.4.2$$

Here, $\underline{r}$ is the average of real returns on capital investment, since these returns will be dispersed under the assumption of imperfect capital markets. I/Y will increase with increasing $\underline{r}$, and will increase with d - $\acute{P}^e$ in the case of a pure 'conduit' operation of money in respect of investment. However, McKinnon allows the possibility of a competing-asset effect to come into play under certain conditions. While the degree of monetisation in the economy is limited, and the real return to money holders is unfavourable, the conduit aspect of money holding predominates. But as the real return on monetary holdings increases, the level of holdings increases, the conduit is less constricted, and the asset-competing aspect comes increasingly to the fore. As real returns to money holding move close to the average return on capital investment, the asset-competing effect serves to <u>reduce</u> the flow of investment. With this combination of conduit and asset-substitution effects of money balances, it would be possible in principle to find a real rate of return on money holdings which maximises the flow of investment.

McKinnon (1973:61-66) maintains that the optimum real return on money holding is significantly higher, based on the theoretical framework, than is generally

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[8] The forward-sloping diacritical mark is used to signify that this is a proportional rate of change, i.e. $\acute{P} \equiv \dot{P}/P$, where $\dot{P} \equiv dP/dt$. The superscript ^{e} indicates expected values.

assumed using traditional monetary theories in either a neoclassical or Keynesian mould. With a spectrum of returns on real capital, there will be a tendency for holders of capital assets with a return below that on money balances to realise such assets in favour of money balances. These money balances can then be used for the acquisition of capital assets carrying returns above that of the money balances. In similar vein, a significantly positive real return on money holding renders it more feasible for those with low incomes to save in the form of money balances in order to undertake a capital investment at a subsequent time. Another consequence of the dispersion of returns on physical capital is that the average return to capital does not necessarily fall as the monetary system becomes more efficient and investment increases. The reduction in low-return capital holding and the continued investment in capital with returns above that on money balances can lead to an increase in the average return. This is notably at variance with the assumption by Classical and neoclassical economists of diminishing returns to capital as capital formation expands. A policy-related conclusion is that "The quality of the capital stock (average rate of return) is positively related to the real return on holding money." (McKinnon 1973:66).

The effects of inflation can also be considered under McKinnon's framework, especially through the effect of expected inflation on the real return on money balances. The implications for a policy of price stabilisation under inflationary conditions are pertinent. In view of the conduit effect of money holding, the monetary policy authority needs to strive for an outcome in which real balances, M/P, are not reduced as inflation decreases, in order to avoid constraining investment. Although the monetary authority may seek to curb the growth of the nominal money supply, McKinnon (1973:49-51) argues that this does not necessarily entail contraction of the real money supply. A careful rise in nominal interest rates paid on deposits (d) together with ensuring the credibility of measures (such as curbing excessive money supply growth) which reduce inflation expectations ($\acute{P}^e$) can lead to attainment of both a higher real return on money holding and an increase in real money balances. This would enable price stabilisation to be achieved without negative consequences to investment and

thereby to economic growth. In McKinnon's view (1973:86), "the crucial difference between *successful* and *unsuccessful* price stabilization is the distinction between contraction in *nominal* as opposed to *real* monetary variables.". McKinnon (1973:51-52) recognises that under a neoclassical monetary framework, deliberate inflation has at times been advocated as a policy option to increase investment. The increased investment would occur under neoclassical assumptions both through the substitution effect from monetary balances to physical capital as a result of the lower real return on money holding, as well as through the additions to nominal money holding due to its declining real value, which accrues to government as seigniorage and can be channelled into investment projects. McKinnon however points out that the inflation is accompanied by economic costs in the form of reduced economic productivity. It also renders the policy measures which he suggests more difficult to implement, especially if the inflation rate is high and unstable.

Thirlwall (1978:257-291) considers the possible means whereby the monetary and financial system could be used to increase investment in the economy and thereby growth. He distinguishes between prior-savings, Keynesian and quantity theory approaches. A prior-saving approach is akin to Classical and neoclassical economic viewpoints, in which saving needs to be generated in advance in order for investment to occur. The focus is therefore on promoting higher saving, which can be achieved by extending and improving the efficiency of financial intermediaries and markets. This ties closely with the analysis and policy prescriptions of McKinnon (1973). In a Keynesian approach, however, investment is primary, with a presumption that saving will occur to the level necessary to fund the investment. With resources in the economy unemployed or under-utilised, real output can be increased through government deficit financing of investment expenditure. The deficit could be met by issuing government bonds to the private sector, or by borrowing from the central bank, with the latter generally having inflationary consequences. Thirlwall (1978:272-273) considers deliberate inflation as a rational policy alternative, with benefits to investment and growth: "If voluntary and involuntary saving are inadequate, inflationary policies which 'force' saving by 'taxing' money and by redistributing

income between classes within the private sector are an alternative possibility." (1978:272). It enables planned investment to move ahead of planned saving, with an element of 'forced saving' occurring through real wages, and hence consumption, falling below planned levels as a result of the (not fully anticipated) inflation. The inflation concomitantly has the effect of re-distributing income from wage-earners to profit-earners, who display a higher propensity to invest. A quantity theory approach also suggests deliberate inflation as a policy measure. The emphasis is on inflation as an effective tax on real money balances, as their value is reduced, requiring supplementation with additional (nominal) monetary issue. This results in an effective transfer of funds, the 'inflation tax', from private sector parties to the issuers of money, generally the central bank, through which it is provided to government itself. The above arguments indicate how inflation was justified as a deliberate policy option to enhance economic growth. Fry (1995:5) maintains that this 'inflation tax' has been a significant source of taxation in less-developed economies, of the order of 2.8% of GNP on average for 26 countries surveyed in 1984. The three approaches differentiated by Thirwall illustrate the analysis of monetary effects on investment and growth that were being considered and debated in theories of growth and development prior to the emergence of endogenous growth theory, as well as highlighting the distinction between saving-driven and investment-driven alternatives.

McKinnon uses the term 'financial repression' to designate the phenomenon, widespread in less developed economies, in which financial intermediation through the banking system is confined in the main to city enclaves, and most economic participants are left to contend with high interest rates of informal moneylenders and pawnbrokers, with concomitant high transaction costs (1973:68-69). Monetary reforms and policies may seek to alleviate 'financial repression' in this sense, through measures which extend the availability and suitable terms of banking and other financial services in the economy. Fry (1995:20-22) uses the term 'financial repression' in the stronger sense of a set of government policies, instituted with specific (possibly short-sighted) objectives, which have the result of market distortions and constriction of the financial sector. In benign form, he terms such a policy set 'financial restriction', with

typical measures being interest rate ceilings, high reserve requirements, foreign exchange controls, high taxes on income from capital, and high duties on private sector issues of bonds and equities. These measures give rise to shifts of funds from private to public sector, beyond a level attainable through conventional income-related taxation, placing greater resources for development (and other) purposes in the hands of government. As pointed out by Fry (1995:22-23), these measures, even if positively intended, can easily have disruptive and even destabilising effects. Measures such as interest rate ceilings and high reserve requirements could be regarded as being in the realms of monetary policy, though imposed by legislation, and measures such as favouring government bond issues through legislation as well as foreign exchange controls are closely allied to monetary policy. Even though the writers on financial repression in an economic development context are concerned primarily with addressing structural, institutional and legislative issues, their analysis gives recognition to a strong relationship between the monetary system and economic growth.

2.5   Monetary models inspired by Financial Repression

The theory put forward by McKinnon (1973)[9] served as a foundation for further theories and models concerning monetary issues in a context of financial repression. Fry (1995:39-52) identifies several models of money and finance which are extensions from the McKinnon-Shaw framework, and notes in particular the models of Kapur (1976:777-795) and Mathieson (1980:359-395), which provide additional analytical depth to the framework.

Kapur's purpose in the development of the model presented (1976:779-793) is to examine the means through which price stabilisation can be attained in a less developed economy in which financial repression is prevalent. The concern is that a policy reduction in the rate of monetary growth is likely to reduce capital investment, and economic growth generally, before inflation expectations and realised inflation decrease. Kapur focuses on changes in the working capital component of total capital in particular, as being widely financed with bank credit.

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[9]   Also that of Shaw (1973), which is similar in essential characteristics and economic policy implications. Fry (1995:39) and others refer to the two jointly in terms of a 'McKinnon-Shaw' framework.

He expresses working and fixed capital in a compatible manner, with a being the proportion of fixed to total capital (and 1-a that of working capital). He expresses the nominal money supply (M) as comprising high-powered money (H) and loans extended by commercial banks (B). He assumes the proportions held of each to be constant, with q = B/M (and 1-q = H/M). He expresses the growth rate of the high-powered monetary base $\dot{H}/H$ as η, with the growth rate of the entire money stock assumed likewise to be η. He assumes that only working capital is financed by banks, and that the proportion of working capital so financed is θ. The additional lending necessary by banks in inflation conditions to maintain the value of working capital in real terms is $\dot{P}.\theta.(1-a).K$ with K designating total capital, and $\dot{P} \equiv dP/dt$. The rate of capital accumulation can be expressed:

$$\dot{K} = 1/(1-a).[\ \dot{B} - \dot{P}.\ \theta.(1-a).K\ ])\ /\ P \qquad\qquad E2.5.1$$

or $\qquad \dot{K} = 1/(1-a).[\ \eta.q.M/P\ -\ \pi.\theta.(1-a).K]\quad$ since $\dot{B}/B = \eta$ and $B = q.M \qquad E2.5.2$

where $\pi = \dot{P}/P$ is the inflation rate expressed relative to the price level.

Assuming a constant output to capital ratio σ (i.e. $Y = \sigma.K$), so that $\dot{Y}/Y = \dot{K}/K$, economic growth $\gamma = \dot{Y}/Y$ can be expressed:

$$\gamma = \eta . [\ q/(1-a) . \sigma. M/PY\ ]\ -\ \pi.\theta \qquad\qquad E2.5.3$$

This equation shows that the economic growth rate γ is positively affected by the monetary growth rate η as well as the ratio of loans to the money stock, q, and output/capital ratio, σ. The velocity of circulation, P.Y/M, has a negative impact on growth, as does the fraction of working capital replaced, θ. A higher reserve ratio on the part of the central bank would reduce θ, thereby having a negative effect on growth.

The equation can also be viewed as showing the effects of the inflation 'tax': $\eta.(M/P)$ is real revenue resulting from inflation, and $\pi.\theta$ is the cost of inflation to the banking system, by way of additional working capital finance provided. This illustrates the positive effect on growth of the inflation 'tax', though the effect is modified downwards by the extent to which banks need to provide additional working capital financing as a result of the inflation ($\pi.\theta$). A steady state equation can be derived from the growth equation, which shows that a particular

money growth rate can be found which is such as to maximise economic growth. Also, with extension of the model to include an interest rate effect on bank lending, a nominal interest rate on deposits can be found which likewise maximises economic growth. In Kapur's model, financial liberalisation in the form of removing ceilings on interest rates automatically produces the optimal interest rate for growth purposes. The model also suggests that growth is maximised when the reserve requirement placed on banks is reduced to a minimum (or even to zero). Kapur's broad monetary policy-related conclusion is that "initially the nominal deposit rate should be raised. Once this has induced a decline in the inflation rate (and an increase in the growth rate), the other instrument [monetary expansion] can be brought judiciously into play." (1976:794).

A weakness of Kapur's model is that investment can be increased indefinitely, without having to be matched by saving. There is no behavioural saving function in the model. More generally, although it depicts an economy in which monetary variables have a real effect on capital formation and growth, this is in a context of structural change in the economy, particularly the lifting of financial repression. The equation can be used to examine both long-run, steady state effects of changes in money stock or inflation, and short-run dynamics, and Kapur (1976:783-793) shows the implications under various economic circumstances and policy measures. This includes showing that McKinnon's (1973:84-88) proposal of instituting an initial increase in nominal interest rates payable on bank deposits has a stabilising effect on economic growth in terms of the model. In the context of this thesis, Kapur's model provides a clear and explicit expression of a relationship between monetary variables and economic growth from the field of growth economics, which recognises the importance of the bank credit channel in determining the rate of investment.

Mathieson (1980:361-369) proposes a somewhat similar model to explore alternative combinations of financial reform and stabilisation in a developing economy subject to financial repression. He modifies Kapur's assumption that bank financing is confined to working capital, to additionally cover fixed capital.

A further extension is explicit inclusion of a minimum required reserve ratio so that policy alternatives in which it is varied can be examined. Mathieson is concerned with the path selection of values for monetary growth, and most appropriate interest rates on deposits and on lending, in order to move the economy toward lower inflation and interest rate decontrol, thereby away from financial repression. He examines optimal policy options under assumptions of both adaptive and rational expectations in determination of expected inflation rates (1980:371-387). Variations of the core model are devised for exploring alternative assumptions and situations in undertaking financial reform (Mathieson 1980:388-395). A likely monetary policy to address financial repression would "initially require high real lending rates that decline more rapidly than deposit rates as the illiquid loans become a small proportion of total financial system assets." (1980:387).

Key messages from the model analyses of Kapur and Mathieson are that policy interventions can be devised which move an economy away from financial repression with the lowest possible disruption or destabilisation effects through the financial system. The model variations all entail significant effects of monetary policy interventions through the financial system to the real economy, though orientated to the circumstances of financial repression in a less-developed economy. Further developments from these approaches are models carrying the neo-structuralist label, in which the role of 'curb' (informal) financial markets is recognised, as well as extension to allow open economy variables (Fry:1995:53-59). The Kapur and Mathieson models, and the extensions to them, are useful in showing possible approaches to relating monetary variables to investment and the real economy, and monetary policy alternatives, arising from the economics of growth and development.

2.6   Endogenous Growth Theory

New, or endogenous, growth theory had its origins in the mid-1980s, arising from the concern that conventional growth theories at that time could not account adequately for the wide disparities between growth rates of countries, even when the differentiating factors of those growth theories were corrected for.

Neoclassical growth models based on the Solow-Swan structure suggested that economies which were further away from their steady state growth path (and below it) would grow more rapidly than those closer to their steady state. A refinement of this hypothesis is referred to as conditional convergence, the conditionality indicating the necessity to take into account the differing model parameters (e.g. saving rate, labour force growth) in each economy. It would imply that, once adjustments are made for these parameter differences, the growth rates of the economies should converge. Although economies which are not too widely different, such as those of the OECD countries, do exhibit such conditional convergence, the picture using widely disparate countries is far more clouded. It was apparent that factors such as technology and government policy environments needed to be incorporated more fully in exploring growth models, and the 'endogenous' term refers to the move to bring such factors into growth models as components of an endogenous process. The work of Romer (1986)[10] was a significant point in launching the new approach. Early contributors viewed the prior growth theory as having come to a virtual standstill from the early 1970s, that it "became excessively technical and steadily lost contact with empirical applications." (Barro and Sala-i-Martin 1995:12). The new approach sought far greater empirical confirmation and policy relevance.

In terms of the Cobb-Douglas production function typically used in the Solow-Swan and similar neoclassical models:

$$Y = A.K^{\alpha}.L^{1-\alpha} \hspace{4cm} \text{E2.6.1}$$

The A broadly represents the level of technology, and is taken to be a constant or function of time, but is determined exogenously to the growth model. The endogenous growth theory approach recognised that differences in A and its behaviour have major implications for the growth rate and path of economies. The determinants of A were therefore given prominence, in such a way as to include them as endogenous elements of the growth model. Changes in A

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[10] Romer sought through the new approach to growth models "the construction of a mechanical, artificial world, populated by the interacting robots that economics typically studies, that is capable of exhibiting behaviour the gross features of which resemble those of the actual world … " (1986:1006).

enable the neoclassical presumption of diminishing returns to factors, capital in particular, to be broken. It can be shown that various government policies, regulations and behaviours can be treated in a similar manner to technology changes. Thus a wide range of government and institutional approaches can be examined through the endogenous growth approach in addition to examining issues of the generation and diffusion of new technology.

For all its merits in examining a broad range of issues affecting economic growth, endogenous growth theory has placed relatively low emphasis on monetary influences. Wide-ranging texts on endogenous growth such as Barro and Sala-i-Martin (1995) and Romer (1994) do not contain any significant coverage of monetary effects. This is likely to be attributable to neoclassical economics and growth models serving as a departure point, together with recognition that technology and institutional issues are major determinants of growth, which warranted extensive attention in the new analyses of the growth process. However, the nature of the treatment of monetary issues within the body of endogenous growth theory can be examined through the work of Fedderke (1998) which draws together the approaches adopted.

Fedderke (1998:109-119) contrasts two views of money in its effect on growth, that in which it detracts from growth and that in which it is conducive to growth. He attributes origin of the former view to the approach adopted for instance by Tobin (1965a). This is the portfolio approach discussed earlier in this chapter (Section 2.2), in which economic actors must exercise a choice between asset holding in money balances and in physical capital. Fedderke derives a mathematical formulation in which the rate of change of real money balances is proportional (proportionality co-efficient μ) to the rate of change of output or income. With otherwise neoclassical growth model assumptions, this gives an equation for per capita output (g_L is the growth rate of the labour force, k is capital stock per worker, s the saving rate):

$$y = [\ g_L\ /\ s.(1 - \mu.\acute{Y}.(1/s - 1)].k \qquad\qquad \text{E2.6.2}$$

This resembles the steady-state growth equation of the Solow-Swan model, except that s is now modified by the factor $1 - \mu.\acute{Y}.(1/s - 1)$. If economic growth ($\acute{Y}$) is positive, this factor has a value below 1 since μ is positive and $0 < s < 1$. The factor resulting from the introduction of money has the effect of reducing saving which translates into investment, with a lower per capita output and capital stock in steady state. As the economy grows, a portion of saving is being diverted into money holdings, with less thereby being translated into physical capital. This view of money lends itself to a deliberate policy of money restraint. Fedderke uses the term 'financial repression' to refer to such a policy, which needs to be construed narrowly, as against the broader sense in which it is referred to earlier in this chapter. One policy response in this view could be imposition of interest rate ceilings on money holding, to encourage transfer from money balances to physical capital. Another possibility would be the introduction of a tax on money holding, either through stamped money as suggested by Gesell (Keynes 1936:357) or by deliberate inflation. A third possibility would be increased reserve requirements placed on the banking sector to curtail the expansion of money holdings. As pointed out previously, this portfolio-analysis view of money relies on the assumption that all or most money is outside money, and is questionable where the monetary system is dominated by credit-based, internal money.

To portray the effects of money under the view that it is conducive to growth, Fedderke (1998:115) introduces real money balances as a production factor in the production function:

$$Y = F(K, L, M/P) \qquad\qquad \text{E2.6.3}$$

which can be expressed as $y = f(k, m)$ in labour intensive form where $m = (M/P)/L$. All saving is now assumed to be invested, and an expression can be derived for output based on the Solow-Swan model with money as a production factor:

$$f(k, m) = g_L/s + g_L.m.(1/s - 1) \qquad\qquad \text{E2.6.4}$$

The first term on the right hand side is that of steady state growth in the Solow-Swan model. The second is positive provided that labour force growth (and

money balances) are positive, since s is assumed less than 1 (and positive). From this expression, steady state output and capital is greater than that in the absence of money by the right-hand term, which increases with per capita money balances. This supports policy measures which serve to expand money balances, much in line with the analysis put forward by McKinnon (1973). The monetary system is regarded as an enabling mechanism for capital investment and as a means for improving the allocation of resources to those capital projects carrying the most favourable returns.

Fedderke (1998:118-136) proceeds to use a two-period analysis - present and future - to show with marginal utilities that agents are able to maximise their utility by adopting a combination of current acquisition of physical capital and holding of financial instruments which enable a higher level of consumption or investment expenditure to be undertaken in the future period. The analysis shows that a societal benefit occurs in addition to the utility benefits of the individual agents concerned, through funds placed in financial instruments by surplus agents being allocated to higher utility physical capital investments by deficit agents. An extension of the analysis shows the benefits which arise through pure deficit units being able to obtain funds for allocation to capital investment through financial intermediation, when income to the unit will only occur in the future period. The analysis is based on all funds being in essence inside money, in that all funds placed in financial instruments are fully and immediately available to other agents for allocation to physical capital investment. Fedderke clearly adopts the view that the monetary system is conducive to economic growth. It is noteworthy that the analysis does recognise a significant effect of the monetary system on real economic magnitudes, so that it departs from its neoclassical moorings in the treatment of money.

2.7 A Post-Keynesian Perspective

Palley (1996d:113-125) maintains that the endogenous growth theory framework is inherently unsuitable to reflect a view of the essential operation of the macroeconomic process which accords with the notion of a monetary economy envisaged by Keynes (1936) and Post Keynesians, but that the framework can

be adapted to provide a model exhibiting such characteristics. The two crucial influences that he regards as requiring to be reflected are: (1) capital accumulation being driven by investment spending which may not translate directly from saving and (2) inclusion of an aggregate demand component which may have differing characteristics from aggregate supply. The neoclassical assumptions underlying endogenous growth theory result in investment being determined directly by saving, without a separate function that reflects investment behaviour of firms rather than saving behaviour, mainly of households. Such neoclassical models do not incorporate any separation of aggregate demand from aggregate supply, so that there is "a dynamic form of Say's law" in operation, whereby demand always expands equally with output (1996d:113). Palley (1996d:123-125) considers that the notion of endogenous growth itself is fully compatible with Post Keynesian views, and that growth models such as those of Kaldor (e.g. 1957, 1960) could be considered forerunners to the endogenous growth endeavour. On this basis, Palley seeks to introduce modifications to the model framework typically used in endogenous growth theory to recast it in a Post Keynesian mould. He considers that "Keynesian growth theory requires *both* the mechanisms of endogenous growth and that capital accumulation be governed by investment spending (rather than saving)." (1996d:114).

The most pertinent aspect of Palley's adaptation for current purposes is his treatment of money. He regards Tobin's introduction of money (Tobin 1965a) as having been a useful starting point, but as still producing results similar to those of a neoclassical model without a monetary component. The essential mechanism which he introduces to reflect Post Keynesian assumptions is an investment function which operates separately from saving. Investment per capita is represented as a function of the marginal propensity to invest per capita (u) and output (f(k)), which is still given by a Cobb-Douglas or similar functional form:

$$I = u(r).f(k) \qquad\qquad\qquad E2.7.1$$

u(r) is intended to give effect to an mec-type schedule, with r being the real interest rate. Palley (1996d:116-117) contemplates the possibility of an interest

rate equation in which the real interest rate is equal to the marginal product of capital, but recognises that this would give investment spending as negatively related to the marginal efficiency of capital. To operate in the envisaged Post Keynesian mode, the model needs a significantly more differentiated money and financial mechanism.

Palley (1996d:118-123) extends the household-firm distinction to separate owners and managers along similar lines. Owners are households, which own equities of firms. Managers are the decision makers on behalf of firms. Equity markets determine equity prices accordingly, and equity owners hold their wealth in money balances as well as equities in accordance with their preferences. The demand for equities is subject to an illiquidity discount. Investment spending depends on managers' cost of capital, which is subject to an adjustment factor relative to the return on equities to reflect managers' priorities not being fully aligned to those of equity holders: managers may adopt a lower cost of capital and therefore accumulate more capital than meeting equities returns would require. It is the managerial cost of capital that feeds into the investment function. Physical capital is thus distinguished from equity holding, with portfolio choice being primarily in the hands of owners allocating funds between equities and money. A wealth constraint ensures that both equities and money markets clear simultaneously. Palley (1996d:118-120) adds equations for the rate of real money growth, output growth and inflation. The resulting model separates a monetary return requirement, the cost of capital, similar in essence to a money rate of interest, from a return on physical capital. This then better captures the Keynesian notion of an interest rate operating in conjunction with a marginal efficiency of capital in the determination of investment. Liquidity preference and inflation can have effects in Palley's model through the monetary system to influence investment. Palley explores the stability conditions and behaviour of such a model; although now reflecting a monetary mechanism in accordance with the interest rate–mec combination of Keynes (1936), it still does not have a separation of aggregate demand and supply, and he proceeds to address this further addition. The investment function posited by Palley (1996d:126-135) is a function of aggregate demand and its rate of change (the accelerator notion of

macroeconomics), as well as the excess or shortfall of aggregate demand relative to aggregate supply.[11]

Palley's modification of a typical endogenous growth model to reflect Post Keynesian precepts provides the possibility that the areas of exploration of endogenous growth theory could be usefully extended under a Post Keynesian macroeconomic paradigm. The analysis of money offered by Fedderke (1998) and others within the conventional body of endogenous growth theory accepts the possibility that the monetary system could be a beneficial factor in economic growth. Although Fedderke's analysis considers the extension or improvement of the monetary system rather than monetary effects resulting from the monetary system while retaining its nature and extent, it constitutes a significant move from disregarding monetary effects other than those on inflation through the quantity theory. However, if monetary effects on investment and growth are to be fully explored in endogenous growth theory, this would require the abandonment of a neoclassical paradigm, with its limited basis for the inclusion of monetary influences, and the adoption of modelling approaches which can more fully reflect the influences of money through a range of possible mechanisms.

2.8   Concluding remarks

Early modern growth models such as those of Ramsey, Harrod, Solow and Swan made significant contributions to the understanding of the economic growth process, but abstracted from monetary issues, either to avoid excessive complexity or because it was assumed that the role of money was negligible. Most theories and models in the late 1950s and 1960s, when there was considerable interest in furthering the field, still did not have monetary components.   There were, however, some significant attempts to introduce money into growth theories.   These include the portfolio approach of Tobin

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[11]   Dutt (2003:83) concurs that it is a key feature of a Post Keynesian growth models that "In contrast to old neoclassical and new growth theory models, post-Keynesian models of growth bring effective demand issues to center stage."

(1965a), the conceptually similar approach of Johnson (1967) and the interest-related approach of Sen (1965). In such models, money has a limited role, and its effects are narrow. The more comprehensive treatment of money in conjunction with the financial system accord it a broader and more intuitively convincing role in the economic development contributions of McKinnon (1973), Thirlwall (1978) and other writers of the 1970s and 1980s concerned with finance in the development process. These approaches do not however present as complete a growth model framework in a formalised, algebraic sense as do the earlier models referred to. The work of Kapur (1976) and Mathieson (1980) extend the McKinnon-Shaw framework significantly in terms of formalised model development, in the context of developing economies experiencing financial repression. These models explicitly reflect strong links from monetary variables through the financial system to investment and the real economy.

The emergence of endogenous growth theory from the mid 1980s could have carried with it a stronger emphasis on monetary effects in growth. However, endogenous growth theory emerged from a strong neoclassical economic paradigm, using the Solow-Swan form of growth model as its departure point. For this reason, together with the large and useful ground to be covered in growth effects relating to technology, knowledge and institutional factors, monetary factors again received relatively low emphasis. There have, nevertheless, been some initiatives to examine monetary issues in growth within the endogenous growth programme, and these were shown to provide some useful background in contemplating monetary effects on investment. The examination of money is however by and large not integrated with the neoclassical framework usually adopted in endogenous growth theory. A writer such as Palley, taking a Post Keynesian perspective, maintains that monetary issues cannot be explored to full effect within the endogenous growth theory programme unless a shift is made from a neoclassical to Post Keynesian paradigm in the underlying growth model and assumptions used. The nature of the monetary mechanisms suggested from a Post Keynesian perspective by Palley and others to enable consideration of monetary effects in endogenous

growth theory are further examined in considering approaches to modelling monetary relationships in the economy, in Chapter 5.

CHAPTER 3

POST KEYNESIAN MONETARY THEORY AND INVESTMENT

3.1   Introduction

Post Keynesian economics could be characterised as a revival as well as extension of the macroeconomic conceptual framework put forward by Keynes, especially that of the *General Theory* (1936) and subsequent papers (King 2002:1-6).   It has posed challenges to orthodox economics, particularly in repudiating the neoclassical synthesis interpretation of Keynes' economics, and the associated extensive analysis using the IS/LM framework initiated by Hicks (1937).   It is likewise critical of analysis based on a general equilibrium or neo-Walrasian framework, which is an underlying paradigm of much of neoclassical economic theory.   It has also been strongly critical of monetarism as a theory of the behaviour and effects of money.   Some key conceptual tenets of Post Keynesian economics are: fundamental uncertainty needs to be taken into account in economic analysis, time needs to be viewed as historical (unidirectional) time, assumptions underlying theories need to accord with reality (contrasted with instrumentalism), scepticism toward a general equilibrium approach to economic modelling, preference for partial equilibrium approaches if equilibrium is used, importance of contracts and societal institutions more broadly, money being treated as credit-related in a modern economy, and monetary and real magnitudes in the economy being closely intertwined.   The theories, research and arguments put forward by writers in the Post Keynesian mould are wide-ranging.   This chapter focuses on characteristics of Post Keynesian analysis relating to monetary issues only, including consideration of monetary influences on investment, in view of the subject matter being pursued in the thesis.

It is recognised (e.g. King 1995; Cottrell 1994a) that Post Keynesian theories in respect of monetary issues are in a state of flux, rather than comprising a unified, consistent whole. It is perhaps inevitable that there is a degree of contradiction between key Post Keynesian writers in the views and theories expressed. Post Keynesian writers who have played a key role in the formulation of monetary

theory from a Post Keynesian perspective include Davidson (1978, 1982, 1986, 1989, 1993, 1994, 2002), Moore (1988a, 1988b, 1989, 1991, 1994, 1997), Kaldor (1985b, 1986), Kaldor and Trevithick (1981), Chick (1983, 1992, 1993, 1997), Dow (1986, 1993, 1996a, 1996b) and Rogers (1985, 1986, 1989). These writers are examined and drawn on to identify and assemble the salient aspects of Post Keynesian monetary theory. Some writers have explicitly sought to draw together and explore the nature of Post Keynesian monetary theory, in particular Cottrell (1994a), Arestis (1988), Rousseas (1986, 1998), Lavoie (1992) and Palley (1996c). These likewise provide a useful source to characterise the essential aspects of Post Keynesian monetary theory which are pertinent to this study. The chapter considers the issues in relating money to real magnitudes, the role of interest rates, monetary equilibrium in the macro economy, causes of inflation, endogeneity of the money supply, money creation, the finance motive, international flows and monetary policy variables. It thereby assembles the core aspects of Post Keynesian monetary theory germane to examining the relationship between monetary policy and investment, from which further layers of depth and model development can be pursued in subsequent chapters.

3.2   Money and the Real Economy

As noted by Cottrell (1994a:589-591), an essential departure point in Post Keynesian monetary theory is that a modern capitalist economy needs to be characterised as a monetary production economy in Keynes' (1936) sense[1]. This implies that money enters into economic consideration in the process of production itself, making it inherently linked into the processes through which real as well as monetary variables are determined. This places all Post Keynesian monetary theory firmly in the Monetary Analysis tradition, in the classification of Schumpeter (1954) described in Chapter 1. 'Money matters' in a very deep and comprehensive sense in Post Keynesian monetary theory. This can be contrasted with the sense in which monetarists such as Friedman (1968)

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[1]   As Rogers (1989:167) notes, Keynes set out in the *General Theory* to develop a 'Monetary Theory of Production' with the latter being the initial title during the writing of the *General Theory*.

regard money as important: the monetarist focus is on monetary aggregates, with long-run effects on price levels rather than real magnitudes.

Davidson, as a major contributor in the formulation of Post Keynesian monetary theory, focuses on the connection between money and contracts in a monetary production economy, and the further relationship to time and uncertainty (Davidson 1980:296-299, 2002:71-76). In his view, it is the fact that contracts are expressed in monetary terms as well as spanning intervals of calendar time that give it essential characteristics which relate to real economy magnitudes. Entrepreneurs "must make money contractual commitments in the present involving performance and payments at specified dates in the uncertain future." (Davidson 2002:11). An important forward contract which connects money and real variables is that of the money-wage contract. Establishment of wages in such contracts, and payment, take place in advance of produced goods being completed and sold. Producing firms adopt a position and assume commitments to hire workers and meet wage and working capital payments in accordance with their expectation of the eventual revenue proceeds which will be received for the goods produced. Forward wage contracts imply 'sticky' wages, i.e. they are not subject to drastic changes over short time intervals. This provides a degree of stability, but also implies that wage rates are an important determinant of price levels.

Time plays a crucial role in a Post Keynesian view of money in that money is viewed as an abode of purchasing power which can be transferred between past, present and future: it is a 'time machine' in this sense (Davidson 1980:297-298). This is an extension of Keynes' perception that "the importance of money flows from its being a link between the present and the future." (1936:293). The Post Keynesian notion of time as being historical time rather than logical time, meaning that it needs to be recognised as moving in a single direction with changing surrounding conditions, accord to money attributes which would not exist under reversible logical time. The concept of fundamental uncertainty

brought forward from Keynes (1936, 1937c)[2] is regarded as an essential reason for the holding of money: money balances are held as unspecified, generalised purchasing power to meet future expenditures which are uncertain rather than stochastically predictable. The propensity to hold money therefore depends on expectations relating to an uncertain future, rather than statistically definable future requirements. The link between uncertainty and money in Davidon's view (2002:12) is that "It is only in a world where the future is uncertain that the importance of money, contractual arrangements, and financial market activity becomes predominant in determining future world outcomes." Monetary holding may change in accordance with expectations concerning future circumstances, even if actual payment requirements do not change.

Post Keynesian views on money depart from first principles with any theory of money which has as its assumption base a general equilibrium framework, as is widely the case in neoclassical approaches to economics. There have been various attempts to accord money an essential and plausible role within a neo-Walrasian, general equilibrium economic framework. Early theoretical contributions in this debate were those of Patinkin (1965) and Clower (1965, 1967). Patinkin (1965:171-192) highlighted the apparent contradiction arising from the quantity theory in which an equiproportionate increase in prices leaves relative prices unaffected and therefore does not affect real demand and supply of commodities (the homogeneity postulate); and yet the price level increase must have reduced the real purchasing power of the money supply. To resolve this conundrum, he resorted to a real-balance (wealth) effect of money holding as an equilibrating force which can affect real magnitudes. Clower (1967) contested this analysis by exploring the introduction of money into a general equilibrium model using an approach based on micro-foundations, in which money is required by agents in order to acquire goods, to determine its effects. Clower (1967:4-8) uses a simple exchange model with discrete time periods and market equilibrium being established at the beginning of each period through a

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[2]   Keynes (1937c:214) describes the essence of this uncertainty concept concerning future outcomes as: "About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know."

tâtonnement process. Agents receive an endowment of commodities at the beginning of each period. Commodities cannot be carried over to subsequent periods, other than money which is the only durable commodity and therefore serves as a store of value between periods. The total quantity of money is fixed. Equilibrium prices and quantities once established are irrevocable. He maintains that money in this neo-Walrasian general equilibrium model needs to be reflected as a finance constraint (his term is expenditure constraint) indicating that economic actors need to be in possession of the required amount of money before they can effect an exchange transaction. In this way, he seeks to develop a model in which "*Money buys goods and goods buy money; but goods do not buy goods.* This restriction is – or ought to be – the central theme of the theory of a money economy." (Clower 1967:6).

The result of the finance constraint in Clower's model is that the inclusion of money plays a role only in the restriction of actual trades which are able to take place. It plays no role in the equilibrium set of prices and quantities which is established by the tâtonnement 'auctioneer' at the beginning of the period. The tâtonnement process has already costlessly pre-reconciled all purchase and sale plans with an equilibrium price vector. Clower (1967:7-9) concludes that in spite of the introduction of the finance constraint, the general equilibrium model remains formally equivalent to one operating under idealised exchange of goods directly for other goods (perfect barter). However, money has a restrictive effect: "Demand (and excess demand) functions in a money economy are thus subject to much more severe restrictions than are those of a barter economy – the latter category being interpreted to include all neo-Walrasian models of money and prices." (Clower 1967:9). A model in which money restricts trading rather than improving efficiencies, and plays no part in determining equilibrium values, does not provide an adequate basis for a theory, as pursued by Post Keynesians, in which money plays an essential role.

Rogers (1989:88) points out that both Patinkin's and Clower's arguments are technically flawed in certain respects. He maintains that Patinkin's quantity equation addition to a neo-Walrasian model is similar in principle to the finance

constraint proposed by Clower (Rogers 1989:90). He argues that both writers were traversing barren ground, since the crucial characteristic of a neo-Walrasian model as far as monetary theory is concerned is that it is fundamentally a perfect barter model in which money cannot be accorded an essential role. Attempts have been made to find a role for money in neo-Walrasian models by, for instance, dropping the assumption of a complete array of contingent futures markets, giving rise to temporary equilibrium models, with trading occurring at every date. Rogers finds that in all cases a neo-Walrasian framework is unable to provide a suitable model for money to play an essential role in the economy. He concludes that we need to "resolve the dilemma of neo-Walrasian monetary theory by allowing that theory to disappear." (Rogers 1989:67). In similar vein, Wolfson (1996:443) maintains that "the only appearance for anything remotely financial in Walrasian models is money's role as a numeraire". Clower himself in a more recent paper (1999:399-413) recognises that the quest to incorporate money into a neo-Walrasian framework has continued with alternative approaches, but considers that these have not produced plausible results, and that the route to developing a general equilibrium micro-foundation to monetary theory "is to abandon completely the program of incorporating financial theory into the corpus of neo-Walrasian analysis." (1999:410).

In view of the inability of the general equilibrium framework to allow the plausible inclusion of money in a non-neutral role, Post Keynesians believe that any non-neutral monetary theory needs to be built on an alternative theoretical foundation. The departure point that they consider suitable for a non-neutral monetary theory is the conceptual framework put forward by Keynes (1936), in which there is an essential link between effective demand and the notion of monetary equilibrium which determines the level at which the economy operates (as summarised in Keynes 1936:245-254). In this framework, monetary variables form part of the causal nexus determining real and monetary magnitudes in such a way that the non-neutrality of money is a fundamental aspect of theoretical models used. At the same time, the framework preserves the notions of uncertainty and historical time which are regarded as important

components of a Post Keynesian analysis. It is a framework in which various aspects of money have important consequences to the economy, both real magnitudes and prices, as further taken up in the remaining sections of this chapter.

3.3   Interest Rate

Post Keynesian views on interest rates can best be seen against the backdrop of Wicksellian interest rate theory, Keynes' development of this in the *Treatise* (1930), and the liquidity preference approach together with the marginal efficiency of capital (mec) introduced by Keynes in the *General Theory* (1936).[3] Keynes' innovations concerning interest rates departed from the Classical and neoclassical view of interest as being determined by supply and demand of loanable funds.   In Keynes' liquidity preference approach, interest is conceptualised as "the reward for parting with liquidity for a specified period" (1936:167). The liquidity preference theory is based on the notion that economic actors will adjust their holdings of financial assets (and money) in such a way as to reach, in equilibrium, equality of expected rates of return on financial assets and money held. Keynes expressed the holdings in terms of money balances and government bonds by way of simplification: the bonds category can be expanded to include a wide range of marketable financial assets. Of the three motives for holding money put forward in the *General Theory*: transactions, precautionary and speculative, the latter is directly dependent on the interest rate level in accordance with the preferences of economic actors between holding bonds and money.   In the case of an increase in the interest rate, agents increase their holding of bonds due to the reduction of bond prices, expectation of capital gain, and the higher opportunity cost of non-interest bearing money holding. There is a strong psychological aspect to liquidity preference: Keynes (1936:246-247) regarded the 'psychological attitude towards liquidity' as one of the ultimate independent variables in his analysis. Liquidity preference is also

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[3]   Neo-Ricardians however, although broadly aligned to the Post Keynesian camp, take issue with Keynes' analysis of the rate of interest on the grounds that it is simply a restatement of the neoclassical relationship between natural and market interest rates (Rogers 1989:229-234).

closely tied to perceptions of uncertainty, as explored by Runde (1994:129-144), which underpin the desire of agents to hold generalised purchasing power.

In Keynes' framework, the interest rate determined by the liquidity preference mechanism operates in conjunction with the mec to establish the investment level in the economy. The mec is defined as the expected future return of a capital asset, equal to the discount rate which equates the future income and cost stream associated with the asset to the present capital cost of the asset (Keynes 1936:135). The mec will differ for individual capital assets; the schedule is compiled by ranking capital investments from highest to lowest, giving rise to a downward sloping mec curve in return-investment space. As emphasised in Chapter 1, Keynes' mec schedule is based on entrepreneurial expectations, formed partly through the will to entrepreneurial endeavour, or 'animal spirits' to use Keynes' term, and will shift as expectations change. Such 'animal spirits' in the face of uncertainty are likewise an underlying precept of Post Keynesian thinking.

The crucial contrast to Wicksellian theory that the interaction of interest rate with the mec provides in Keynes' framework, is that the interest rate serves to determine the mec rate at which capital investment projects become attractive for entrepreneurs to undertake. The Wicksellian mechanism is reversed, with the mec tending towards the interest rate level, rather than the interest rate tending towards a natural (real) rate. This was an important component of Keynes' theory of investment and output determination, which could give rise to an output level below full employment level:

> the significant conclusion is that the output of new investment will be pushed to the point at which the marginal efficiency of capital becomes equal to the rate of interest; and what the schedule of the marginal efficiency of capital tells us, is, not what the rate of interest is, but the point to which the output of new investment will be pushed, given the rate of interest. (Keynes 1936:184).

The interest rate does not adjust through economic forces in such a manner as to move the level of investment towards a magnitude which will provide full

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employment in the economy. It is separately determined and may be such as to prevent the economy moving towards full employment for an extended period.

Although Keynes (1936) assumed that monetary authorities act directly on the money supply, which translates to an interest rate through the liquidity preference mechanism, as further considered in Section 3.6 below, Post Keynesians generally view monetary authorities as acting directly on interest rates through a policy rate as instrument, so that the interest rate is considered exogenous in this policy control sense. Moore (1988a:263-270) for instance is very explicit in expressing an exogenous interest rate view. He regards nominal interest rates as being determined by the central bank, as an administered policy variable. It is combined with his view of strong endogeneity of monetary aggregates. Kaldor (1985b:12) maintains that "It is the regulation of interest rates, and not the quantity of money, which … 'is the centre-piece of monetary action.'"[4] Kaldor and Trevithick likewise clearly hold the view of the interest rate being under the control of the monetary authority, for instance "a given stance of monetary policy is best expressed by a chosen rate of interest, and not by a chosen quantity of credit money in existence" (Kaldor and Trevithick 1981:6). Kaldor and Trevithick also hold the liquidity preference view of money demand as propounded by Keynes, for instance, "the distribution of wealth between liquid or illiquid assets is a portfolio decision which depends partly on wealth holders' preferences for liquidity and/or their expectation of the behaviour of interest rates in the future." (1981:11). Rogers likewise stresses the centrality of the exogenous nature of the interest rate, for instance "the fact that the rate of interest is an exogenous or independent variable cannot be overemphasised." (1989:251). Surprisingly, Davidson does not focus significantly on the determination of the interest rate in his major works (e.g. Davidson 1978, 1982, 1994, 2002). He clearly adopts the liquidity preference theory put forward by Keynes - and devotes considerable attention to supplementing it with the finance motive as a fourth motive for holding money. The finance motive is taken up below.

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[4]   Kaldor is quoting these words from the UK Radcliffe Committee report of 1959.

It is thus apparent that exogenously determined short-term nominal interest rates, under the control or strong influence of the central bank, are a key feature of a Post Keynesian monetary view, and that this is regarded as an intrinsic feature of a credit-money economy, rather than an ideal or policy preference. The Post Keynesian view recognises, however, that there are limits within which this interest rate exogeneity must operate (Moore 1988a:266). These depend on the economic circumstances faced by the country, as well as structural characteristics such as the size, degree of openness and government regulatory framework. The limits apply in particular to an open economy, since the interest rate has direct consequences for foreign capital inflows or outflows, as taken up in Section 3.9 below. But even in a closed economy, holding of short-term nominal interest rates at too low a level will result in investment projects being undertaken which are not sustainable in the long run, and to an excessive rate of expansion of economic activity giving rise to demand-led inflation (Moore 1988a:269). Too high a rate would conversely have a severe dampening effect on economic activity and employment. In addition to inflationary/deflationary effects, large and frequent changes in the central bank administered rate are likely to cause severe economic disruption and greater uncertainty since the basis on which entrepreneurs take investment decisions changes significantly and unpredictably. A sound investment decision today may be rendered foolhardy within days or weeks. This similarly applies to transactions in financial asset markets. A central bank is constrained from moving too far from a current interest rate level in too short a time period in order to ensure stability in the financial system.

The interest rate exogeneity view applies, strictly speaking, to short-term nominal rates. However, Post Keynesian writers recognise a fairly strong relationship from short-term rates through the term structure to long-term rates. This is in line with Keynes' view in which long-term rates are determined by expectations of the future path of short-term rates (Moore 1988a:252). Moore appears to regard the relation of interest rates across the term spectrum to the short-term rate as fairly direct, based on weighted expectations of future short rates. Rogers (1989:251),

on the other hand, describes a transmission mechanism from short to long rates which "is somewhat elastic and manipulations of Bank rate to change long rates may not always be effective." The latter is more in line with the Radcliffe Report (1959) which regarded the spectrum of financial assets from short to long term, and with different risk and liquidity characteristics, as being complex and subject to multiple influences. Whether more or less direct, the Post Keynesian view is generally one of causality from short to longer term, rather than short rates varying about a norm or convention in respect of long rates, for instance in the nature of a real rate norm as suggested by Fisher (Moore 1988a:257), but which has been shown empirically not to be valid. Post Keynesian writers, however, recognise a conventional or psychological aspect to interest rates operating in conjunction with central bank determination.   Rogers, for instance, maintains that the interest rate "reflects psychological, institutional and other historical factors which cannot be specified *a priori*." (1989:253).   He distinguishes between transitory and persistent changes in market rates, with the former being temporary fluctuations which do not affect the long-term rate and through it investment. The long rate then has psychological and institutional factors built into it and the monetary authorities need to ensure ongoing confidence in the rate to avoid deviations which could cause elastic expectations with a destabilising result.

3.4   Monetary Equilibrium and Effective Demand

In the Post Keynesian analysis, monetary equilibrium is directly linked to determination of the point of effective demand, giving the level of output and employment at which the economy operates. This is crucial, since it is through the principle of effective demand that Keynes demonstrated the possibility of the economy operating at less than full employment, without there being intrinsic forces to move it towards full employment. In accordance with the previous section, the money rate of interest is regarded as an exogenous-type variable, i_m, based on a combination of central bank determination, convention, psychological and historical factors. The exogenous interest rate gives rise to a particular investment level which balances the marginal efficiencies of assets to the interest rate. This level of investment may or may not be such as to employ

all resources in the economy. But since the investment rate is established by monetary equilibrium, which may be a long-period equilibrium, there are no further economic forces towards asset price changes, interest rate adjustment or investment which will cause either aggregate demand or aggregate supply curve to shift. The economy is therefore confined to this involuntary unemployment equilibrium unless the interest rate changes. At the equilibrium point, there is no incentive for entrepreneurs to expand production of capital due to there being no profit from doing so beyond Marshallian normal profits. Say's Law is broken since additional supply does not create its own demand if it cannot be sold at a profit.

The Post Keynesian mechanism giving rise to the point of effective demand takes place through pricing of capital assets in the fixed capital market. As Keynes pointed out (1936:186), the rate of interest does not equate the demand and supply of new capital investment[5]. Instead, it is the prices of capital goods that bring about equality between the stock of capital goods demanded and that offered. The demand price of a capital good depends on the future income yield that it is expected to generate; the price is given by the future yield discounted at the prevailing interest rate. The supply price, on the other hand, is given by the producing firms' cost functions according to Marshallian short- or long-run analysis. It should be noted that the supply refers to completed capital goods placed on the market, not only to the flow-supply of new capital goods produced. The supply of capital goods can be aggregated from representative capital producing and selling firms, to give a combined supply of existing assets (fixed) and newly produced assets (upward sloping) (Davidson 1994:56-62).

The demand is a downward-sloping curve of functional form:

$$D_k = f (P_k, i, \varphi, E) \qquad\qquad E3.4.1$$

where P_k is the price of capital assets, i the rate of discount, φ the state of expectations about the future profits to be earned (rather than the mec itself),

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[5] Since, in terms of the liquidity preference theory, "the equality between the stock of capital-goods offered and the stock demanded will be brought about by the *prices* of capital, not by the rate of interest." (Keynes 1936:186).

and E the number of entrepreneurs able to obtain the finance required (Rogers 1989:216). The latter three variables are treated as shift parameters in the price-capital schedule. The demand curve shifts to the right when the discount rate, i, decreases. Equilibrium is then determined as the intersection of supply and demand curves in the capital goods market, with the interest rate as a parameter rather than an equilibrating variable.

As indicated above, the mec is a reflection of what entrepreneurs believe to be the likely outcome of their investment decisions in an uncertain environment. Declining entrepreneurial confidence will shift the mec downwards directly, leading to lower investment at a given interest rate. Keynes for instance expresses the state of confidence as a factor determining the mec: "There are not two separate factors affecting the rate of investment, namely, the schedule of the marginal efficiency of capital and the state of confidence. The state of confidence is relevant because it is one of the major factors determining the former, which is the same thing as the investment demand-schedule." (1936:149). The equilibrium in the capital goods market, and consequently monetary equilibrium for the economy as a whole, cannot therefore be viewed as stable even if attained. The equilibrium will always be subject to changing entrepreneurial expectations and confidence. Post Keynesians generally view attainment of equilibrium states as tenuous, and some have argued for economic analysis without use of the equilibrium device (e.g. Kaldor 1985a).

3.5 Inflation

The Post Keynesian view of the inflation process contrasts directly with that of monetarists. Monetarists maintain a causal view of the quantity equation in which increases in the price level are directly and causally related to increases in the money stock. Many pages of Post Keynesian writing have been devoted to attacking the tenets of monetarism (e.g. Kaldor 1985b, 1986; Moore 1988a). Post Keynesians place the primary causal mechanisms of inflation outside the money creation process. Post Keynesian expositions of the inflation process can be found in Davidson (1994:142-163), Kaldor (1978:214-230), Kaldor and Trevithick (1981:16-19), and Moore (1988a:378-381).

Davidson (1994:143) identifies three possible causes of inflation: (1) diminishing returns, (2) increasing profit margins, and (3) increasing money wages relative to productivity improvements:

Diminishing returns inflation refers to the increased costs incurred by firms as output is increased due to the hiring of less-skilled workers and utilisation of older, less efficient capital equipment. The increased marginal costs are passed on in the form of higher prices. Davidson points out that this phenomenon was emphasised by Keynes as "a main reason for rising supply prices before full employment." (1994:143). This form of inflation is unavoidable in the short run if output is increasing under diminishing returns, but may be offset in the long run through improvements in technology, training programmes and increased capital utilisation per worker.

Profits inflation refers to the increase by entrepreneurs of gross profit margins when market conditions render this possible or even necessary. This is related to the degree of monopoly (versus competition) in the market concerned and in the economy as a whole. It is not necessarily related to changes in aggregate demand, though diminishing price elasticity of demand could lead to rising profit margins with output growth (Davidson 1994:144). Kaldor (1978:222) associates higher profit margins with higher rates of capital accumulation, and in turn with income re-distribution towards profit recipients and away from wage earners.

Wage inflation refers to increases in money wage rates which are not offset by productivity improvements, and which, with profit margins maintained, are passed on in the form of higher prices. Although it may be easier for workers to obtain greater wage increases when unemployment is decreasing, this source of inflation, in the view of Post Keynesians, is not tied to changes in the level of aggregate output. Wage inflation is rather related primarily to the entire wage negotiation process which takes place in the economy. In this sense, it can be regarded as institutional in origin. Since wage inflation is considered by Post Keynesians to be the primary cause of inflation, the exposition below focusses on the mechanism of this form of inflation.

Kaldor and Trevithick (1981:16) identify the considerations which predominate when unions present their wage demands in the collective bargaining process as: (a) the desire to preserve the wage level of their members in relation to other groups of workers; (b) the desire to appropriate for their members what they consider a fair share of any increases in their companies' profits; (c) to resist any erosion of the standard of living of their members resulting from unfavourable external events such as a rise in the price of fuel or of imported raw materials. (a) in particular plays a strong role in an inflation spiral. In each wage negotiation round, one or a few groups of workers serve as leading groups due to their favourable bargaining position, which may be the result of rapid productivity growth, profit rises, or increased demand for the skills of the workers concerned. These groups feel entitled to higher wages, and the employers will typically be fairly accommodating to their demands. Other groups, however, perceive the wage differentials between the leading groups and themselves being threatened; they resent the 'leap-frogging' that seems to be taking place. Retaliatory or defensive wage claims are triggered on the part of the other groups. To the extent that wage agreements reached entail wage increases beyond productivity growth, an inflationary process is set in motion.

Kaldor and Trevithick (1981:17-18) maintain that the above wage negotiation spiral is supplemented by the increased prevalence of oligopolies in modern economies. Owing to their dominance in their markets, oligopolies are not forced to pass on the effects of improved productivity to their customers in the form of lower prices. Leading oligopolies are frequently willing to increase wages in line with their increasing output, in order to enhance labour relations, enable them to select better workers to fill vacancies, and to promote a sense of good will and co-operation in the firm. The wage settlements of leading oligopolies set the standard to which other enterprises are placed under pressure to conform. The objectives of trade unions to increase the real earnings of members, maintain relative wage differentials and obtain a fair share in the value added of their employing firm, are not compatible, and are reconciled to the extent possible through wage-induced inflation. The spiral

acquires a momentum due to the differing times and frequencies at which wage settlements take place, together with the discrete intervals at which finished goods prices are adjusted to take account of input costs.

Davidson (1989:149) concurs with the model put forward by Weintraub (1977) which depicts the inflation arising from the struggle over distribution of current income:

$$P.Q = k.w.N \qquad\qquad\qquad E3.5.1$$

where P is price level, Q is real output, w is the money wage rate, N the level of employment and k is a multiple of the wage bill (w.N). This can be expressed as:

$$P = k(w/A) \qquad\qquad\qquad E3.5.2$$

where A is the average physical productivity of labour and w / A is unit labour costs of production. k can then be seen to be the gross profit mark-up on unit labour costs. Inflation takes place through rising unit labour cost as a result of the wage bargaining process (as described above) but *also* as a result of increases in the gross profit mark-up attained by firms which is the figure which determines the allocation of income to capital-owners relative to workers. Weintraub is thus extending the income struggle cause of inflation to include the struggle by the owners of capital to maintain or increase their appropriation of the output of productive enterprise relative to labour.

It should be noted that money supply increases in the Post Keynesian inflation framework are regarded as by and large *accommodatory* in nature. The only effect of money supply changes is through the indirect route in the case of a restrictive monetary stance, whereby economic activity in general is restricted which in turn leads to a climate in which wage demands are less strident and settlements lower through economic necessity. This view is linked to the endogenous view of credit money, in which money supply increases beyond requirements are extinguished through repayment of debt, as taken up below.

3.6 Money Supply Endogeneity versus Exogeneity

The endogenous view of money creation is a major departure from the conventional wisdom of monetary theory as expressed in text books and mainstream writings, and has generated considerable controversy and debate. The conventional wisdom expounded in text books has been along the lines of a high-powered money base determined directly by the central bank, and a money multiplier dependent on the reserve ratio (set by the monetary authorities) together with behavioural parameters which determines the total size of the money stock. Factors such as preferences by households and firms for holding of physical money (notes and coins) and demand deposits are behavioural parameters which vary only gradually over time. These together with the set reserve ratio result in a money multiplier which is stable over time. According to the conventional explanation, therefore, the central bank is able to exercise tight control over the total money supply through its ability to determine the high-powered base and reserve ratio.

The endogenous money view as put forward by Post Keynesians such as Kaldor (1985b, 1986), Moore (1988a, 1989) and Davidson (1994, 2002) holds not only that changes in the money multiplier prevent the central bank from exercising close control over total monetary aggregates, but that the monetary control mechanism itself is such that central banks are unable to control the level of high-powered money. Cottrell (1994a) distinguishes between ways in which money is widely recognised as being endogenous to some degree, and the more deeply held endogeneity view of Post Keynesians. He cites two ways in which money is widely seen as partly endogenous: firstly, where the money supply is regarded as a multiplier times a high-powered money base, the money multiplier may be recognised as being partly determined by portfolio decisions of private sector actors; secondly, the central bank might be regarded as deliberately choosing to effect control of the money supply indirectly through use of interest rates, rather than through direct control, with money demand by the private sector accommodating to the interest rate. Implied in the latter deliberate choice is that the central bank has the option to exercise direct quantitative control of the money supply when and to the extent that it wishes. Cottrell characterises a

Post Keynesian view as going far beyond these two respects of endogeneity, to one in which "the central bank simply does not have the option of exercising genuine quantitative control over the stock of money: the accommodation of the private-sector demand for money, at an interest rate of the authorities' choosing, is not a political choice but a structural necessity in a modern credit-money system." (1994a:597).

The endogenous money view has major implications for economic theory. For instance, Moore (1988a:xv) maintains as a consequence:

> that the entire literature of monetary control and monetary policy, IS/LM analysis, the Keynesian and the money multiplier, liquidity preference, interest rate determination, the influence of public sector deficits on the level of domestic interest rates, growth theory, and even the theory of inflation must be comprehensively reconsidered and rewritten.

It implies shifting the focus from the magnitude of monetary aggregates to the terms on which money is provided, as well as to the flow of credit in the economy as taken up by Lavoie (1984, 1992), Rousseas (1986, 1998) and others. It implies abandoning the view that increases in monetary aggregates are a major cause of inflation. It implies changes in the monetary policy role of central banks and government treasuries. It also has significant implications for monetary issues in an open economy.

As previously noted, Keynes' own view on the endogeneity issue was unclear and has been subject to debate. In his *Treatise on Money*, and other works, the money supply appears to be treated as endogenous. He treats money as predominantly bank money, with the central bank's lending rate having various indirect effects on the volume of bank money (e.g. Keynes 1930:194-197). In the *General Theory*, however, Keynes seems to assume the money supply to be exogenously determined by the monetary authorities. Moore, after examining the evidence in various of Keynes' writings and the development of his views over time (1988a Ch. 8), concedes Keynes' treatment of money as exogenous in the *General Theory*, and offers possible explanations, such as that Keynes

wished to provide every possible concession to 'classical' economists, or that this was a lapse in the direction of his thinking. He points out that Keynes introduced the finance motive for holding money into his analysis subsequent to publication of the *General Theory*, and maintains that the finance motive is the conclusive argument for the endogeneity of the money stock. Moore concludes (1988a:199) that, although Keynes did not put forward a clear and consistent endogenous theory of money: "One cannot help but feel confident that with time he would have succeeded in realising his final and full emancipation from the quantity theory ... ".

The view that the supply of money is determined endogenously rather than exogenously is one of the most readily recognised characteristics of the Post Keynesian school, and places its adherents in sharp relief to those of monetarism. Long and intense debates took place over a numbers of years in the seventies and eighties between economists who became leading representatives of Post Keynesianism (such as Kaldor and Davidson) and leading monetarists, especially Milton Friedman, with the endogeneity/exogeneity issue being one of the primary points of contention. The title of Kaldor's book, *The Scourge of Monetarism* (1986), reflects the depth of difference between the two schools of thought. The endogeneity view is closely tied to the perception of money as being primarily credit (rather than commodity) money. In terms of representation of money supply and demand curves in interest-money space, the endogenous money view entails an elastic money supply function. Post Keynesians such as Moore (1988a) regard the function as necessarily infinitely elastic at the interest rate set by the central bank, but others, for example Minsky (1986), Rousseas (1986, 1998), regard the function as upward sloping, albeit highly elastic (King 1995:66). In a similar graphical representation, an exogenous view of money implies an inelastic money supply function. Complete exogeneity would be represented by a perfectly inelastic or vertical money supply function. Moore coined the terms Horizontalist and Verticalist to depict these two contrasting views, which form the title of his book

examining these issues (Moore 1988a). The term Horizontalist[6] is used in this thesis in Moore's sense. It is the Verticalist view that is adopted by monetarists as well as in the neoclassical synthesis (Moore 1988a:x-xi).

The Post Keynesian endogeneity argument arises largely from the institutional nature of the provision of credit money. Commercial banks provide loans at a mark-up over cost to borrowers who in most cases have pre-arranged facilities (e.g. overdraft facilities). Borrowers are able to draw loan funds at their initiative up to their facility ceilings. The central bank has a lender-of-last-resort function and, although it can institute higher prices and penalties for commercial bank borrowing from its discount window, it cannot in the final instance refuse to provide funds to the banking system without imperilling the financial solvency of the system. Open market sale transactions have the effect of reducing non-borrowed reserves of the banks, thus driving them to the discount window (directly or indirectly through the market for Treasury bonds, Eurodollars and similar). The banks in preference to calling in or reducing their loans provided, bid for any funds needed to meet their liquidity requirements, ultimately from the central bank discount window if necessary.

Moore (1988a), reminiscent of the Banking School real bills doctrine, argues that credit money can never be in excess supply since any excess would simply be used to repay bank credit balances outstanding. The quantity of nominal money demanded in his view is thus always and necessarily equal to the quantity of money supplied (1988a: pxiii). Kaldor adopts a similar view (e.g. 1985b:7-8). Moore examines the workings of the banking system, particularly that of America, to substantiate his contention that central banks cannot and do not control monetary aggregate quantitative variables directly. He draws on empirical evidence or stylised facts, partly of an institutional nature, in support of this claim, including the manner in which the monetary base, multiplier, bank lending and central bank actions and policies are determined. He uses evidence from econometric studies to refute the monetarist proposition that a causal

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[6]   The term is used hereafter without the initial capital, since it is widely used in Post Keynesian writing to depict the indicated view of money supply determination.

relationship exists from money supply aggregates to nominal income. He argues that the endogeneity of money is not merely the consequence of a flexible monetary multiplier applied to an exogenous monetary base: he regards the base itself as endogenously determined. He considers central banks to be faced with an asymmetrical situation: "Central banks always possess the ability to *increase* the base, so as to support any increased nominal volume of bank intermediation. But they in general do not have the same ability to *reduce* the base, and with it restrict the nominal volume of bank intermediation." (1988a:15).

Kaldor (1986:24) maintains that: "In the case of credit money the proper representation should be a *horizontal* 'supply curve' of money not a vertical one. Monetary policy is represented *not* by a given quantity of money stock but by a *given rate of interest*; and the amount of money in existence will be demand-determined." He goes on to argue that the central bank cannot, even in principle, control the quantity of money directly, nor the monetary base. "The Central Bank cannot close the 'discount window' without endangering the solvency of the banking system; they must maintain their function as a 'lender of last resort'." (1986:25). His views on endogeneity are therefore similar to the horizontalist views put forward by Moore as described above[7].

Davidson places less emphasis on the endogeneity issue than Moore or Kaldor, but his view is clearly one of (at least partly) endogenous money: for instance, "under the income generating-finance process, an increase in the demand for money induces an endogenous increase in supply *if bankers are willing and able to expand under the rules of the game* that regulate banking operations." (1994:136). He refers to the monetary authority being able to initiate action to increase the money supply, e.g. "the Monetary Authority can exogenously initiate

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[7] It is interesting to note that Romer (2000:154-161), arguing from a New Keynesian perspective, puts forward an adaptation of the IS-LM framework for examination of monetary issues in which the adapted LM curve, designated the MP curve, is based on the central bank targeting a real interest rate, which likewise reflects a horizontal line in interest-money space and consequent horizontal MP curve in interest-output space. The horizontal curve however results from the policy approach of the central bank, rather than being an inevitable consequence of the nature of the banking system as argued by Kaldor (e.g. 1986), Moore (e.g. 1988a) and other Post Keynesian horizontalists.

action (open-market operations) to induce the public to hold more or less money balances. By bidding up the price of outstanding government debt (lowering the rate of interest), the Monetary Authority makes it profitable for bondholders to sell some government securities and substitute additional bank deposits as an alternative liquid store of value" (1994:136). This appears to be in line with Moore's view of asymmetry in the monetary authorities' actions, whereby they can initiate an increase but not a reduction in money supply through open market operations. Davidson does not, however, spell this out explicitly.

Rogers (1985:243) asserts that, "In Post Keynesian analysis the monetary base does not determine but *is determined by the money supply*. In other words banks can always get the necessary reserves to support whatever level of liabilities they have incurred. The only influence that the central bank has on this process is to alter the price at which these reserves are obtained." He contrasts this with the monetarist view of the direction of causality. He argues that monetary targeting could still be contemplated, primarily through the indirect means of adjusting interest rates, but that such actions could have unpredictable consequences due to money and credit multipliers not being stable. It is clear, however, from the above that Rogers regards the monetary base itself as being endogenously determined.

As indicated, Moore's analysis entails a relatively strong view of money supply endogeneity within the Post Keynesian camp: some Post Keynesians (e.g. Davidson 1994:135-136, 2002:100-102; Dow 1993:32-37; Rousseas 1989:476-478, 1998:109-116; Wray 1992:297-310) regard the money supply as being partly exogenous, partly endogenous. This would imply that the monetary authorities have a degree of influence over monetary aggregates, or control of portions of monetary aggregates, so that it is not purely endogenous. The fiat money component in particular could be regarded as exogenously determined. Money endogeneity issues have been the subject of ongoing debate within the Post Keynesian camp: e.g. the mini-symposium held in 1989, as covered in *Journal of Post Keynesian Economics*, 1989, Vol 11 No 3. They are taken up

further in subsequent chapters of this thesis. It is, however, a characteristic view of Post Keynesians in general that the broad money supply aggregates are not and cannot be directly controlled by the monetary authority, owing to the nature of credit money. The Post Keynesian view is that broad money supply aggregates can only be determined indirectly through the price mechanism of interest rates, with some Post Keynesians, such as those mentioned above as having a 'partly' endogenous view, maintaining that additional influence may be exerted through quantitative measures affecting credit provision, as well as moral suasion and institutional changes. The latter view is explored more fully in Chapter 4.

3.7   Money Creation Process

Post Keynesians do not dispute that there is strong correlation between monetary aggregates and money income, but maintain that causality runs from planned output to money stock rather than vice versa. They regard increases in monetary aggregates in advance of economic activity as explainable by the accumulation of funds to meet planned expenditures in the expansion of production. The Post Keynesian view of money creation is bound to the role which credit-generated money plays in the production process. The nature of the money creation process from a Post Keynesian perspective described below is based primarily on Moore (1989).

Moore's point of departure is to characterise commercial banks as essentially "retailers in the business of selling credit" (1989:11), seeking to maximise their profits through the interest rate spread between their average cost of funds (with funds being mainly in the form of bank deposits) and their average lending rate on bank loans provided. Banks seek to set their average lending rates at a mark-up to wholesale fund rates, and their average deposit rates paid as some mark-down to wholesale rates, so as to achieve a target spread on their total volume of intermediation which will generate their required rate of return on the bank's equity. Moore recognises the additional activities of banks, such as holding of marketable securities as assets, but considers the above to be the essential nature of commercial bank activity in view of its accounting for the bulk

of bank transactions. Banks can then be regarded as two input, two output firms: with the two inputs being retail and wholesale deposits, and the two outputs retail and wholesale loans. Using the deposit and lending rates set through their mark-up and mark-down to wholesale rates, banks accept all cash and deposits supplied, and meet customer loan requests, provided that these comply with their minimum collateral and risk requirements (with credit ceilings being specified for each loan or facility). The result is that, once each bank has set its retail deposit and lending rates, the volume of deposits and lending is effectively demand-determined by bank customers rather than being directly determined by the bank.

In the case of wholesale deposits and borrowing by the banks, individual banks are price takers and quantity setters in a wholesale funds market. Banks use the wholesale market to manage or balance their liquid asset and liability position. Wholesale assets are used to provide a defensive margin to enable banks to meet cash and reserve requirements arising from high deposit withdrawals or demand for loans. Banks have a variety of options in adjusting their wholesale funds position: they can draw down deposits held in other banks, present Treasury Bills for cash instead of for new Bills, borrow on collateral of eligible securities, sell NCDs, Treasury Bills and other term deposits, or borrow central bank funds. Wholesale assets and liabilities are generally readily substitutable between the various forms, enabling banks to actively manage their wholesale funds position on an ongoing basis.

Moore (1989:22) illustrates the workings of the model diagrammatically as follows:
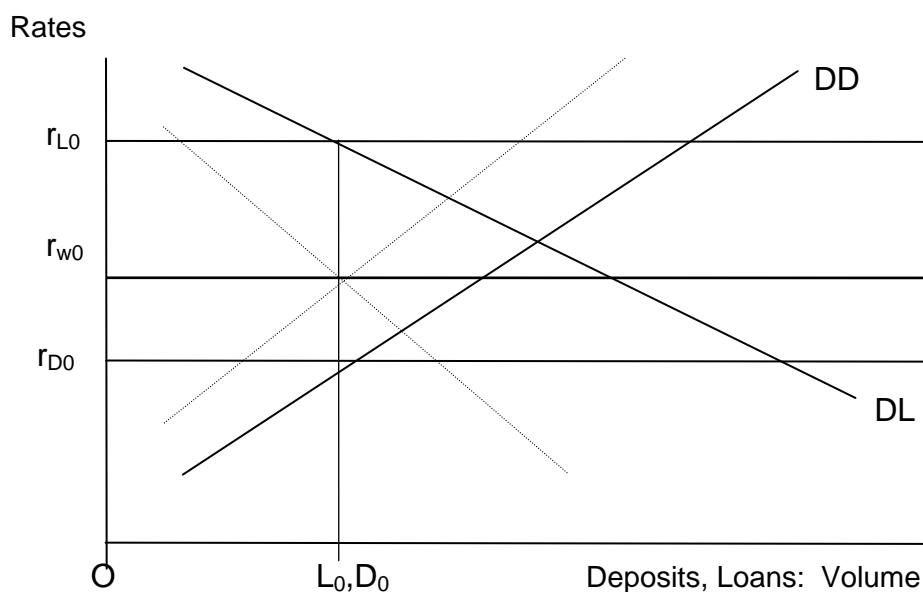
Figure 3.1 Moore's bank intermediation model

He characterises a bank's balance sheet relationship as:

$$R + L + B = D + NW \qquad\qquad E3.7.1$$

where R = Reserves, L = Loans, B = Net wholesale assets, D = Deposits and NW = Net worth. The demand for bank loans in the diagram is represented by DL, the demand for deposits by DD. The banks set their lending (r_{L0}) and deposit (r_{D0}) rates, and the supply curves become the horizontal lines r_{L0} and r_{D0} respectively.

The marginal cost of bank funds is determined in the wholesale market, shown as the wholesale rate r_{w0}. As banks are price takers in the wholesale market, the supply curve for wholesale funds is given by the horizontal line r_{w0}. Profit-maximising banks will seek to set their rates in each market such that marginal revenue is equal to the marginal cost of funds. For profit maximisation, the marginal revenue of providing loans must be equal to the marginal cost of obtaining deposits, and in turn be equal to the market interest rate on wholesale funds. This gives the profit maximising equilibrium in the diagram at which loans and deposit volumes are $L_0 = D_0$.

Within this framework, Moore maintains that the volume of bank loans or credit is determined by demand at the interest rate (price) set by the banks. Deposits in

turn arise from the loans and credit advanced. The demand for loans and deposits are interdependent. This interdependence is enhanced by the practice of liability management, in which deposit vehicles are created or expanded as needed, and on suitable terms, to attract the volume of deposits required to meet the volume of loans and credit advanced. Also reinforcing the demand-driven nature of credit money is the extensive use of overdraft facilities. These entail banks allocating credit limits to their clients which at any one time are only partially utilised. Moore gives evidence (1988a:16) that the volume of overdraft credit allocated but not utilised at any time is of the order of 50% of the total overdraft credit available in America and Britain. This means that bank clients are able to draw down additional credit on demand in accordance with their requirements without reference to the banks. Banks cannot summarily terminate overdraft facilities or call in overdraft advances (let alone term loans) in order to reduce their total volume of lending.

The role that Moore (1988b:374-381) ascribes to the central bank in this model is primarily that of determining the wholesale funds rate. The central bank is not able to reduce or restrict the cash reserves lodged with it by commercial banks in terms of stipulated reserve ratio requirements. This arises from its responsibility for the stability of the financial and banking system of the country. If it were to refuse to meet requirements by commercial banks for borrowed reserves, this would be likely to cause a liquidity crisis in the applicant bank, and this could readily have a domino effect on other banks, leading to a major banking crisis. In practice, Moore argues, central banks may apply penalties and interest rate premiums to discourage commercial bank borrowing from the central bank, but will always provide borrowed funds at some price to stave off a liquidity crisis. This then reinforces their price control role through the interest rate and any premiums or penalty costs applied to borrowing through the discount window. In this way, it is not only the broader money supply aggregates but the high-powered base itself that is endogenous.

The money supply aggregates in the above exposition could be either M1 (notes, coins and demand deposits) or a broader aggregate such as M3 (which includes

in addition time deposits of short and long duration). The arguments apply similarly in both cases. Less clear is the situation of the narrow component of money comprising notes and coins only. It would seem that Moore regards notes and coins in similar vein to the rest of the M1 or M3 aggregate. Notes and coins held by non-bank private parties form part of high-powered money. It is clear that the central bank can exercise direct control over notes and coins available in the sense that their physical issue and replacement is under the control of the central bank. Notes and coins, however, generally constitute only a small component by value of the M1 money supply (around 10%), and a lower proportion of M3. Even if the central bank were to exercise strict control over this component, it would not negate the endogeneity argument in respect of the M1 or M3 money supply as a whole. A central bank could allow the issue of notes and coins to be determined by the technical demand to meet transactions and cash holding requirements, even if it is seeking to exert control over the broader money supply, on the basis that notes and coins are a relatively small and stable component. Thus even a monetarist might concede that the notes and coins component of the money supply is frequently endogenous in practice, but this would not affect the substance of the argument in either direction concerning the broader monetary aggregates.

3.8   The Finance Motive

Keynes introduced the notion of a finance motive, as an additional cause for the holding of money balances over and above the transaction, precautionary and speculative motives, only after publication of the *General Theory* (1936) and in response to criticisms received of his theory of interest (Azimakopolous 1991:109). He put forward the notion in three short articles in 1937 and 1938 (Keynes 1937a, 1937b, 1938). It appears that, in Keynes' mind, the finance motive was a relatively minor amendment to his liquidity preference theory, which did not alter its essential nature (Tsiang 1980:468-477). Certain Post Keynesian writers, however, regard the finance motive as a crucial link in the analysis of money holding when investment levels are changing, and in explaining the creation of credit independently from saving. Davidson in particular regards the money demand function as being miss-specified without

the autonomous component provided by a finance motive (e.g. 1994:124, 2002:96-100). Rousseas (1986, 1998), Moore (1988a) and Dalziel (2001) treat the finance motive as an essential element of a Post Keynesian monetary theory.

The finance motive refers to the liquidity-preference of entrepreneurs with a view to meeting planned business activity. It relates to the liquidity required in advance of entering into forward contracts for new production or for the acquisition of new capital goods to be produced. The finance motive becomes crucial when the general level of economic activity is increasing or decreasing (Davidson 1994:122). If output is unchanging over time, the requirement for liquidity to meet ex ante business activity will be provided by the release of liquidity as payments are effected for previously planned business activity. The business activity referred to covers investment in particular, but may also include any other forms of autonomous expenditure (Keynes 1937b). The increased demand for liquidity to meet the finance motive occurs prior to the additional employment and income being generated. Keynes saw his initial omission of the finance motive as a deficiency in not taking into account the effect of ex ante output on money demand, as against the effect of ex post, realised output.

Davidson (1994) considers the inclusion of the finance motive to be of material significance because it renders the demand for money no longer directly proportional to output, but dependent in a more complex way as "a function of a function of current output" (1994:125). A demand for money function relative to output would need to be drawn with a positive intercept on the money axis, rather than as a 45^0 line through the origin, showing dependence on the autonomous component of ex ante expenditure. This implies an income elasticity for money balances of less than unity along the entire money demand function, contrary to the monetarist assumption of unitary elasticity. It offers a ready explanation for the empirical finding that short-run income elasticities of money demand are less than unity, as an alternative to the permanent income hypothesis put forward by monetarists. It also underpins the interdependence of the real and monetary sectors of the economy, which can be shown with an

IS/LM curve analysis in which the (re-specified) LM curve shifts when the IS curve shifts so that the final outcome of a movement of either curve is not readily apparent (Davidson 1994:129). Davidson (2002:99) maintains that "The inevitable conclusion of the correctly specified liquidity preference analysis (to include the finance motive) is that the money-contract-based, entrepreneurial system in which we live cannot be dichotomised into independent real and monetary subsets."

The finance motive provides a counter to any empirical evidence that the monetarist school may offer that money supply increases have occurred prior in time to output increases, thereby implying a causal relationship from money to output. The finance motive implies that money supply increases can occur in advance of output increases without being the cause of the latter. It is rather entrepreneurial expectations, together with ex ante decisions to invest and produce in accordance with the expectations, that can cause an increased money supply in advance of economic activity. The finance motive also emphasises the importance of banking and financial institutions in the expansion of economic activity (Davidson 2002:100).

As indicated in Chapter 1, Keynes (1930:217) made the distinction between Industrial and Financial circulations, the former referring to bank deposits used to meet physical investment and business activity, the latter to those used to meet acquisition of financial instruments. The liquidity demands within the two circulations need not be closely related and the financial circulation could be far more volatile due to speculative movements in the holding of financial instruments. The finance motive, however, applies to both circulations. This has the implication that increased speculative activity in financial markets could be met through the banking system accommodating the finance motive of speculators in much the same ways as for increased physical investment and business activity. If the banking system is such as to readily accommodate the liquidity needs of expanding (real) economic activity, it may equally serve to fuel speculative activity.

Perhaps the most vital characteristic of the finance motive is that it represents a fully autonomous increase in demand for money based on future expectations rather than any change in current economic variables. The fact that such an autonomous increase in money demand can, in the Post Keynesian view, be met by the banking system without necessary recourse to the central bank implies that the banks can play a major role in expanding the money supply without this being subject to control by the monetary authorities. The provision of money to meet the finance motive is separated from saving, either current or resulting from the additional business activity being financed. The finance motive adopted by Post Keynesians appears to go further than Keynes' original intention to reinforce his argument that interest rates are determined by liquidity preference effects rather than as a price equilibrating supply and demand of loanable funds. It supports money supply endogeneity arguments, at least in the banking system portion of the monetary chain, as well as having implications for the financing of economic expansion and for the fuelling of speculative financial activity. The ready availability of unutilised overdrafts in the banking system, as referred to by Keynes and emphasised by Post Keynesians (e.g. Moore 1988a), enables the finance motive requirement of entrepreneurs to be more easily and rapidly met, and reinforces the endogeneity and related credit-money provision views.

3.9   International Flows

Davidson (1982, 1994) and Dow (1986, 1993) sought to put forward a Post Keynesian monetary theory concerning international financial flows. This serves as a counter view to the "global monetarism" which is prevalent in the neoclassical synthesis (Dow 1986:237). The Post Keynesian theory emphasises the impact of monetary variables on the real domestic economy at any stage of the business cycle. Whereas a monetarist view maintains a sharp dichotomy between fixed and flexible exchange rate regimes, with flexible rates enabling exogenous money supply determination by the domestic central bank, the Post Keynesian view finds little difference in end result across the fixed-flexible exchange rate spectrum. The Post Keynesian view finds international flows generally to be a contributor to economic instability in the domestic economy.

Davidson (1982:97) identifies three adjustment mechanisms which are put forward in orthodox trade theory as tending to correct trade imbalances. They are (1) the real wealth mechanism, with the monetary approach to the balance of payments being a variation of this (2) the neoclassical relative price mechanism and (3) the 'Keynesian' foreign trade income multiplier mechanism. The real wealth or monetary approach, put forward by monetarists, postulates that trade deficits are always and only the result of an excess in real monetary balances in the domestic economy. They assume that there always exists a price vector which ensures simultaneous clearing of all markets, that the general price level, including prices of exports, increases in the economy with excessive real monetary balances, and hence that relative price movements between exports and imports will lead to a re-balancing of the two, thereby eliminating the trade deficit. Equivalent reasoning is applied to a trade surplus. The relative price movements have the effect of increasing the real wealth held by the (temporarily) surplus country at the expense of the deficit country, but with total international wealth unchanged. Adjustments according to this view therefore take place through relative pricing without any significant effect on (overall) real economic variables, with the proviso that exchange rates are fully flexible to allow price movements to occur through market forces.

The neoclassical relative price mechanism relies on a variant of the 'price specie flow mechanism' of classical writers whereby an outflow of specie (gold) or international reserve assets from deficit to surplus country results in relative price adjustments, either directly or through devaluation by the deficit country of its currency. Provided the Marshall-Lerner condition, in which the sum of elasticities of demand for imports and exports of the trading partners exceeds unity, is met, the relative price adjustments would eliminate the trade deficit without reducing the combined real national income of the two countries.

The mainstream Keynesian foreign trade multiplier mechanism assumes an income effect in the surplus country resulting from the increase in imports of the deficit country. Provided that the marginal propensity to import is equal to or greater than the marginal propensity to consume in each country, the income effect in the surplus country will result in an increase in its imports which will at

least offset the original increase in imports of the deficit country. The interaction of these marginal propensities to spend in the two trading partners would have an equilibrating effect on the trade balance between them.

Post Keynesian writers are critical of all three orthodox mechanisms as being based on unrealistic assumptions (e.g. Davidson 2002:151-158). The monetary approach *assumes* that excessive domestic money supply creation is the sole underlying cause of the trade deficit, and that the imbalance can always be resolved through flexible prices and exchange rates. The neoclassical relative price mechanism takes no account of income effects of exchange rate changes and *assumes* that there is strong cross substitution between goods across trading partners; it does not take into account the high proportion of goods in most economies which are not internationally tradable. The foreign trade multiplier mechanism *assumes* that marginal propensities to consume and import in each trading partner are such as to create offsetting trade balance effects. This is unlikely in two trading partners, and even less likely in a multinational trading environment. It is also possible that marginal propensities to spend are endogenous variables which are affected by trade imbalances and could have a destabilising rather than stabilising effect on the trade imbalance. The mechanism simply *assumes* that the magnitudes of propensities are such as to have a stabilising and equilibrating effect.

The Post Keynesian view of international flows extends Keynes' concept of liquidity preference to the open economy[8] and allows effects of monetary variables on real economy magnitudes. The exposition below covers fixed exchange rate and flexible exchange rate cases separately before drawing together the strands of both. It is of course recognised that exchange rate regimes lie along a continuum of which fixed and flexible rates are the extremes.

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[8] Hawkins (2003:99) for instance, in examining international flows from a Post Keynesian perspective, maintains that "the existence of international monies exacerbates the domestic effects of liquidity preference." This occurs as a result of liquidity preference being exercised over a range of international currencies.

In an open economy with fixed exchange rates, the provision of finance in the domestic economy is enhanced by an overall balance of payments surplus and diminished by a deficit, unless countervailing action is taken by the monetary authorities (Dow 1993:64-65). If expectations of income and profitability growth in the domestic economy are high relative to the rest of the world, both domestic and foreign investors will buy additional domestic financial and real assets and sell foreign assets. This increases the provision of credit in the domestic economy as well as the elasticity of provision relative to the expected returns. Domestic borrowers are not constrained by the financial capacity of the domestic banking system, as in the case of a closed economy. Funding for investment can be met by reducing foreign asset holdings as well as by decreasing idle balances of domestic money. These changes in asset holdings from foreign to domestic are undertaken without significant financial risk since the central bank serves as market maker at the specified fixed exchange rate. Assets can once again be converted from domestic to foreign at the same exchange rate at any future date that the asset holder chooses. The interaction between liquidity and productive asset acquisition operates in a manner similar to that in the closed economy, but with provision of financing, and liquidity preferences, occurring across international borders. This implies a vastly greater pool of funds being potentially available to finance asset acquisition in the case of favourable relative returns as well as wider alternatives for the holding of liquid funds (money or idle balances). It also implies the availability of credit in the domestic economy being outside the control of the monetary authorities (if indeed they are able to exercise any control over credit in the closed economy case). Foreign funding inflows will tend to supplement domestic funding during upswings in the business cycle, where perceived marginal efficiencies of capital on real investments are greater than prevailing domestic interest rates. This will have the greatest effect at the end of the upswing when financing is becoming constrained (markets congested), serving to extend or prolong the final stages of the upswing (Dow 1993:65-66). Conversely, foreign funding outflows during the downswing of a business cycle will tend to extend and prolong the lowest portion of the cycle since the removal of liquid funds from the domestic economy delays the point at which short-term interest rates have fallen sufficiently for investment once again

to start rising as a result of the mec being above the interest rate (Dow 1986, 1993; Davidson 1982).

The above effects will be dampened by measures which the domestic monetary authorities take when foreign reserves fall to unacceptably low levels or increase excessively. Monetary authorities will seek to alleviate low foreign reserves through increasing domestic interest rates to attract short-term foreign capital or through direct arrangement, or encouragement, of foreign borrowing. This excludes, of course, the more drastic actions of foreign exchange controls which would need to be separately considered. The analysis could be extended by treating the effect of the trade balance, short-term capital and long-term capital flows separately. Short-term capital flows are influenced primarily by interest rates, whereas long-term capital flows are influenced primarily by expected returns on physical investment (the mec). This can result in short-term and long-term capital flows partially offsetting one another over certain stages of the business cycle. The mec may improve through a positive trade balance increasing actual and expected returns on physical assets, in the form of greater export earnings, especially relative to import costs.

In the case of purely flexible exchange rates, net international financial flows are assumed to be fully eliminated through the immediate adjustment of the exchange rate, so that the balance of payments has little direct effect on the nominal money supply. The real value of the money supply is, however, affected through appreciation or depreciation of import prices through exchange rate changes. Domestic liquidity is also affected through differences in maturities of assets which are being bought or sold by foreigners: purchase of domestic long-term assets by foreigners with contemporaneous sale of short-term assets, or purchases by domestic residents of foreign bank deposits, would leave the overall balance of payments (and exchange rate) unaffected, but would affect the domestic liquidity structure. These two indirect effects on the domestic economy are strongly influenced by expectations of exchange rate appreciation or depreciation (Dow 1993:67-68).

Expectations of expansion in the domestic economy encourage purchase by foreigners of domestic medium- and long-term assets, which results in appreciation of the exchange rate. Anticipated further exchange rate gains lead to further purchases of the domestic currency, to be held speculatively or for conversion to domestic longer-term assets. The indirect effect of increasing the real value of the money supply contributes to this process being pro-cyclical. When the domestic economy is close to its expected peak, sale of longer-term assets for currency results in increased monetary demand. The currency appreciation and its attendant indirect effects are thereby extended. As the currency is sold for a foreign currency, however, downward pressure is exerted on the exchange rate: with expected further exchange rate weakening, "as imports rise relative to exports, a massive short-term capital outflow can be expected …" (Dow 1993:68). With a reverse process occurring for the purchase of longer-term assets as the economy draws out of a trough, exchange rate depreciation is extended. Over the course of a business cycle, this view of international currency effects indicates an accentuation of the cyclical movements, with sharper upswings and declines.

Dow (1993:67) maintains that, in the case of a largely self-sufficient economy, the trade and short-term capital flows tend to offset long-term capital flows over the course of the cycle. The rise in nominal short-term interest rates in the later stages of the upswing, lasting through to near the middle of the downswing, is likely to attract short-term capital inflows and encourage a continuation of exchange rate appreciation. Similarly, low interest rates prevailing well into the upswing will result in short-term capital outflows to practically offset longer-term inflows. This leads Dow to the view that international flows under flexible exchange rates have pro-cyclical effects and increase the scope for instability across the business cycle. Davidson (2002:178) further maintains that more flexible exchange rates lead to greater financial currency speculation, which "tends to encourage expanding international capital flows relative to production and trading payment flows."

The Post Keynesian view therefore finds that international monetary flows tend to increase instability in the domestic economy, with this being the case under a fixed or flexible exchange rate regime (though more so in the latter case), and by implication any dispensation between the two: "the general statement may be that economic openness increases the scope for instability." (Dow 1993:70). In both cases, international funding flows tend to be restricted when most needed in the domestic economy, and more readily available when least needed. Although Post Keynesians generally view the money supply as already substantially or entirely endogenous in the case of a closed economy, the Post Keynesian analysis of the open economy case indicates additional sources of domestic monetary expansion or contraction outside the control of the monetary authorities. If a partial exogeneity view is held in the closed economy case, this is eroded to the extent that the economy is open, through international monetary flows, under fixed or flexible exchange rate regimes. The international monetary flows, as with domestic money, have significant and enduring effects on the real domestic economy.

3.10 Monetary Policy Variables

The implication of an endogenous theory of money, together with an interest rate determined by convention or exogenously by the monetary authorities, is a reversal of the key policy variables as viewed by monetarists and many neoclassical economists. The money supply or money stock (by any defined aggregate) is no longer a key monetary variable over which close scrutiny and control by the central bank is imperative, as in the monetarist view. Whereas monetarists see growth of monetary aggregates as directly causally connected to inflation (through time lags) as well as a potential source of economic instability, Post Keynesians view monetary aggregates as passively adjusting to the demand for money and credit according to interest rate levels, investment activity and income. The level and growth of monetary aggregates are thus taken off centre stage in a Post Keynesian policy view as being neither controllable by the authorities nor crucial in any economic causal chain. This is not simply a matter of a reduced empirical relationship between monetary aggregates and economic activity: it is rather a consequence of endogenous

money, "a logical necessity rather than a policy choice." (Palley 2006:245). This should not, however, be seen as diminishing the importance of money in the Post Keynesian scheme: the existence and attributes of money remain crucial. It is simply that other aspects of money are regarded as most appropriate for policy intervention purposes.

In Post Keynesian monetary policy analyses, the interest rate takes centre stage as being both controllable by the monetary authorities and a key determinant of the level of investment activity and other economic expenditure through which, in terms of the principle of effective demand, the economy can be brought closer to full employment. The central bank is regarded as exercising monetary policy primarily through the level of interest rates, using as its instrument variable its discount rate, and any penalty premiums applied, at which the banking system can obtain borrowed reserves (taking account of foreign reserve holdings, especially in the case of a small open economy). This operates in conjunction with the reserve requirements placed on commercial banks, as well as open market operations conducted by the central bank. The central bank has its primary effect on short-term rates through use by commercial banks of discount window borrowing, but can also have an effect on the interest rate structure (yield curve) through open market operations and other financial market activities.

Post Keynesians deny the causal validity of the quantity theory and place virtually no role with monetary aggregates in combating inflation. With inflation regarded as largely an institutional phenomenon through the money-wage contracting process, anti-inflation measures are not considered as the appropriate sole or core focus of central bank policies. Combating inflation instead becomes at least partly the responsibility of executive government (in particular the Treasury or Ministry of Finance, with co-operation from other ministries). This places Post Keynesians in direct opposition to monetarists in respect of policy prescriptions for combating inflation. In the Post Keynesian view, "the fight against inflation cannot be left to independent central bankers." (Davidson 2002:254).

The principle of effective demand, together with the view of entrepreneurial expectations as being subject to a variety of influences under conditions of uncertainty and therefore unpredictable, places investment as an important policy-related variable in the Post Keynesian framework. This raises the possibility of state involvement either to stabilise investment, or to adopt measures to bring the level of investment closer to a full employment level. Keynes referred to the 'socialisation of investment' as a policy option which he favoured (Keynes 1936:378). He had in mind that his would be achieved through the route of fiscal policy, but monetary policy could play a significant role, as taken up in subsequent chapters.

Although the money supply as a whole, whether broad (M3) or narrow (M1), is not an important policy variable in the Post Keynesian framework, importance is accorded to the extension of domestic credit to the private sector. This is not generally regarded as a direct control variable[9], being largely demand driven, but serves as an indicator of new credit generation in the economy, which in turn is a medium of transmission for monetary policy actions to the economy. It is a variable to be monitored, both at aggregate level and in respect of its changing composition. It also holds the possibility of monetary policy influence which could be used to improve the functioning and stability of the economy, also taken up in subsequent chapters.

Again contrary to monetarist and neoclassical views, the exchange rate of the country's currency is regarded as potentially a policy variable in a Post Keynesian framework. The typical monetarist or neoclassical view is that the exchange rate is best left to find its own market level under a freely floating exchange rate system. The Post Keynesian view is that the exchange rate should be either set, and adjusted when necessary, under a fixed exchange rate system, or strongly managed, with the level and adjustments to it being determined by appropriate monetary policy for the circumstances of the

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[9]   Rousseas (1998:128-133) however provides an example of Post Keynesian argument in favour of selective, direct credit controls. This is taken up further in Chapter 4.

economy, and in support of other economic policy measures (Davidson 1994:236-239). The exchange rate is therefore regarded as an important monetary policy instrument under the control or influence of the central bank, in conjunction with other aspects of monetary policy. Davidson (2002:235-236) suggests that, within a revised international financial architecture, exchange rates be guided towards levels that "maintain the relative efficiency wage parities among nations."

3.11 Concluding remarks

A Post Keynesian monetary framework provides a theoretical departure point in which monetary variables are tightly linked into the real economy through a variety of channels and mechanisms. Monetary equilibrium is aligned to the point of effective demand as conceptualised by Keynes. Investment is influenced by interest rates through an mec schedule, which lends itself to more in-depth analysis than that originally put forward by Keynes. Inflation is regarded as far more closely linked to institutional factors in the economy than to monetary aggregates or monetary policy instruments, contrary to monetarist views. Money supply aggregates are regarded either as fully endogenous, determined by demand rather than central bank control, or largely endogenous, with the central bank having no more than a limited influence. The money creation process is viewed as commercial bank centred, as argued by Moore (1989), with banks able to create credit-money in response to demand for lending. The finance motive, as originally suggested by Keynes but elaborated on by Post Keynesians, is regarded as a link between money holdings and investment expenditure. International flows are not neutralised by exchange rate adjustments in the Post Keynesian analysis, even where exchange rates are fully flexible, so that such flows have effects on monetary flows and aggregates in the domestic economy and through these on real economic activity.

This is a more complex world from a monetary theory and policy perspective than that under monetarist or neoclassical assumptions. Interest rates become crucial for monetary policy purposes, not only for assisting in attaining inflation rate objectives, but for exercising influences in various ways on the behaviour of

the real economy, including the level of investment activity. Although money and credit generation may well be largely endogenous through the role of banks in response to demand, the central bank may nevertheless have the possibility of exerting a wide array of influences through interest rates as well as through its engagement in open market transactions and exchange rate management actions. This leads to consideration of interest rate as well as money and credit flow effects which could occur within a Post Keynesian theoretical framework of the monetary system, and in particular alternative possible channels through which monetary variables could affect investment through the banking system. These are examined in the next chapter.

CHAPTER 4

CREDIT STRUCTURES IN MONETARY TRANSMISSION

4.1 Introduction

Minsky (1982, 1986, 1997) is most closely associated with the notion of financial instability which can arise systemically from the credit structure of the economy. Minsky in particular, and other economists sympathetic to this notion, fall generally into the Post Keynesian view of how a modern economy operates. Since the credit structure of an economy is closely associated with the monetary system, it is pertinent to investigate the possibility that the credit structure of the economy could be a significant factor or channel in determining investment, both in itself and in the transmission of monetary policy. Minsky maintains that the changing credit mix itself contains forces which can lead to severe financial crises. But this surely indicates that, even outside periods of crisis, the credit structure is likely to be a factor in relating monetary variables to investment. This chapter commences with examining the work of Minsky and other writers developing the credit structure and financial instability thesis further (e.g. Dow 1986, 1993, 1996a; Chick 1997; Carvalho 1997; Kregel 1997) to determine what the implications of these ideas are for the relationship of monetary variables, and monetary policy instruments in particular, to investment. Various Post Keynesians, such as Lavoie (1984, 1992, 1996a), Rousseas (1986, 1998) and Davidson (1986, 2002), emphasise the importance of the flow of credit, and the implications of this is examined. Allied to this is consideration of credit rationing by Post Keynesian writers such as Dow (1993, 1996a) and Wolfson (1996). These analyses serve as a departure point for examining additional Post Keynesian concepts relating to the role of credit structures in determining economic behaviour. The ideas of Rousseas (1986, 1998), Davidson (1989, 1991, 1994, 2002), Wray (1992), Howells (1995), Palley (1996b, 1996c, 2006), Dalziel (2000, 2001) and Chick and Dow (2002) on the effects of credit structures on investment are pertinent, and these are drawn together to provide a basis for further analysis. The role of bank liability structures and the implications of the 'revolving fund' allied to Keynes' finance motive are examined, as are the effects of foreign flows, which have become increasingly significant

over the past two decades. The chapter explores the manner in which the credit structure in the economy, and the flow of funds as it alters, can best be taken into account in a model relating monetary policy to investment, drawing on the analyses of Post Keynesian writers concerning monetary issues.

As indicated in Chapter 3, the strong endogenous or horizontalist view of money held by many Post Keynesians is viewed by those holding it as having as its counterpart that monetary policy influence occurs entirely, or almost entirely, through interest rate channels. The key policy interest rate is thereby the focus of monetary policy, with recognition given to its influence on other interest rates, together with possible additional influences on the spread of interest rates on alternative financial assets which the monetary authorities could exert through market transactions. Post Keynesians such as Moore who hold a strong endogenous view of money would subscribe to such a view of interest rate centrality. Their essential argument is that, if money holding through credit provision is entirely demand determined, then it is only price variables (i.e. interest rates) that can influence that demand. However, the various concepts and analyses put forward in this chapter, still drawn or synthesised from leading Post Keynesian writers on monetary issues, have implications that monetary influences through the financial system are not confined only to interest rate influences. The key monetary policy interest rate is still regarded as the core instrument for effecting monetary policy, but the strong endogenous money view would be regarded by Post Keynesian writers not holding this view as a simplified characterisation of a more complex reality. By seeking to explore a more comprehensive and nuanced consideration of monetary effects through the financial system, taking into account the credit structure in the economy, the possibility of quantitive[1] influences in addition to interest rate influences arises. The nature of such possible quantitive influences is explored in this chapter, and, provided these are plausible, they are taken forward for further examination and empirical testing in the following chapters.

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[1] To ensure clarity where applicable, the word quantitive is used to convey quantity-related as contrasted with price-related, in preference to the word quantitative, which is frequently used in the sense contrasted with qualitative.

4.2   Minsky, Instability and Credit Provision

The work of Minsky (1982, 1986, 1997) provides an important extension of the Keynes and Post Keynesian view of the economic world as being inherently subject to instability, through its monetary and financial structures.   Minsky developed the thesis that instability is bound into the very nature of a capitalist economy through its financial system.   This means that episodes of economic recession or depression will inevitably occur from time to time in a capitalist economy as a result of the operation of the financial system, and that such episodes require suitable government policies and interventions to reduce their severity.   Minsky's financial instability thesis entails monetary variables having a major impact on the real economy.   It is at complete variance with a neoclassical view that an economy will tend towards a stable equilibrium if market forces are allowed to operate freely and in the absence of continual shocks or disturbances.

Minsky (1982:73-79) adopts the Post Keynesian recognition that investment is determined in a capital asset market according to the supply price of existing capital assets, the flow-supply price of newly produced assets (investment) and the demand price of capital assets resulting from the expected profit (quasi-rent) stream arising through their productive use.   The latter depends on the interest rate which is used to determine the present capitalised value of capital assets.   The extent of new investment depends on the relation of demand to supply prices of capital assets: assets with a flow-supply price above the demand price will not be produced, i.e. the investment will not take place.   Minsky (1982:65) develops his argument on the basis that "the ability to debt finance new investment depends upon expectations that future investment will be high enough so that future cash flows will be large enough for the debts that are issued today to be repaid or refinanced."   Minsky (1986:191-195) formulates the capital asset supply and demand curves to reflect borrowers and lenders risk. Borrowers risk arises from the uncertainty on the part of the borrower as to whether the profit yield from the asset will materialise as expected.   Lenders risk relates to the uncertainty on the part of the lender as to whether interest and loan repayment will be made in accordance with agreed lending terms.   Greater lenders risk increases the supply price of capital assets since the cost of lenders risk is incorporated into the supply price, greater borrowers risk decreases the

demand price. The intersection of the risk adjusted curves gives the price at which capital assets are acquired. Minsky (1986:183-190) distinguishes between internal funds (generated within the enterprise) and external funds (raised from outside parties, typically in the form of bank borrowing). A prevailing combination of interest rates, profit expectations and perceived risks will justify a particular level of external funding by a representative enterprise.

To continue the argument, Minsky (1986:206-208) distinguishes between hedge financing, speculative financing and Ponzi financing. Hedge financing is such that expected cash flows from deployment of the capital asset acquired are sufficient to meet both interest and principal repayments in each period over the duration of the financing. With speculative financing, a shortfall in cash flow yields is expected in some periods, but is expected to be made up in others, so that the financing is fully repayable from yields of the capital asset over the duration of the financing. Under Ponzi financing, yields are insufficient to meet interest and principal payments over the duration of the financing arrangement, so that additional financing will be required at some point to meet the repayment commitments of the initial financing arranged. Whereas entrepreneurs and bankers may enter into financing arrangements on a responsible basis according to the economic circumstances and information available at the time when the financing is provided, these circumstances can and do change over time. Under stable conditions, most financing will fall into the hedge and speculative categories, with Ponzi financing restricted to cases where entrepreneurs mislead bankers, or where investment projects are not adequately assessed. However, an increased interest rate beyond expectations, or other unanticipated adverse economic changes, can lead to hedge financing becoming speculative financing, and speculative financing becoming Ponzi financing. The higher the proportion of Ponzi financing in the economy, the more prone is the financial system to crisis or catastrophe.

Minsky's argument goes further than this susceptibility to adverse economic changes. He argues that fully rational and responsible financing behaviour by bankers and entrepreneurs can build up the conditions for a crisis. This occurs because bankers are reliant on repayment records of the past for determining

the terms and extent of financing provided, and profit yield expectations of entrepreneurs are likewise influenced by recent past experience. During relatively stable or growth periods, the risk perceptions of both parties steadily decrease, and the profit yield expectations of entrepreneurs increase, leading to greater leniency in the terms on which financing is provided. As leniency increases, there inevitably comes a time when a significant number of enterprises are not able to meet repayment requirements, even in the absence of other negative changes in the economy, and this can trigger a financial crisis: enterprises try in vain to obtain additional financing, are placed in liquidation, having negative repercussions for their creditors, with further liquidations, leading to a downward spiral through reduced confidence on the part of bankers and entrepreneurs for further investment and its financing. There is a significant element of self-fulfilment in these processes through changing expectations, which may be best reversed through government intervention, in accordance with the policy prescriptions associated with Keynes (1936). Kregel (1997:547) describes this in terms of decreasing 'margins of safety' occurring through the banks' credit evaluation process: "Hedge, speculative, and ponzi financing positions at current interest rates may all have the same flows of cash commitments, but they will have different margins of safety to protect them from probable changes in future interest rates and increasing future payment commitments."

Minsky's thesis is one in which the financial system of a capitalist economy carries within itself the seeds of crisis. The source of instability lies in the nature of entrepreneurial investment and its financing by the banking sector. Hart (1992:2-4) distinguishes between this view of incipient instability and that of Rogers (1989:267-271) which he refers to as potential instability arising from key monetary variables (e.g. interest rates) being conventional rather than determinate in nature. The difference is perhaps more one of emphasis than of theoretical viewpoints, since both regard uncertainty as fundamental and instability as being ever-present. Both regard the instability as arising in the interaction between monetary variables and investment behaviour. For both, investment behaviour of entrepreneurs is subject to uncertainty and precarious expectations, as in Keynes (1936), and is closely bound to the monetary system

in such a manner as to result in instability which can lead to crises affecting monetary as well as real sectors of the economy. Both consider that this instability needs to be recognised and addressed by adoption of appropriate institutional structures and policy measures.

4.3   The Flow of Credit and Credit Rationing

The flow of credit aspect of money is emphasised by several Post Keynesian writers, notably Lavoie (1984, 1992), Carvalho (1997), Moore (1988a, 1989), Davidson (1986, 2002) and Rousseas (1986, 1998). Essential points that they seek to convey are that money arises as a result of the provision by banks of credit, that it is created as part of the process of production through firms' requirement to pay factors of production, that it is best understood as income-money and credit-money (Lavoie 1984:772-776, 791) rather than holding of money stock. The emphasis in considering monetary issues is thereby placed on the asset rather than liability side of banks' balance sheets, and 'money' as conventionally defined is regarded in the light of a stock residual which is an end result of the monetary generation process. The flow-of-credit concept highlights the dynamic aspect of credit-money creation, rather than the bank balance sheet end result. Lavoie (1984:775) relates the flow-of-credit concept to the Post Keynesian claim that investment determines saving rather than vice versa, since it is the provision of additional credit to firms that is the spur which enables new investment activity to take place. Davidson (1986:101-106) analyses the credit flow process in depth to show how it enables investment to be generated through finance in advance of saving obtained for the ongoing funding of the resultant capital. Lavoie (1984:789-791) also regards the flow-of-credit concept as being essential to the incipient financial instability posited by Minsky (1982, 1986). Since "firms are always requiring banks to create new loans", an over-extension of credit "forces firms that went too far in their commitments to ask for additional loans in order to pay back those that have just expired. When banks refuse to finance these roll-overs, there is an impending crisis …" (Lavoie 1984:790).

Minsky's thesis suggests that there could be a variety of mechanisms through which the lending behaviour of banks, and hence the flow of credit, transmits

monetary circumstances to real economic effects. Credit rationing by banks would be one of these (Lavoie 1996a:283-284). Dow (1996a:497-507) provides an account of how bank lending behaviour is likely to result in credit rationing, with the degree of rationing being pro-cyclical. Dow introduces the notion that it is 'creditworthy' demand for borrowing that is met by banks, and the 'creditworthy' assessment is based on bank perceptions of risk under conditions of uncertainty. Not only do bank perceptions of risk shift over time, so that borrowers assessed as creditworthy at a point in time may well with identical characteristics be assessed as not creditworthy at a subsequent time, but the shifts will tend to exhibit systematic patterns linked to the phases of the business cycle. Dow (1996a:500-502) uses an adaptation of Minsky's framework to illustrate the functioning of this credit variation process in expansionary and contractionary phases in business activity. The effective supply-of-credit curve varies with the degree of perceived risk, which increases during the contractionary phase of a cycle, so that the effect is pro-cyclical. This is compounded by the banks' concern for the value of collateral securing their loans; collateral values are revised downwards during the contractionary phase. On both counts, banks engage in credit rationing behaviour which directly constrains credit provision and aggregates[2], even though credit and money could still be considered as broadly endogenous (demand determined), in the sense that they cannot be directly controlled by the monetary authorities.

Wolfson (1996:443-470) puts forward a theory of credit rationing based on Post Keynesian assumptions, which he contrasts with a New Keynesian theory based on the asymmetric information concept. In the latter theory, the borrower has a known probability distribution for the risks relating to the project to be undertaken. The borrower may however not reveal this to the lender, so the lender is faced with additional risks, including moral hazard on the part of the borrower (delinquent or unanticipated perverse behaviour[3]) and adverse

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[2]   Credit rationing is also contemplated in mainstream economic writing: Blinder (1987:327-352) for instance provides such an analysis, based on the theory of imperfect information. He finds that "credit rationing enhances the power of monetary policy …".

[3]   Wolfson (1996:449) uses the term 'moral hazard' in Keynes' (1936:144) sense, which he quotes as "voluntary default or other means of escape, possibly lawful, from the fulfilment of the obligation".

selection (higher interest rate leading borrowers to choose riskier projects). There is of course an extensive theory relating to asymmetric information, associated in particular with Stiglitz (e.g. Stiglitz and Weiss 1981) and Bernanke (e.g. Bernanke and Gertler 1990), in which both price (interest rate) and quantity rationing of credit occur as a means whereby lenders maximise their returns in the face of incomplete or defective information.[4] The Post Keynesian approach needs to bring in the notions of uncertainty and expectations, and Wolfson (1996:450-451) puts forward the concept of asymmetric <u>expectations</u>. Under endemic uncertainty, borrower and lender will in general have differing expectations concerning the outcome of a project, even if information is not asymmetric. Borrowers will only put forward projects to the lender for funding if they expect a favourable outcome (unless they deliberately seek to mislead!), so lending will be limited to those projects where both borrower and lender hold expectations of a favourable outcome. Wolfson argues that lenders form expectations based on various conventions, together with the assumption that the existing state of affairs will continue (hence they expect borrowers with a good repayment record historically to continue similarly). Further, the expectations will be held with varying degrees of confidence over time, so that the lender may become more stringent towards the same or similar borrowers as macroeconomic factors change. This is the phenomenon put forward by Minsky as the primary cause of endogenous financial instability.

From these arguments and observations relating to the operations of banking institutions in practice, Wolfson maintains that both interest rate and quantity rationing of credit occur under a Post Keynesian view of the monetary system: "If a bank's state of confidence in a particular borrower or class of borrowers falls, it will increase both the price and nonprice terms of lending." (Wolfson 1996:464). The former occurs through banks charging higher interest rates to borrowers which it considers to have higher default risk, the latter through the banks only providing loans to borrowers in which it has a minimum level of confidence (i.e.

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[4] Rotheim (2006:307-327) provides a further critique of the New Keynesian approach to credit rationing from a Post Keynesian perspective.

for which its assessed risk is below a maximum which it sets). So, in Wolfson's analysis, there is a notional demand curve for borrowing, based on the expectations of borrowers, and a second (lower) effective demand curve which is based on expectations of those borrowers which lenders consider 'creditworthy' i.e. which are within its maximum risk expectation level. At a particular average interest rate, the difference between the two curves gives the degree of credit rationing.

Adopting the notion of credit rationing in the monetary policy transmission process to investment has significant implications. One is that monetary policy effects of a quantitive nature can in principle occur through any influence on the degree of credit rationing taking place on the part of banks. A second is that policy interest rate effects may be considerably stronger than would be implied by cost-of-capital changes experienced by borrowing firms undertaking investment projects. Studies which show that investment behaviour is relatively inelastic to changes in the cost of capital (such as those cited by Bernanke and Gertler 1995:27-28) would not then imply that it is similarly inelastic to monetary policy interest rate changes: the latter could have significant effects in addition to the cost-of-capital route through changing the degree of credit rationing and consequently the extent of new borrowing obtained for investment purposes. Related to these at a theoretical level is that neither credit provision nor money supply can then be viewed as fully endogenous, in the sense of being purely demand determined at the interest rate charged by banks for credit provision. There would be both an increase in interest rates charged as additional borrowers are added of a higher (bank-) expected risk level, and an ongoing shortfall of credit provision relative to borrower demand, in which the shortfall may vary as a result of factors other than the policy interest rate. Recognition of the occurrence of variable credit rationing is therefore not compatible with a horizontalist view of money and credit, and entails alternative analytical approaches, such as those contemplated by Dow (1996a) and Wolfson (1996). This places such writers at variance with those holding a horizontalist view, such as Moore (1988a, 1988b, 1989) and Kaldor (1986), even though both groups are adherents to Post Keynesian thinking.

4.4   Financial Asset Structure

Although the role of credit flows was highlighted above due to its centrality in linking monetary variables to the economy as viewed by most Post Keynesian writers, the financial asset structure in the economy, especially that of banks, is nevertheless a possible arena for examining causal mechanisms and monetary effects.   The financial asset structure and changes to it have become increasingly complex in modern economies as a result of a wide range of financial assets, with differing maturity, return and risk characteristics, as well as provision of lending to firms and households, being available to banks in such a way that substitutions or transfers between asset classes can be undertaken on a continual basis. Banks must of course meet minimum cash reserves and liquid asset holdings stipulated by the central bank as well as capital adequacy requirements based on risk weightings of asset classes, and meet other prudential requirements, but large changes in asset holdings are possible while complying with these requirements. A question to be explored for the purposes of this thesis is what monetary policy effects are transmitted to the financial asset structure, and in turn what effects the asset structure of the banking system could have on investment by firms.

Wray (1992:297-308) analyses the financial asset behaviour of banks in terms of liquidity preference, where "the liquidity preference of banks can be satisfied by high-powered money." (1992:301). He regards liquidity preference as a theory of asset choice across the entire spectrum of assets held (1992:304). He views banks as always using a combination of price and quantity effects in their lending activities, with a variety of means by which credit rationing takes place. Although he regards central banks as placing financial stability before any other goals in the final instance, he does not take this to imply that they always and fully accommodate the needs of banks for high-powered money (1992:307), but rather that they "operate with a wide range of discretion in constraining reserve growth" (1992:308). He explicitly places himself as not holding a horizontalist view, though regarding money as broadly endogenous, but having an upward sloping supply curve with respect to the interest rate. He is an example among Post Keynesian writers of advocacy of a combination price-quantity approach to monetary effects from monetary authorities through the financial asset structure

of the banking system, as taken up further below.

Dow (1996a:497-504), in a clear departure from a horizontalist view, portrays monetary policy effects through the financial asset structure of banks using a liquidity preference approach, and this is elaborated on in Chick and Dow (2002:587-607). The liquidity preference operating is applied to the financial asset holdings of banks, as with Wray's (1992) and Lavoie's (1999) analyses mentioned above, and covers the entire portfolio of asset holdings of banks, from cash reserves to long-term advances. Palley (1996c:112-117) likewise provides an analysis of bank financial asset portfolio management using a liquidity preference approach in which "banks actively manage their asset and liability positions …" (1996c:112). Bank adjustment of financial asset holdings results from their changing liquidity preference over time, both through their own risk perceptions and in response to monetary policy changes and actions. Credit rationing serves as one device that banks use to alter their financial asset holdings. Chick and Dow (2002:590) regard banks and monetary authorities as jointly playing a role in credit and money supply determination through bank financial asset holding. Quantitive effects on credit provision and monetary aggregates may occur even where there is no conscious quantitive policy objective on the part of the central bank.

Stipulated requirements to hold cash reserves and liquid assets is a direct mechanism through which liquidity preference (in this case mandatory) affects the financial asset holdings of banks. Chick and Dow (2002:595-597) use an aggregation of banks' balance sheets, in which there is a level of deposit liabilities which can be supported by the current bank holdings of cash reserves[5] and liquid assets. In addition to cash reserves and required liquid assets, the financial assets of banks can be categorised into other liquid assets, securities/investments and advances (lending). A demand curve for advances, at the banks' lending rate (i_A), may be such that, if it were met, the resulting deposit liabilities would be such that they would exceed the level compatible with

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[5]   In most countries, these comprise bank vault cash and bank deposits with the central bank, for which the central bank stipulates a required minimum percentage to eligible deposit liabilities.

cash reserve and liquid asset holdings. Banks need to act in order to comply with central bank stipulated minimum percentages and to ensure the banks' own liquidity requirements are met (whichever is the greater). Banks may in this circumstance restrict new lending through credit rationing to ensure that deposit liabilities do not become excessive relative to the liquid portion of their assets, or may seek to borrow reserves from the central bank discount window at its normal (Bank or repo) or penalty rate, to meet the extra demand for advances. Banks could also meet the demand for advances by selling securities (e.g. bonds) to maintain the total financial asset level (and consequent deposit liabilities) in line with cash reserves held. The sale of securities by banks to non-bank parties reduces deposit liabilities in the banking system, offsetting the deposits created through advances. Effectively, this substitutes advances for securities in the asset holdings of banks while maintaining the total level of assets and deposit liabilities unchanged. A proportion of advances will be in respect of new investment activity, so such a portfolio change in bank asset holding would be likely to affect investment.

The framework put forward by Chick and Dow (2002) provides a means of examining the effects of monetary policy actions on the financial asset structure of the banking system[6]. Chick and Dow give consideration to this in the actually prevailing monetary regime in Britain, applicable at the time of their writing in 2002. The cash reserve requirement is minimal, but cash reserves must at least be sufficient to cover clearances through the central bank on a daily basis. The cash reserve ratio is not used as an instrument of monetary policy, but serves to ensure that the key policy interest rate, the repo rate, takes effect in the market in accordance with central bank policy decisions. In the framework posited by Chick and Dow (2002), monetary policy occurs primarily through changes in the repo rate, but there are additional channels of monetary policy operating through the financial asset holdings of banks: "banks must ensure the liquidity of their portfolios, and there is a range of assets of varying degrees of liquidity from

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[6]   Dow (2006:35-51) provides a discussion of the context of Post Keynesian monetary theory in which Chick and Dow (2002) is placed.

which to choose." (2002:591). The actions of monetary authorities may thereby have both interest rate and quantitive effects. Chick and Dow identify open market operations in particular as having quantitive effects: "Open market operations … can add a quantity effect to combine with the price effect of a rise in the repo rate." (2002:605). Although the analysis of Chick and Dow (2002) is based on the economy of Britain, the essential elements of the analysis are likely to be applicable to most modern-day economies, and in particular to South Africa, where a repo system has been in operation from 1998 and changes in the cash reserve requirement are not used as an active instrument of monetary policy.

Open market operations could have a range of quantitive as well as interest rate effects through bank asset holding adjustments, based on a liquidity preference or similar theory of asset holding. The central bank may trade in a wide spectrum of financial assets, from gilt-based repos to local authority bonds to Treasury bills in the case of Britain (Chick and Dow 2002:603-604). Assuming an open market transaction occurs directly with clearing banks, a sale of securities by the central bank has the immediate effect of decreasing the cash reserves of the banks. The banks can borrow through the repo system from the central bank to supplement cash reserves, with the possible (eventual) consequence of an increase in the repo rate arising from the central bank reaction to increased discount window borrowing. Banks may also be subject to 'frown costs' on the part of the central bank, whereby perceptions by the central bank that a bank is operating too leniently in its extension of credit (particularly relative to other banks) lead to the bank becoming reluctant to request additional discount window borrowing. Alternatively, banks can make adjustments to their financial asset holding by selling assets of one class or another, or reining in new credit advances through credit rationing (or calling in certain advances where the terms allow), so as to compensate for the open market transaction effect on their cash reserves. These actions may have quantitive effects on the financial asset level of banks, or interest rate/yield effects on the asset class realised if the sale of financial securities rather than curbing of advances is pursued. Banks can of course adopt a combination of central bank (repo) borrowing and reduction of financial securities and advances, so the effect of the open market transaction

could vary from primarily an interest rate effect through to primarily a quantitive effect, and the central bank may not be able to predict accurately which response combination will be adopted by the banking system. To the extent that quantitive effects occur on total financial assets of banks (through reduction in securities plus advances), these will translate into quantitive effects on deposit liabilities and hence on monetary aggregates (such as M1, M3). The above process applies similarly to an open market transaction which increases cash reserves and provides banks the opportunity to repay repo borrowing to the central bank or to expand one or other class of financial asset.

The adjustment combination adopted by banks will depend on the risk and earnings expectations held in respect of securities such as Treasury bills and bonds, and of credit provision. Under expansionary economic conditions where the perceived default risk applicable to advances is low, the downward adjustment is likely to take place on securities, with a greater likelihood of drawing on central bank discount window borrowing. Under contractionary conditions, downward adjustments are more likely to take place on advances. Open market operations may also have the effect of leading to shifts from advances to securities holding or vice versa, which result in a change in portfolio composition of the financial assets of banks: "Through substitution between advances and investment, banks can manipulate the liquidity of their portfolios according to their needs for liquidity and earnings." (Chick and Dow 2002:591). Open market operations can thereby give rise to changes in financial asset composition as well as in the level of financial assets, and both could have implications for investment behaviour in the economy. They could also affect relative interest rates across the maturity spectrum of financial assets according to the shifts in asset holding occurring and consequent demand shifts between alternative securities.

Public debt management holds the possibility of affecting the financial asset structure of the banking system in a somewhat similar manner to open market operations, though a major difference is that payments by the Treasury only constitute high-powered money, as do the payments of the central bank, if they are effected from accounts held with the central bank. A second difference is

that public debt management is more frequently concerned with long-term bond issues or redemption, which is likely to affect the financial asset structure of banks over a sustained period, in view of the long maturity of the financial instruments. In many countries, South Africa included, the central bank is given a mandate to issue and manage certain financial instruments on behalf of the Treasury, so that these can be co-ordinated in conjunction with other monetary policy measures. A further device to enable monetary policy measures to take place is the holding of bank accounts by the Treasury with private sector banks rather than with the central bank (Tax and Loan accounts). This has a stabilising effect on monetary flows in that tax and other receipts by the Treasury remain as bank deposits with commercial banks. Transfers to or from a Treasury account with the central bank can then be made as an explicit monetary policy action, which changes non-borrowed cash reserves. These change cash reserve holdings of banks in a similar manner to open market operations. Public debt management needs therefore to be taken into account in contemplating monetary policy effects on investment, in a somewhat similar manner to open market operations, in view of its interaction with the monetary system.

The above conveys the essential nature of the types of mechanism that could occur through level and composition adjustments by banks of their financial asset structure. Although exploring the implications of the financial asset structure in conceptual terms, the existing literature does not take this framework the further step of expressing it in specifically formulated algebraic terms, nor is the link to investment portrayed. This thesis seeks to spell out a formalised algebraic portrayal of monetary effects through the financial asset structure of banks, based on the above notions, as part of the multi-faceted symbolic model of monetary effects developed in the next chapter.

4.5 Liability Structure of the Banking system

The liability structure considered here refers to the liability composition in the combined balance sheets of commercial (clearing) banks. In the above sections, this was generally subsumed under the umbrella term 'deposit liabilities'. However, the balance sheet liabilities of banks comprise a wide range of deposit forms with differing degrees of liquidity, maturity and interest rates applicable.

Demand deposits, or cheque/current accounts, are one component of this, though important in being widely considered as fully liquid 'credit-money' or 'bank-money'. Time deposits of varying maturities, from weeks to a few years, are an extension to this fully liquid money in that demand deposits can be converted by holders to time deposits of a range of alternative maturities at their discretion. These then become liquid on reaching maturity. It is this notion of convertibility between maturities that leads to the broader, more inclusive definitions of money to include categories of near-money (e.g. Gowland 1991:23-26). But it is conceivable that shifts in the composition of these liabilities, and therefore in the composition of 'money' in its broad definition, could be influenced by monetary policy actions which ultimately affect investment expenditure.

Consideration of the bank liability structure, and hence monetary aggregates, brings to the fore possible similarities with a monetarist approach. The common ground is the recognition of monetary aggregates as a possible transmission medium (channel) in the economy. However, the monetarist view holds that there is a grouping of monetary assets (physical cash and bank liabilities) within which there is ready interchange between asset holding, with a marked step between this grouping and other financial assets. It further maintains that this monetary asset grouping has direct effects on spending and prices. It is for this reason that monetarists focus on quantitive control of such a monetary asset grouping. The consideration of the bank liability structure here is more nuanced, being viewed as a virtual continuum from highly liquid demand deposits to illiquid long-term deposits. There is no assumption of a single, sharp dividing line from an economic agent's perspective between less liquid bank term deposits, non-bank term deposits, bonds, equities and even tradable physical assets. This means that 'ripple-through' effects between asset classes are potentially a factor to be considered, and direct transmission from a monetary aggregate to spending, though not ruled out, is not assumed to be the central mechanism through which monetary effects occur. The approach is closer to the portfolio analyses pursued by Tobin (e.g. 1965b) than to the monetary aggregate-spending relationships typically explored in a monetarist framework.

Cash reserve and liquid asset requirements stipulated by the central bank clearly entail a link from bank liability composition to the composition of their asset holdings. The stipulated requirements are typically specified as a percentage of defined eligible liabilities, which include non-government demand deposits as well as time deposits of up to an indicated maturity (for instance 24 months) [7]. Changes in the level of eligible liabilities can occur through changes in the composition of bank liabilities, as a result of net payments by private parties to or from government accounts held with commercial banks (e.g. tax payments and bond repayments), or shifts in the maturity of time deposits. These composition changes increase or reduce the proportion of bank liabilities designated as eligible liabilities. These liability composition changes translate into increased or reduced reserve requirements which banks need to meet on the asset side of their balance sheets. This could lead to banks altering their rate of loan advances, which would be one of the means by which they could adjust to changes in required reserves. They could of course also meet reserve requirements through sale of securities to reduce deposit liabilities, or could increase their level of central bank discount window borrowing.

A second possible link from bank liability composition to asset composition would arise from the portfolio management processes within banks for their own purposes. Each bank seeks to manage its asset composition relative to its liability composition in such a manner as to attain desirable profit levels, without incurring too great risk through asset default or through having insufficient liquidity to meet deposit withdrawals (Vickers 1985:167-170). A shift in the maturity composition of liabilities towards greater liquidity, implying higher levels of demand deposits both immediately and in the near future as short-term time deposits mature, would be an influence on bank portfolio management in shifting asset composition towards greater liquidity. This would typically entail a shift from loan advances towards securities holding, and from lower to greater

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[7] Some countries have removed minimum cash reserve requirements in recent years: Dow (2006:36) cites Britain, America, Canada and New Zealand. Banks are nevertheless required to hold positive clearing balances.

liquidity or shorter maturity in the securities held. The reduction in loan advances could have an effect on investment. This second possible link, although plausible, occurs through the internal management processes of banks, so is not subject to direct influence by the monetary authorities. It is highlighted since it may nevertheless need to be considered in conjunction with the first link described above, in interpreting the empirical analysis of Chapter 6.

Both of the above linkages occur through their effects on the composition of bank asset holdings. The adoption of 'liability management' approaches by banks would entail some degree of reverse influence also occurring. Under liability management, banks would deliberately seek to modify their liability composition in order to enable them to attain a desired asset composition. Moore (1989:12-16) maintains that liability management gives banks considerable scope for sustaining an asset composition of their choice, and uses this to support an argument for strongly endogenous credit and money generation. Goodhart (1989:29-33) however maintains that the variation in asset structure achievable through liability management is limited, and that historically much of liability management arose as a result of structural changes in the monetary system. Liability management, to the extent that it gives greater latitude to banks in determining their asset composition, could be viewed as a countervailing force to the two linkages from liability to asset structure mentioned above, though is unlikely to be strong enough to nullify those linkages.

With the Post Keynesian view of bank deposit liabilities being largely originated through bank credit advances, the question arises of how deposit liabilities are brought into accord with the demand by agents to hold bank money balances. The adjustment process could have a bearing on the manner in which the liability structure has an effect. (Moore 1988a:371-376, 1988b:382-383) posits that increased deposits constitute 'convenience lending' in which agents accept whatever money balances eventuate from bank advance activity[8]. Lavoie

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[8] This has some parallels to the 'buffer stock' notion of money holding put forward, amongst others, by Laidler (1984:17-34) within a monetarist framework. Under the 'buffer stock' view, monetary aggregates serve to absorb positive and negative fluctuations of a stochastic, difficult-to-predict or unpredictable nature in the short run, and adjust towards an equilibrium level over a period, so that there may be

(1999:103-113) contemplates this possibility, together with a reflux principle in which excess balances are extinguished through repayments of credit. He maintains that a reflux mechanism is fully plausible and likely to be the primary mechanism. The reflux mechanism is essentially that put forward by Kaldor and Trevithick (1981:1-19) and which has its historical underpinnings in the work of Tooke (published in 1848) and the Law of Reflux of the Banking School in the nineteenth century, described in Chapter 1 of this thesis.

Lavoie (1999:106-108) examines various categories of economic actors to show that in each case reflux is able to occur. In the case of businesses or individuals who have credit advances from banks, such as overdrafts or flexible repayment term advances, using excess money balances to reduce these advances is readily possible and likely to occur in view of the interest saving attained. The case of actors who have no such advances is more difficult to argue, and in fact led to Howells (1995:89-105) relegating the reflux mechanism to a secondary role. Howells posits a less direct mechanism through changes in relative interest rates to bring about the portfolio shifts necessary to indirectly adjust the level of money holdings to that desired by actors. Lavoie (1999:105-107) fully accepts that such interest rate changes and portfolio effects could, and probably do, occur. He (1999:107-108) nevertheless maintains that actors having excess money holdings and no bank indebtedness are likely to engage in asset portfolio shifts, whereby they acquire bonds, debentures or similar financial assets in place of the excess money holding. Whether the shift is to new issues, or to existing instruments which increases demand for such instruments and leads to new issues, an indirect process occurs through which excess money holdings are transferred to actors (generally firms) which do have bank indebtedness which it is rational to reduce through repayment of excess money holding. Lavoie (1999:111-112) maintains that the reflux mechanism operates directly for

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disequilibrium between money demand and supply in the short run. To the extent that money holding enables economic actors to endure such fluctuations at lower cost than obtaining information to better predict the fluctuations, the holding of money becomes a substitute for information (Laidler 1984:19).

the most part, but even where it cannot operate directly, that it nevertheless occurs indirectly through the portfolio shift process.

The operation of a reflux mechanism, even indirect, suggests that holders of bank deposits do exercise their preferences in determining the composition of bank liabilities. This would imply that the liquidity preferences of bank liability holders are a significant factor in liability composition, rather than banks being able to pursue credit advances and asset holdings of their choosing, on the basis that any resulting level and composition of deposit liabilities will be voluntarily held. The process of adjusting deposit liability holding through a reflux mechanism would also have some effect on bank asset composition in that the resulting 'reflux' could occur either as credit repayments or as payments for purchase of securities held by banks. In so far as monetary policy measures affect liquidity preferences on the part of the non-bank public, this could therefore have an effect through banks' liability composition to banks' asset and credit advance behaviour.

4.6   The Revolving Fund for Investment

The revolving fund which forms part of bank liabilities in accordance with the finance motive described by Keynes subsequently to the *General Theory* (1937a:241-252) is considered by many Post Keynesians to play a role in the analysis of monetary effects on the economy, as indicated in Chapter 3. As portrayed by Keynes (1937a:241), the revolving fund arises in conjunction with the finance motive in the form of liquidity accumulated to meet planned (ex ante) investment expenditure, though would apply also to other autonomous expenditure. In the Post Keynesian view, in which investment expenditure takes place prior in time to the saving that is generated to meet it, it is the revolving fund provided by the financial system that serves to bridge the time difference or 'interregnum' period between investment expenditure and the generation of saving of equivalent magnitude (Pollin and Justice 1994:280). Although financing accumulated for investment is continuously released as the investment expenditure takes place, so that the revolving fund could remain constant in equilibrium if investment expenditure remained constant, the revolving fund needs to increase each time the level of investment expenditure in the economy

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increases, in advance of the actual expenditure taking place[9]. In the event of a reduction in investment level, there are likewise monetary consequences through the revolving fund. Writers such as Davidson (1978, 1986, 1994, 2002), Rousseas (1986, 1998), Moore (1988a) and Dalziel (2001) give considerable focus to the revolving fund and its implications.

The essential operation of the revolving fund occurs in conjunction with the multiplier described by Keynes (1936:113-128), first introduced by Kahn (1931). Using Keynes' simplifying assumption that the multiplier effect takes place in a single period, this occurs as follows. Firms initiating the production of capital assets (investment expenditure) accumulate (through corporate saving) or borrow funds in advance to meet such expenditures, in the form of money balances. These in aggregate constitute the revolving fund. The firms make payment to factors involved in the production of capital goods during the investment process. These payments constitute income in the hands of the factors. A portion of this income is spent on consumption in accordance with the marginal propensity to consume, the remainder is retained as saving. The consumption expenditure portion becomes income to other factors, and this recurs through the multiplier process, to the extent that voluntary saving becomes equal to investment expenditure ex post. On the assumption that the saving retained, initially as money not spent, is used to acquire equity (shares) in the new capital stock formed, the money is thereby returned to the firms initiating the investment. The firms use this money to effect repayment of advances obtained prior to and for purposes of the investment: "The entrepreneurs repay the proceeds, … which re-establishes the initial liquidity positions of the banks and entrepreneurs." (Kregel 1986:95). In this way, the money balances become once again available to be used for further investment expenditure. If it is assumed that the acquisition of equities also occurs in the same time interval, the change in equity value is equal to the value of the investment undertaken.

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[9]   It is a 'revolving' fund in the sense that it is being continually replenished and redrawn as the investment process proceeds.

The process brings voluntary saving and additional equity to equality ex post with the investment undertaken.

Although the revolving fund forms part of the money supply, and is an element of deposit liabilities reflected in clearing banks' balance sheets, it is not identifiable in that it cannot be distinguished from deposit liabilities held for other motives. Although useful for conceptual purposes in the Post Keynesian exegesis of monetary behaviour (for example in arguing against the use of the LM schedule in macroeconomics), its lack of a clear referent in financial magnitudes renders it of little use for specific, empirically testable relationships and models. The question could also be raised of what degree of influence it could exert over investment under a Post Keynesian framework in which the money supply is entirely or largely endogenously determined in accordance with the demand for credit and money balances. Under a horizontalist view, credit extension and money stock would expand to meet the need for the revolving fund as well as other motives for the holding of money. Under a view of money as not fully endogenous, the Post Keynesian framework still places the primary emphasis on credit provision, so that the revolving fund would only be restricted indirectly to the extent that credit provision is constrained. In the Post Keynesian framework, monetary policy measures influence credit-related flows and magnitudes, and monetary magnitudes on the liability side of banks' balance sheets are a secondary consequence of the credit related effects. The revolving fund therefore, in the context of this thesis, needs to be noted as forming part of the monetary conceptual scheme put forward by various Post Keynesians (most notably Davidson e.g. 1978, 1994, 1986, 2002), but is unlikely to constitute a significant component of a model of the link between monetary policy actions through the financial system to investment in the economy.

Davidson (2002:126-129) in any event emphasises the revolving fund in the context of liquidity preference by non-bank transactors. His argument is concerned with the changing liquidity preference of such transactors. If there is a shift towards greater liquidity preference on the part of these transactors generally, this could occur to the detriment of liquidity held in the revolving fund, which could constrain investment: "In sum, an excessive demand for liquidity by

the public can restrict expenditures on new capital goods even if the public proposes to be sufficiently thrifty out of a given level of income to maintain the warranted rate of growth." (2002:128). He therefore advocates monetary leniency by the authorities under such circumstances. Implicit in this is the assumption that monetary authorities have some influence on monetary aggregates, even though this may be indirect. It would be an argument against a monetarist view in which a pre-determined growth rate of the money supply is advocated, since a shift in liquidity preference could render the consequent money supply insufficient to meet expansion of the revolving fund, with a constraining effect on investment. Davidson's policy advocacy in this instance is at the broad level of not restraining money or credit expansion when this could curb investment unnecessarily, and even providing additional liquidity pre-emptively, rather than relating specifically to the revolving fund as a link between monetary policy measures and investment.

4.7 Foreign Capital Flows

As covered in Chapter 3, a view of international flows in the Post Keynesian mould entails significant effects on the domestic economy under either fixed or flexible exchange rate regimes, or a combination of the two extremes in the form of a managed float. Price effects of relative exchange rates do not produce continuous adjustments to maintain domestic equilibrium as assumed under a neoclassical or monetarist view. This has the implication that foreign flows into or from the domestic economy may have material and sustained effects. Capital flows, and short-term portfolio flows in particular, can have both money supply effects and asset-liability portfolio effects in the domestic economy. This applies most strongly when there is an increase or decrease in the net foreign reserves position of the country (a substantial portion of which is held by the central bank). Even where the central bank engages in stabilisation transactions through open market operations to neutralise monetary base effects, there may nevertheless be portfolio effects which occur regardless.

An illustrative example is the case of a net inflow of foreign financial capital, mainly for the purchase of government bonds, which is in excess of any current account deficit and therefore increases foreign reserve holdings. The inflow occurs in the form of a transfer of foreign currency to domestic banks, who

exchange it for local currency in a transaction with the central bank, thereby increasing the central bank's foreign reserves. The central bank has paid high-powered money into the domestic banking system for the foreign currency. The bank at this point has a deposit liability in local currency held by a foreign resident, and increased cash reserves in its asset portfolio. If not neutralised by the central bank, these cash reserves can be used to expand advances or to purchase financial assets according to the financial judgement and circumstances of the bank. As the increased cash reserves constitute high-powered money[10], the eventual money supply effect of expanding advances could potentially be a multiple of the foreign capital inflow. If the central bank seeks to neutralise the monetary effect, it sells securities (say government bonds) to the banking system (or non-bank parties) through open market operations. This can indeed withdraw an amount of high-powered money equal to the foreign inflow from the banking system. But the asset composition of the banks may be altered (compared to before the foreign inflow) depending on the nature and maturity of the securities sold by the central bank. This may trigger asset portfolio adjustments on the part of banks, so the consequence of the foreign inflow will still not be entirely neutral. The closest the central bank could reach toward neutrality would be if it sold to the banking system securities which are the same or similar in nature and maturity to those which the foreign resident purchases, on the assumption that the purchase is made from a bank. But the central bank does not have a basis through which to determine this with any degree of precision in view of the large numbers of purchase and sale transactions occurring in the financial markets. Such a foreign capital inflow thus always has some effect on the domestic monetary system, even if this is confined through sterilisation measures undertaken by the central bank to an asset portfolio effect. This applies similarly to capital outflows which reduce the holding of net foreign reserves.

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[10]   The term high-powered money, referring to the money of the central bank itself, which includes bank deposits with the central bank as well as fiat money (notes and coins) held by banks and non-bank parties, is widely used synonymously with 'monetary base'. However, the latter term may be used in the more restricted sense of central bank deposits held by clearing banks to distinguish it from the broader definition of high-powered money.

Flows which have no net effect on the holdings of foreign reserves have a lesser impact on the domestic monetary system. This is the situation for instance with a foreign capital inflow which exactly balances a current account deficit. The net flow is nil, the central bank's position is unaltered, and the effects are confined to the differences in the nature of transactions in the commercial banking system itself. The current account deficit results from trade and similar transactions, so that operating money balances of companies are exchanged for foreign currency which is used to effect payment to foreign suppliers. The capital inflow however, although initially placed as a money balance (deposit liability) in the banking system, will generally be paid thereafter to a bank or non-bank party in exchange for securities of some form (e.g. government bonds). This could have some influence on the asset portfolio structure of the domestic economy, and of the banking system in particular, if the foreign inflow for this purpose is significant relative to the values of purchases of such securities in the domestic economy. Again, a capital outflow which compensates for a current account surplus, with no net effect on foreign reserves, can be viewed in similar vein, mutatis mutandis.

In respect of exchange rate adjustment, neither a classical specie-flow mechanism nor a monetary approach to the balance of payments would anticipate any effect in the case of capital flows exactly compensating for a current account imbalance, though a neoclassical approach would through its focus on the trade imbalance influencing relative prices. All three approaches would expect an exchange rate adjustment in the case where foreign capital flows more than or under- compensate for the current account imbalance, since the specie-flow or monetary flow effect comes into force in the former two approaches, and trade imbalances still pertain in the third. In this situation, the Post Keynesian view likewise anticipates an exchange rate change, through the flow of funds influencing demand and supply conditions, though the exchange rate is regarded as too volatile, unless strongly managed, to be a suitable equilibrating mechanism. Under this view, the flows of foreign capital, particularly those of a short-term portfolio nature which may be reversed at short notice, have the potential to give rise to disruptive effects through the monetary system.

Capital inflows for the purpose of direct investment, provided sterilised in their effect on cash reserves by central bank transactions, are far more benign. The monetary balances held by foreign residents after conversion by domestic banks are spent on the capital assets which were the rationale for the foreign investment. The expenditure may take the form of payment for completed physical capital assets (or equities representing such assets) or of payments to production factors for the construction of such assets. In either case, the monetary balances constitute an addition to the revolving fund for investment, which enhances the capacity of the monetary system to embark on additional investment expenditure. Even portfolio effects are likely to be minimal, since financial assets are not generally being acquired, with the exception of direct investment through acquisition of equity. In the latter case, however, the equity will not in general be acquired from banks, so that even in this case the bank portfolio effect is likely to be minimal.

The damaging effects of foreign portfolio flows, especially in the case of developing economies, has been increasingly recognised over the past decade. Private capital inflows to developing economies increased by a factor of approximately ten times in the 1990s relative to the 1980s, though this was partly offset by a reduction of around 60% in official inflows (Helleiner 1999:4-8). The inflows were accompanied by increases in real effective exchange rates and large current account deficits in these economies as import prices declined and exports were rendered less competitive. The difficulties were thus not confined to the subsequent reversal of capital inflows. Countries attempted a variety of economic policy measures during the inflow period. In East Asian countries, the tendency was towards preventing excessive strengthening of the exchange rate through active intervention in the currency market by the central bank, as well as instituting direct and indirect capital controls. The emphasis was on retaining the competitive position of tradable goods produced in the economy. Monetary sterilisation was used to ameliorate monetary aggregate effects. South American countries such as Chile and Colombia had a broadly similar policy response (Helleiner 1999:21-23). Countries in southern Africa, however, such as Uganda and Zambia, were inclined to allow the currency appreciation to

proceed, with negative consequences for international competitiveness and the current account of the balance of payments. In all these cases, and in most developed countries given the general increase in international capital flows, monetary policy actions which are necessitated by international capital flows are significant and have consequences for the domestic monetary system. Domestic monetary policy measures are inevitably pursued in the context of international flows and circumstances which hamper or limit the domestic measures which can be adopted[11]. Foreign capital flows are increasingly a factor which needs to be taken into account in examining the relationship between monetary policy and investment in the domestic economy.

The increased levels of foreign capital flows and holdings is also a channel through which the 'contagion' effects of financial crises may occur between countries. Allen and Gale (2000:379-406) for instance put forward a systematic mathematical account of how liquidity and solvency positions are propagated across banks and across regions. Allen and Gale distinguish between a complete interbank market in which all regions are interconnected, and an incomplete market in which regions (countries) are connected only to certain others, which may in turn be connected more widely. They show that in terms of their theoretical analysis, financial crisis and contagion is far more likely to occur in an incomplete market. This is essentially because the effects of a liquidity or solvency constraint are concentrated in a limited area, rather than being widely dissipated. The contagion effect occurs through banks drawing down on interbank deposits, once they have utilised short-term assets, to meet crisis demands. This is financially preferable to realising long-term assets, which would incur a reduction relative to full value in being prematurely realised. Closure of one or more banks of significant size in one country can place liquidity stress on banks in one or more countries to which the first has a high degree of interbank deposit linkages. If this leads to bank closures in a second country, this can likewise place severe stress on the banks of one or more further countries. Financial crises can spread successively, as occurred in the East

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[11] Hawkins (2003) develops the concept of the vulnerable economy in which "analysis of the financial account provides insight into international liquidity preference and how it tends to constrain a vulnerable economy." (2003:240).

Asian crisis of 1997-98. It is noteworthy that this explanatory mechanism of financial contagion does not rely in any way on the spread of negative sentiment and financial portfolio changes which result from this. Financial crises are undoubtedly accompanied by negative sentiment, and the negativity may well spread to other countries through media and personal contact, but the interbank deposit flows are sufficient to provide an explanation of the contagion phenomenon.

4.8   Monetary Policy Influences through the Credit Structure

Recognition of the non-neutral role of asset-liability structures in transmitting monetary effects in the economy implies that monetary policy needs to be considered as operating through several possible channels rather than being confined to a single channel such as the (central bank) interest rate or a money supply aggregate. It needs to be emphasised that this differs from the view and argument of those Post Keynesian writers who regard the interest rate as the sole or predominant channel through which monetary policy operates. Howells (2003:257-260; 2006:65) for instance characterises a Post Keynesian view of monetary policy as being essentially interest rate policy, and Post Keynesians holding a strongly endogenous or horizontalist view of money would share this policy view. Earlier sections of this chapter however indicate that there are various Post Keynesians who hold a more nuanced view of money endogeneity, in which quantitive effects may occur alongside or in conjunction with interest rate effects. Central bank transactions such as open market operations, transfers to and from Treasury Tax and Loan accounts, and in foreign exchange would be considered as having possible quantitive as well as price (interest rate) effects.

Those Post Keynesian writers who, while agreeing with the centrality of the interest rate as monetary policy instrument, also emphasise the importance of quantity effects on the monetary system, generally advocate recognition of quantitive instruments as a means of pursuing monetary policy. Post Keynesians expressing this view of monetary policy include Wray (1992), Palley (1996a), Carvalho (1997), and Dalziel (2001, 2002), as well as Chick and Dow

(2002) [12]. This thesis seeks to identify and analyse possible quantitive channels through which monetary policy effects could be transmitted, whether used separately as policy instruments or regarded as subsidiary to the main instrument. Post Keynesians of a horizontalist view such as Moore (1988a, 1988b, 1989), might argue that considering non-interest, quantitive channels runs contrary to an endogenous view of money. The counter argument is that it may indeed imply that money is not strictly and entirely endogenous, since the monetary authorities exert quantitive influences on credit provision and thereby on monetary aggregates, but is far closer to an endogenous than exogenous money view. The quantitive influences do not imply direct control of monetary aggregates. Furthermore, the quantitive channels allow for the possibility of capturing more of the complexity of monetary effects than a binary differentiation between pure-endogenous and pure-exogenous money.

Under all shades of Post Keynesianism, the interest rate is regarded as having multiple and significant effects on the real economy. Post Keynesian views of all shades share their departure point in Keynes' *General Theory*, whereby there is no automatic tendency for an economy to move towards full employment, and the interest rate is an important determinant of the level of gross output. With the interest rate as a policy instrument, it potentially becomes a means whereby the economy can be shifted towards higher output and an increased employment level. The interest rate, though, also gives rise to distributional effects with a higher rate favouring financial asset holders and a lower rate favouring entrepreneurial investment in new projects, and more generally affecting the relative income of net borrowers and lenders [13]. These effects translate into

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[12]   Tily (2007:183-225) recently makes the case, with extensive reference to Keynes' Collected Writings as well as unpublished documents, that Keynes himself held a nuanced view on monetary policy transmission in which both interest rates and quantitive effects play a role through the liquidity preference mechanism. He argues (2007:195-199) that Keynes countenanced the possibility of deliberate manipulation of expectations which affect the liquidity preference function, as well as active use of government debt management and direct use of open market operations, as a possible means of exercising monetary policy.

[13]   Wray (1996:459) suggests that "money is a social relation between debtors and creditors …".

effects on societal groups, such as low-income vs high-income earners, and on production sectors, according to their relative borrowing and lending positions. Lavoie (1996b:536) maintains that, where inflation is regarded as resulting from conflict over income shares, the interest rate could be viewed as "not so much a variable to control the level of investment and that of aggregate demand, but rather it is a distributive variable …". Also noteworthy is the dual effect of the interest rate on the financial system, in both affecting the demand for credit, which translates into monetary deposits, and the demand for money in terms of a liquidity preference schedule for the holding of demand deposits, with the two effects being in opposite directions in determining money holdings. This is far removed from any loanable funds theory of the interest rate whereby it serves to equilibrate between supply of available funds from saving and demand for fund to undertake investment.

Whereas open market operations would be regarded as a supportive or supplementary measure in a Post Keynesian view which regards the interest rate as the predominant policy instrument, and would typically be regarded as forming part of a base-money/multiplier control mechanism in a monetarist view, it is explored as a potential channel in its own right in the framework of this thesis. This is in recognition of the direct effects which open market operations have on the asset structure of the banking system, as described earlier in this chapter. With the interest rate being a price instrument in a largely endogenous credit-money system, open market operations become a potential channel for quantitive effects, as well as having an effect on the interest spectrum beyond the short end which closely follows the primary policy instrument rate. Open market operations may be conducted either with clearing banks or with non-bank actors, with both ultimately affecting the cash reserve holdings of the clearing banks, which influence the provision of advances and consequently investment. Transactions with non-bank parties have the further effect of a commensurate change in the banks' deposit liabilities. Also, the central bank holds a range of financial assets, of differing maturities, which it is able to use in conducting open market operations. The effects of open market operations on the financial

system will differ in accordance with the maturity of financial assets used as well as the value of the open market operations conducted.

As indicated earlier in this chapter, foreign exchange flows, in a Post Keynesian dispensation in which neither exchange rate nor prices adjust rapidly to bring about an external equilibrium, may have a significant effect on the domestic monetary system, even when sterilised by monetary authorities. Although the monetary authorities do not generally have control over these flows, unless direct foreign exchange controls are instituted, they do exercise policy influences over them through the degree to which they engage in sterilisation transactions and the degree to which they allow foreign reserve holdings to increase or decrease, as well as through ongoing transactions in the foreign exchange market. It is these influences which can be regarded as monetary policy channels which have effects on the monetary system. The effects are primarily quantitive in nature, in the form of cash reserve and financial asset portfolio changes in the banking system, but could also have an interest rate spectrum (yield curve) effect depending on the maturity of financial assets used by the monetary authorities in market transactions.

The stipulation of minimum cash reserves and minimum liquid asset holdings, as percentages of deposit liabilities defined as eligible, was traditionally regarded as a channel of monetary policy but has been less emphasised over the last few decades, due partly to their not being readily changeable on a frequent or active basis, and partly due to the increasing prominence of the interest rate as primary instrument. In a monetarist framework, the central bank is expected to maintain strict control of the monetary base, which translates into a money supply level depending on the cash reserve and liquid asset ratios in place. Ongoing control is therefore expected to be exerted through monetary base control rather than changes to the cash and liquid asset ratios, which could however be modified under difficult circumstances. In a Post Keynesian framework of endogenous or largely endogenous money, the level at which cash reserve and liquid asset ratios are set is of lower significance, in that credit provision and money supply is

viewed as primarily demand determined, with last-resort lending by the central bank being provided, if such provision is necessary to ensure stability of the financial system, irrespective of the ratios specified.

Transactions relating to management of the public debt, as pointed out earlier in the chapter, can have significant monetary consequences. Close communication is generally pursued between the central bank and Treasury to ensure that public debt transactions do not have conflicting effects to those being undertaken for monetary policy purposes. Certain transactions may be allocated to the central bank to conduct on an agency basis so that these can be undertaken in terms of prevailing monetary policy considerations. Transfers between Treasury accounts held with the central bank and those held by clearing banks have a direct effect on cash reserves held by clearing banks. Bond issues and repayments have similar direct effects if transactions are conducted through a central bank account. Public debt management also typically serves to alter the maturity structure of government debt in order to meet its requirements and payment projections, and this has corresponding effects on the financial asset maturity structure of the banking system. The monetary effects of public debt management are assumed in this thesis to be under the control of the central bank, or of the 'monetary authorities' to include the Treasury operating in co-ordination with the central bank. On this basis, changes in public debt which have monetary consequences are considered as a further avenue of monetary policy, with quantitive and portfolio composition effects, as well as effects on interest rate differentials, i.e. on the yield curve.

Prudential requirements in the form of a minimum capital adequacy ratio applied to clearing banks, could be seen in a somewhat similar vein to cash reserve and liquid asset ratios. As Dow (2006:39) observes: "New efforts were made to control credit creation by means of capital adequacy ratios as a substitute for reserve requirements. …. Capital adequacy ratios have not reduced the endogeneity of credit supply, but rather changed its nature." Although funds obtained through capital raised remain with the bank as part of its assets rather than being placed as a deposit with the central bank, the capital adequacy ratio can not be readily or frequently altered, nor can the risk-rating structure for

classes of assets on which it is based. It could nevertheless have a monetary policy impact through interaction with more actively used monetary policy channels. For instance, portfolio shifts in financial asset holdings by clearing banks may have the result of moves to higher-risk rated asset classes, with a consequently higher capital adequacy requirement. This would necessitate the raising of additional equity capital if the financial asset composition is to be sustained. Since equity capital cannot generally be increased at short notice, and requires adequate expected returns to equity providers for it to be raised, the capital adequacy requirement would serve as a restraint on the expansion of credit provision, even if the central bank provided accommodation to meet minimum cash reserves. Alterations in the CAR (capital adequacy ratio) regime when introduced from time to time will therefore have monetary consequences. For these reasons, the CAR and accompanying risk rating regime could be considered as a potential mechanism in conducting monetary policy.

Fiscal policy in the form of the public sector budget deficit could have monetary consequences through government spending exceeding revenue, though the presumption pursued here is that the monetary effects arise only if there is a shortfall (or surplus) after taking into account net new borrowing by the Treasury. If all revenue and expenditure occur through Treasury accounts with the clearing banks, the monetary effects are minor, since the transactions occur through transfer of deposit liabilities within the clearing bank system. There is nevertheless some effect since the Treasury account balances are not included as eligible liabilities on which cash reserves and liquid asset requirements are based. Provided there is co-ordination between central bank and Treasury, transactions can be arranged through Tax and Loan accounts in such a way that monetary effects are negligible, unless a monetary effect is sought as a deliberate action in pursuance of monetary policy. It is thus only such transactions, involving transfers between Tax and Loan accounts and the central bank, which are regarded as a channel for monetary policy in this thesis.

4.9   Concluding remarks

This chapter has shown the importance of the financial asset and liability structure of the banking system as the substrate through which monetary effects

are transmitted to the real economy, to investment in particular. Although the instability thesis put forward by Minsky (1982, 1986) showed that negative monetary effects could be incipient within the credit structure of the financial system, and lead to dire consequences from time to time, the chapter has sought to extend this line of thinking to a range of monetary effects which could occur through the financial system. These are viewed as operating through all stages of economic cycles, with their characteristics determining the basis on which monetary factors exercise their influence on real economic behaviour and magnitudes. It was therefore important to examine how the asset and liability structures of the banking system operate in conjunction with the central bank regime and monetary policy actions. The analysis of leading Post Keynesian writers on monetary issues was drawn on to synthesise a set of possible channels through which the asset-liability structure of the financial system could transmit monetary policy actions into the economy. This opened up the prospect of quantitive monetary policy influences occurring alongside the interest rate channel of monetary policy. Recognition of quantitive influences entails a departure from a purely endogenous, horizontalist view of money as held by many Post Keynesians. The causal mechanisms through which quantitive effects could occur, in particular through open market operations, public debt management, Tax and Loan accounts and foreign currency flows, were examined. Crucial attributes giving rise to quantitive influences through banking financial structures and behaviour were described as: ongoing credit rationing behaviour by banks with variation in its degree of stringency, existence of an unfulfilled 'fringe of unsatisfied borrowers' which can be accommodated to a varying degree by the banks, and engagement by banks in asset portfolio management (an extension of a liquidity preference concept) on a continuing basis. To these can be added the effects of foreign flows, which may be ameliorated to a greater or lesser degree by monetary policy action. This provides a framework in which several posited channels of monetary policy influence by the central bank or monetary authorities broadly, both through interest rates and of a quantitive nature, can be examined in terms of their possible effect on the monetary system, and through that in turn on investment in the economy. These channels are taken up specifically in the next chapter in such a manner as to develop mathematical formulations which can be combined

into a symbolic model and examined econometrically.

CHAPTER 5

A MODEL OF MONETARY EFFECTS ON INVESTMENT IN THE POST KEYNESIAN MOULD

5.1   Introduction

Drawing on the conceptual material of the previous chapters, this chapter explores and constructs a symbolic model which relates the main variables of monetary policy, through the financial system, to investment. The focus is on the South African economy. Although some macroeconometric models of the South African economy include monetary variables and equations, this does not imply that these are in accordance with the Post Keynesian monetary theory and relationships as assembled in the previous chapters. The model developed in this chapter traces the effects of monetary policy variables through the banking system to investment and has as its underlying principle the interplay between monetary and real economic variables. It also includes the credit structure of the banking sector in such a way as to capture the financial dynamics discussed in Chapter 4. Interest rate as well as quantitive flow and level effects, including those relating to the foreign sector, are considered and incorporated. Comparisons are made to the model used by the SA Reserve Bank (de Jager 1998; de Jager and Smal 2001), with comment on the difference in theoretical foundations. The model of De Wet, Jonkergouw and Koekemoer (1995:577-597) serves as a further basis for comparison. Also useful are analyses of the operation of the South African monetary system such as those of Schoombee (1996:83-96) and Meijer (1995, 1997, 2000), and various publications of the South African Reserve Bank. Work undertaken by Arestis, Chick, Dow, Dalziel, Palley, Wray and others working on monetary issues from a Post Keynesian perspective with a focus on the banking system is used by way of conceptual comparison to the model formulation conducted in this chapter. The work of Arestis (1989:611-627) in modelling the UK economy to reflect a Post Keynesian perspective and subsequent analysis of the Bank of England macroeconometric model (Arestis and Sawyer 2002:529-545) provide a useful model comparison. The chapter provides a formally expressed, symbolic model and discussion of it in theoretical context and by comparison to other models relating monetary

policy to the macro-economy, to be taken forward in the next chapter by way of empirical examination and testing.

A uniform and systematic approach to expressing relationships between variables in the form of mathematical expressions and equations is adopted in formulating components of the model, with the aim of providing as much clarity and precision as possible. Expressions and equations are generally time-based, and a sequential moment approach is adopted rather than a sequential period approach, though both aspects of time are present. This means that the focus is on the moment or instant at the end of each time period, at which variables are reflected as levels at that instant, a stock concept, and flows are treated primarily as changes in levels which occur over the period from one instant to the following instant. The flows associated with level variables at an instant are denominated as the flows or change occurring in the period <u>leading up</u> to (i.e. directly prior to the instant), rather than the period directly after, the instant. These conventions enable stock and flow-type variables to be clearly differentiated, and time sequencing to be clearly reflected. A subscript t therefore refers to the instant or moment t along the continuum of time. The subscript t-1 refers to the previous moment, with the interval being of arbitrary but suitable duration for the purpose, say a month or a quarter, but could also represent a varying or abstract interval, such as production period. Similarly, t-2 represents the moment two periods prior, and t+1 represents the moment one period subsequent to t. Where all variables in an equation refer to the same moment, say t, the subscript may be omitted to render the equation more easily readable.

The changes in a variable between two moments are reflected as Δ followed by the variable symbol. This is equivalent to the first difference of the variable. Variables are generally designated by a single-character or two-character symbol, close to symbols typically used in macro and monetary economics where possible, and subscripts are used to designate more specific definition of the variable. For instance, i_C is used to reflect the central bank key policy rate (repo rate) and i_A the average rate charged by banks on advances (roughly

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equivalent to prime overdraft rate). Superscripts are used sparingly to show expected, desired or target variables, in such a way as to avoid the appearance of indicating exponentiation, and the symbol ê is used rather than e to indicate expected variables to preserve the widely used mathematical meaning of e as the natural logarithm base constant. This enables exponential expressions to be used with clarity where applicable. The meanings of symbols are adopted throughout the chapter on a consistent basis, so that a variable defined in the course of one section will retain the same meaning in later sections and in the rendition of the model in its complete form. Other generic symbols adopted, with subscripts or a second character to define the referent more specifically, are I for investment, Y for output, M for money aggregates, A for bank lending (advances), B for bonds and other securities held, H for high-powered money, D for deposits, P for prices and r for expected asset yields.

5.2   Interest Rate Policy Mechanism

There has been a marked trend over the course of the 1990s for central banks to move to openly regarding the key policy interest rate as the primary instrument of monetary policy, and Post Keynesians have generally welcomed this. The move has in many cases occurred in conjunction with the adoption of a direct inflation targeting mandate assigned to the central bank by government. The inflation targeting approach does not accord entirely with a Post Keynesian view, since Post Keynesians regard the causes of inflation as lying only partly within the realms which can be addressed by monetary policy. Seeking to attain inflation targets through monetary policy means is not however intrinsically inimical to a Post Keynesian monetary view. In fact, there is a surprising rapprochement between the approaches adopted towards inflation targeting and the policy implications of endogenous money, as noted by Fontana and Palalio-Vera (2002:548). Both approaches have advocated a move away from the targeting of monetary aggregates, prevalent under monetarist influence. The concern of central banks with monetary aggregates has declined to a point where monetary aggregates are typically regarded as secondary economic indicators only, to be taken into account in conjunction with a range of other indicators for monetary policy purposes.

Arestis (2002:529-545) maintains that the conceptual framework used by the Bank of England since the introduction of inflation targeting in 1992 is in this vein, with monetary policy taking effect primarily through the policy interest rate. Arestis shows that, in the macroeconometric model used by the Bank of England, a demand-for-money function serves to determine monetary aggregates endogenously in such a manner that they are not an essential link in a causal chain. They are reflected rather as the end result of other mechanisms. The primary effect of monetary policy occurs via the central bank interest rate through to market rates and the real cost of capital, which influence aggregate demand, directly and indirectly, as well as capacity utilisation, which is regarded as a key factor in determining the inflation level. The Bank of England operates in an inflation targeting policy environment, yet its framework is compatible with an endogenous money view. Dalziel (2001:112-122) likewise notes the compatibility of the approach and modelling used by the central bank of New Zealand in recent years to an endogenous money view. This is significant in that New Zealand was at the forefront of introducing inflation targeting in 1989/90, and in that monetary aggregate intermediate targets have given way to an approach which focuses on a more direct policy interest rate influence through to components of aggregate demand.

In the case of South Africa, inflation targeting was formally introduced from February 2000, though the Reserve Bank had been informally using an inflation targeting approach from a year earlier. Monetary aggregate targets or guidelines were used from 1985, but the actual growth rate in M3 money supply fell outside the upper and lower limits far more frequently than within them. The Reserve Bank moved increasingly toward an eclectic approach, taking into account a range of indicators, during the 1990s, before abandoning expression of any monetary aggregate guidelines in 1999 during the lead-in to inflation targeting. The Reserve Bank considered that the relationship between monetary aggregates and demand for goods and services had become subject to shifts resulting from increasing integration of the South African economy with global financial markets, liberalisation of domestic financial markets, relaxation of exchange controls and financial deepening in the form of more widespread use of financial services across the population (de Jager and Smal 2001:2-4). In the

Reserve Bank's inflation targeting monetary policy framework, the policy interest rate (repo rate) is regarded as primary, but as having multiple channels through which it affects the economy, as well as the effects being subject to significant and variable lags, typically of the order of six months to two years. The main channels as viewed by the Bank occur through market rate influences on investment and consumption, through exchange rate effects on imports and exports, through credit provision and through changes in asset prices (equities, property, etc). The primary objective pursued is domestic price stability, in the form of maintaining inflation within the specified target range, but other economic objectives such as exchange rate stability, economic growth and unemployment reduction are not ignored entirely, though only receiving consideration to the extent that they do not conflict with attainment of the primary objective (van der Merwe 2004:6-12).

In line with a Post Keynesian view of money, this thesis concurs with the four main channels of possible interest rate influence on the economy as viewed by the SA Reserve Bank under its inflation targeting framework, though the precise manner of influence differs in various respects, as well as being more fully specified in respect of the link to investment. In addition, it needs to be noted that the SA Reserve Bank places virtually all monetary policy influence as occurring through the policy interest rate, whereas this thesis examines several additional monetary influences which are potentially or actually under the control of the monetary authorities. In the SA Reserve Bank view, the influence of the policy interest rate on investment occurs (most directly) through its effect on the cost of capital experienced by entrepreneurs. In the analysis of this thesis, the cost-of-capital influence is extended in that it translates to demand for capital assets through a marginal efficiency of capital function in the Post Keynesian mould. There is also consideration of an additional effect through altering the degree of credit rationing applied by the banks, as well as indirect effects through consumption and exchange rate changes. The manner in which the policy rate influences market rates in a Post Keynesian view accords with the way this is currently viewed by the SA Reserve Bank. This occurs through effects on short-term market rates as a result of the central bank ensuring that commercial (clearing) banks are always in a net borrowed position with the

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central bank, so that the policy rate is maintained as a wholesale rate for borrowing by banks, as portrayed by Moore (1989:14-27). Long nominal rates are linked to short rates through being based on the expected time trajectory of short rates. Real long rates are nominal long rates less future inflation, which can only be estimated, with expected inflation ($\acute{P}^{\hat{e}}$) being one such estimate. The real cost of capital in respect of bank financing for capital acquisition by entrepreneurs can therefore be expressed as:

$$j_R = j_N - \acute{P}^{\hat{e}} \qquad\qquad\qquad \text{E5.2.1}$$

where $\qquad j_N = i_N \qquad\qquad i_N \equiv {_0}\!\int^T i_N^{\hat{e}}\, dt$ where the integration

indicates an average of the expected future

trajectory of short-term rates over time

horizon T

and $\qquad i_N = i_C + u_C \qquad$ with u_C being an approximately constant differential between the central bank policy rate and a short-term market rate

Demand for capital assets is determined by the mec as a function of the cost of capital (bank borrowing by firms):

$$K_D = f(\, j_R \,, \cdot\,) \qquad\qquad\qquad \text{E5.2.2}$$

where the $\cdot$ is used to indicate that there are a number of other variables which determine the position and shape of the mec, thereby influencing K_D. It needs to be noted that j_R is the real cost of capital for bank-sourced financing, and firms will typically have some portion of financing available from internally generated funds and from share capital issues. j_R is nevertheless the primary influence channel from market interest rates to new capital demand. Also, it serves as an opportunity cost for the use of internally generated funds and provides an approximate risk-free anchor from which share capital costs are gauged and influenced. K_D is expressed in present-day prices (real terms). The real cost of capital is used on the basis that expected inflation effects are removed from future projections of revenue and expenditure, in arriving at the mec schedule.

In accordance with Post Keynesian theory, investment actually occurring is determined by the interaction between demand for capital assets and the supply

of such capital assets. Although the supply of capital assets may be quantity constrained by various factors, the interest rate influence on capital asset supply occurs primarily through the cost of short-term bank financing obtained by capital-goods producers over the duration of their production cycle. The interest rate applicable is the short-term lending rate of banks, which is closely related to the policy rate of the central bank, with a margin differential. This accords with Moore's analysis of bank intermediation (Moore 1989:14-27). Because of the relatively short period applicable, the nominal rate is likely to be a stronger predictor of capital supply than the expected real rate. The interest rate on short-term borrowing is a cost factor in the production of capital goods, shifting the supply curve upwards through the price effect in the case of an interest rate increase. The capital asset supply curve can therefore be expressed as:

$$K_S = f(i_N , \cdot)$$
E5.2.3

where the $\cdot$ again indicates other influencing factors. Actual investment is determined by the intersection of K_S and K_D schedules, in accordance with the Post Keynesian analysis presented for instance by Davidson (1994:48-66) and Iyoda (2005:115-120).

Interest rate changes also affect consumption, which in turn translates into effects on investment through the process often termed 'the accelerator' in traditional macroeconomics. This is somewhat of a misnomer since it is both change in the level of consumption and the new level of consumption attained that influence investment through capital asset demand. The change (expressed as a proportional change) and level of consumption are additional variables in the demand function for new capital. The consumption changes could be regarded as shifting the mec schedule. Consumption spending is influenced mainly by short-term market rates, generally a range of rates such as prime overdraft rate for less durable goods and the asset financing (financial lease or hire purchase) rate for durable goods such as vehicles and household equipment. In view of the short duration of much consumer lending, nominal rates are likely to be as applicable a predictor as anticipated real rates. The effect of interest rates on consumption could be expressed as:

$$C = f(i_N , \cdot)$$
E5.2.4

and the incorporation of this into the new capital asset demand function as:

$$K_D = f(\cdot , \acute{C} , C(i_N) , \cdot)$$ E5.2.5

with C reflected both in respect of its proportional rate of change and level.

The exchange rate channel from policy interest rate to investment occurs in the first instance through a change in the country's exchange rate itself. This is the conventional effect analysed in macroeconomic texts whereby an interest rate increase relative to that of major trading partners (or 'the world') results in financial capital (portfolio) inflows due to the relative attractiveness of financial asset yields, which results in a stronger domestic currency exchange rate, ceteris paribus. The stronger exchange rate has the consequence of lower import prices, including prices of imported capital equipment, which is a significant component of imports in developing economies in particular. This reduces the supply price of capital goods, i.e. the K_S curve shifts downwards. In conjunction with the capital demand curve, K_D, this establishes the investment level. It needs to be noted that the exchange rate effect is in the <u>opposite</u> direction to the two effects described above in which an increased interest rate leads to reduced investment. The exchange rate effect on import prices of capital goods will be partly offset by weaker export demand in the case of a stronger exchange rate, but the export effect will be mainly through demand for consumption goods, thereby only indirectly on investment, especially in the case of a developing economy. The main exchange rate effect of policy interest rate through to investment can therefore be expressed in influence terms as:

$$i_C \rightarrow i_N \rightarrow \varepsilon_N \rightarrow P_M \rightarrow K_S \rightarrow I$$

In equation terms, the key relationships are:

$$K_S = K_S (\cdot , P_M , \cdot)$$ E5.2.6

and $$P_M = P_M (\cdot , \varepsilon_N(i_N) , \cdot)$$ E5.2.7

expressing that K_S is a function of import prices P_M (amongst other variables) which in turn is a function of the exchange rate (ε_N), which in turn is influenced by short-term nominal interest rates.

The asset price channel operates through the inverse relationship between yield and capital value of various classes of financial assets, of which bonds are a familiar example. An increase in short and long-term market interest rates resulting from a policy rate increase, leads to a reduced capital value of these assets. Portfolio shifts will give rise to some degree of effect on other financial assets, such as equities, and on immovable assets such as land and buildings. Reduced asset prices have a (negative) wealth effect, resulting in reduced consumption spending on the part of consumers which translates indirectly into a reduction in investment by firms through lower future revenue expectations (through the mec). But they also have a more directly negative effect on investment through the reduction in collateral values available to firms to obtain bank advances for investment purposes. Using the symbol Z for asset prices generally, the influence channel can be expressed:

$$i_C \rightarrow i_N \rightarrow Z \rightarrow C \rightarrow K_D \rightarrow I$$
$$\searrow AN \rightarrow K_S \rightarrow I$$
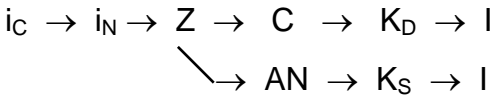
where AN refers to net additional bank advances. The effect of interest rates on investment through changes in asset values can be expressed in equation form as:

$$K_D = f(\,\cdot\,, Z(i_N)\,,\,\cdot\,)\,,\ \ K_S = f(\,\cdot\,, Z(i_N)\,,\,\cdot\,)\,,\ \ I = f(K_D\,, K_S\,,\,\cdot\,)$$
E5.2.8

with recognition that asset prices are only one intermediate variable affecting investment.

Drawing the above channels of influence through the policy interest rate together, gives the following equation combination:

$$K_D = f(\,j_R\,,\ \acute{C}(i_N)\,,\ C(i_N)\,,\ \varepsilon_N(i_N)\,,\ Z(i_N)\,,\,\cdot\,)$$
E5.2.9

$$K_S = f(\,i_N\,,\ P_M\,,\ Z(i_N)\,,\,\cdot\,) \qquad\qquad \text{where } P_M = f(\,\varepsilon_N(i_N)\,) \qquad\qquad \text{E5.2.10}$$

$$I = f(\,K_D\,,\ K_S\,,\,\cdot\,) \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \text{E5.2.11}$$

The first equation indicates demand for new and existing capital assets in similar vein to an mec schedule. The second indicates the supply function for new and

existing capital assets. The third indicates investment as determined by both demand and supply functions for capital assets. The interest rate effects take place through the intermediate variables which affect demand and supply conditions of capital assets, and these jointly determine the investment level. The demand and supply functions for capital assets can be visualised as schedules in a diagram with a price axis, so that demand and supply are reconciled through price depending on the position and slopes of the schedules. This is of course a gross simplification of the process which occurs in practice, especially since the capital assets are highly diverse in nature, but conveys that price negotiations will typically occur to bring demand and supply aspirations closer to enable transactions to occur.

5.3 Open Market Operations and Public Debt Management

These are the channels described in the previous chapter, which are considered as potentially significant in this thesis, in line with the theoretical views of certain Post Keynesians, but not with horizontalist views. Central banks generally engage in open market operations, which may have deliberate monetary policy intentions or be undertaken to ensure orderly operation of markets and for central bank asset management purposes. It is a surmise being explored here that these transactions have monetary consequences, which translate into investment effects, whether the central bank is undertaking them in pursuit of monetary policy objectives or not. The channel contemplated primarily is open market operations conducted with clearing (commercial) banks which increase or reduce their holdings of central bank deposits, a major component of high-powered money, as well as affecting their financial asset composition. Open market operations conducted with non-bank parties have a similar effect once such transaction proceeds are paid into a clearing bank; they have the additional effect of increasing or reducing demand deposits with the clearing banks and hence monetary aggregates, but here the focus is on the asset holdings of banks. Taking the case of an open market purchase by the central bank of government bonds from a clearing bank, the cash reserves (central bank deposits) held by the clearing bank are increased by the value of the bond purchase. The asset composition of the bank becomes more liquid, and it may use the increased central bank deposits as a basis to increase advances to loan

applicants, or to purchase short or longer term securities. To the extent that there has existed an 'unsatisfied fringe of borrowers', a portion of whom will be firms wishing to undertake investment spending, the degree of credit rationing may be reduced, and the additional advances contribute to an increase in investment. Allocation of the central bank deposits arising from open market operations to acquire other securities in its asset spectrum, is still likely to have some positive effect on investment, since a proportion of the bank payments are likely to flow to firms who use it to undertake investment spending, i.e. they have sold securities in order to obtain funds for investment spending. An open market sale of government bonds to banks will have an equivalent contractionary effect on bank lending or holdings of securities and consequently on investment spending by firms. These open market operations effects through asset portfolio adjustment are essentially compatible with the clearing bank liquidity preference view put forward by Wray (1992:287-309), Palley (1996c:112-117), Dow (1996a:498-504) and Chick and Dow (2002:587-607), in which bank asset portfolio shifts are analysed using a liquidity preference framework.

The degree of the effect of open market operations on investment depends primarily on the extent to which banks translate the change in deposits with the central bank into changes in the flow of advances to firms, which is the allocation most directly linked with investment. Both demand for borrowing by firms and the state of economic conditions (as well as portfolio preferences of the banks) are determinants of this change in credit flow. These in turn will vary over the course of a business cycle as well as with changing economic conditions. The influence channel can be expressed in equation form as

$$I = f(AN, \cdot) \qquad \text{where in turn} \qquad \text{E5.3.1}$$
$$AN = f(OP, \cdot) \qquad \text{E5.3.2}$$

with AN being (net additional) advances to firms by clearing banks, and OP being the value of open market operations conducted with, or affecting, the cash reserves of clearing banks in a specified time period. The flow of advances to firms is a key variable in the chain determining investment, in accordance with the Post Keynesian analysis put forward in earlier chapters. Open market operations is one means through which central bank actions affect this flow, but

there are other quantitive influences, of which public debt management and foreign reserve flows are significant contributors.

Where a government treasury holds its banking accounts with the central bank, payments to government by the private sector constitute withdrawals of money from the financial system, and payments by government constitute injections of money. In both cases, the changes occur to high-powered money, since the payments are to or from central bank accounts. These payments to and from government could be both those arising from tax receipts and their expenditure, as well as those from the issue or redemption of government bonds and short-term instruments (e.g. Treasury Bills). In the case of South Africa, Treasury tax collection and payment accounts were held entirely at the Reserve Bank until 1993. This inevitably caused sharp fluctuations in bank cash reserves as well as total deposit liabilities whenever tax receipts were bunched together during a period relative to government expenditures, creating disturbances to the conduct of intended monetary policy. Almost a decade earlier, the De Kock Commission (1985:32-36) had shown these fluctuations to be very large, and recommended the establishment of Treasury Tax and Loan accounts with clearing banks as one measure to alleviate the situation. Accordingly, with effect from 1993, Tax and Loan accounts were established by the government Treasury at major clearing banks, with deposits from and payments to the private sector being channelled through these accounts. Under this arrangement, the transfers of money deposits remain within the commercial banking system, unless the Reserve Bank or Treasury deliberately transfers funds to or from Treasury accounts with the Reserve Bank. This means that routine flows of tax revenues and expenditures have a neutral (or minimal) effect on monetary policy transmission, but that transfers between the Tax and Loan accounts and Reserve Bank accounts can be used as a deliberate instrument of exercising monetary policy. As Schoombie (1996:91) and Meijer (1997:32) indicate, this device has in fact been so used to a significant degree by arrangement between the Reserve Bank and Treasury. It therefore needs to be reflected as a possible quantitive channel for monetary policy action.

In the case of long-term bond issues by the Treasury, and repayments of interest and capital, arrangements have similarly been made between the Reserve Bank and Treasury (since 1993) for these to be channelled through the Tax and Loan accounts as necessary to avoid monetary fluctuations which are not in accordance with the Reserve Bank's monetary policy stance. This by and large removes the unintended monetary consequences of net cash inflows and outflows to the Treasury in respect of bonds. Although Government's budget deficit is an important component of its public sector borrowing requirement, this is supplemented by borrowing to replace loan redemptions taking place, or any decrease of cash balances held, as well as by deliberate borrowing beyond expenditure needs undertaken to reduce excess liquidity in money markets. These public debt management actions translate into changes in high-powered cash reserve balances held by banks, to the extent that the Treasury makes use of its bank account facilities with the Reserve Bank to receive or provide payments. However, even if the Treasury channels such transactions entirely through accounts with the clearing banks, there may nevertheless be significant portfolio effects on the banking system which influence asset allocations on the part of banks.

The portfolio effects on banks are partly similar to those occurring with open market operations, but have the additional characteristic that the instruments used have a wider spectrum of maturity and liquidity, with a larger proportion towards the longer maturity, lower liquidity, end. There is the further aspect that the Treasury engages in deliberate actions to vary the maturity spectrum of the instruments placed in the market for purposes of its own financial management objectives and plans[1]. The maturity spectrum provided, and changes to it, form part of the asset portfolios of banks to which they must adapt to meet their own liquidity, risk management and profitability objectives. Changes in government instruments provided will lead to changes on the part of banks to the levels of other asset classes held, which may include changes to the level of advances, and consequently to the flow of credit to firms, which will influence investment.

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[1]   As Van der Walt (1995:478) notes, "In deciding on the term structure of its debt the Treasury is guided by cash flow and liquidity considerations similar in principle to those prevailing among enterprises in the private sector.".

In this sense, public debt management needs to be considered as a channel through which monetary policy occurs, even though control of the public debt structure may rest primarily with the Treasury rather than the Reserve Bank. This is recognised to a degree in South Africa, where the Treasury is expected to consult with the Reserve Bank in determining its public debt management policies to seek to take into account monetary policy consequences which may be at variance with monetary policy being pursued by the Reserve Bank (Meijer 1995:386). The Reserve Bank serving as agent in issuing Treasury instruments, and creating a market in them, provides a means whereby the Reserve Bank can take account of monetary effects to a degree. However, the size and maturity structure of the public debt is ultimately determined by the government Treasury, and the Reserve Bank may not be in a position to fully counteract the effects on the monetary system to accord with its monetary policy. The Reserve Bank may also not fully recognise the monetary effects of changing maturity composition of financial assets occurring through the public debt management undertaken by the Treasury in its conceptual framework.

It needs to be noted that government deposits with clearing banks do not form part of the eligible liabilities on which the cash reserve requirement of banks is based. This means that, although transfers between private sector parties and government do not affect total bank deposit liabilities if the government Tax and Loan accounts with clearing banks are used, there is nevertheless an effect on the level of cash reserves required to be placed as deposits with the Reserve Bank. A net transfer from private sector parties to government accounts reduces the cash reserves required and vice versa. The use of such Tax and Loan accounts does not therefore render government receipts and expenditures neutral for monetary policy purposes, but does decrease the effect markedly by comparison to withdrawal of such receipts from the monetary system. Banks need to adjust their lending or discount window borrowing to meet the change in cash reserves required, but this is a much smaller effect than direct depletion of cash reserves, which occurs where payment is effected on behalf of depositors by the banks to a Treasury account with the Reserve Bank.

For purposes of model development, the open market operations and public debt management channels can be expressed in a similar form, which indicates effects through changes in cash reserves and in the portfolio composition of the assets of the clearing banks. The sale of financial assets by the Reserve Bank in open market operations with banks reduces by equivalent value the cash reserves of the banks, which must borrow as necessary from the discount window to meet minimum required levels, or reduce provision of additional credit advances, or sell securities to non-bank parties. Transfers of funds from Tax and Loan accounts to the Reserve Bank have a similar effect. Transfers from private sector deposits to Tax and Loan accounts (e.g. in the payment of taxes) affect the required level of cash reserves, with the changes in cash reserves to meet the new required level being modest in magnitude relative to direct effects on the cash reserves. In addition, both open market operations and public debt management have effects on the asset portfolio composition of the banks to some degree, which may affect the level of advances to firms in the banks' asset structure, thereby affecting the credit flow to firms. In the cash reserve holding and asset portfolio shifts, it is posited that the primary channel for quantitive effects on investment lies through changes in the credit flow to firms. This combination can be expressed in equation form as follows:

$$\Delta HN \; = \; f(\, OP \, , \, OT \, , \cdot \,) \qquad \text{Basic cash reserves (change)} \qquad \text{E5.3.3}$$

$$BU \; = \; f(\, OP, OT \, , \cdot \,) \qquad \text{Asset maturity structure} \qquad \text{E5.3.4}$$

$$AN \; = \; f(\Delta HN \, , \, BU \,) \qquad \text{Additional advances} \qquad \text{E5.3.5}$$

where ΔHN is changes in non-borrowed cash reserves held by the banks (also termed basic cash reserves), a function of open market operations (OP), transfers between Tax and Loan accounts and government accounts with the Reserve Bank (OT), and additional variables introduced in sections below. BU is a measure of the asset maturity structure, based on the proportions of securities (e.g. Treasury bills) realisable on demand, of short duration and of medium/long-term duration, elaborated in Section 5.5 below. AN is additional credit extension by the banks (net advances), being expressed as a function of basic cash reserves and the asset maturity structure of the banks.

5.4   Foreign Flows

As indicated in Chapter 4, a net inflow of foreign funds (say financial capital in excess of a current account deficit) translates into an increase in high-powered money in the domestic banking system, unless deliberately neutralised (sterilised) by the central bank. The degree to which the central bank sterilises the monetary effects of such flows constitutes a component of monetary policy action. The sterilisation is in general accomplished through open market operations, through which high-powered money equal to the foreign inflow can be withdrawn from the banking system. This occurs directly for open market operations transactions with banks, indirectly for transactions with non-bank parties. To the extent that the open market operations are conducted with banks, this leaves banks with additional financial assets (government bonds or bills) in place of the increase in cash reserves. The foreign inflow may be for the acquisition of bonds, which could serve to reduce simultaneously the additional financial assets of the banks resulting from the open market operations as well as the foreign deposit holding, but could equally well be for other purposes. Even if for bonds, those acquired may differ in maturity from the additional financial assets of the banks resulting from the open market operations, so that a portfolio shift may still occur.

The most significant relationship that needs to be captured for model purposes is the transmission of net foreign inflows to high-powered money, together with the attenuation provided by sterilisation actions undertaken by the Reserve Bank using open market operations as part of its monetary policy approach. The relationship is fairly direct in principle, in that the change to high-powered money is equal to the foreign inflow (expressed in domestic currency) minus the value of counteracting open market operations transactions undertaken. The foreign flow effect on high-powered money can be expressed as:

$$\Delta HN \ = \ \Delta FR \ - \ OS \hspace{6cm} E5.4.1$$

where ΔFR is change in foreign reserve holdings[2] and OS is open market sales undertaken specifically to sterilise the effects of foreign reserve inflows.

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[2] The exact definition which is appropriate in the context of this thesis is pursued in Chapter 6.

The effect of foreign inflows themselves on bank asset portfolios contributes to the more general effects occurring through the domestic bond and money markets and is in any event not directly influenced by monetary policy actions. The portfolio effects of sterilisation actions are however potentially under the control of the Reserve Bank. They are captured in the analysis of open market operations, as provided in the previous section, and do not need to be considered separately in respect of foreign flows. The above equation therefore captures the essential additional monetary effect occurring through the foreign inflow process. The term 'inflow' is of course used for expository convenience, and could equally be a negative figure to show an outflow, with a reversal of direction of open market operations for sterilisation purposes, and with the depicted relationship remaining as expressed above.

5.5 Credit Structure

As described in Chapter 4, the asset composition of the clearing banks in aggregate is a potential source of transmission of monetary effects into the economy. The effects of monetary policy actions on the asset portfolios of clearing banks has been described in the previous sections of the current chapter. This section seeks to capture and portray the further effects arising from the credit structure of the banks, in particular through dynamic effects resulting from the progression of asset composition with the unfolding of time. An asset composition at the present instant holds within itself an inevitable transition to an asset composition at a future instant due to the asset class changes which occur as a result of the maturities of assets changing through the elapse of time. Thus securities of two year maturity become liquid assets two years hence; medium-term assets become short-term assets, and long shift to medium, according to maturity periods. This means that monetary policy actions undertaken towards an asset maturity structure of the banks in the present can translate into asset composition effects at a subsequent date which may not be adequately predicted in advance by the monetary authorities. For instance, open market operations carried out to reduce liquidity in the present may lead to high liquidity at a subsequent time, which could be too great for the monetary authorities to neutralise at that time without having repercussions in money and capital markets. Efforts to sell longer-maturity securities into the market could

depress securities prices, putting upward pressure on interest rates along the maturity yield curve. Both the interest rate effect and quantitive shift towards these securities would have a constraining effect on provision of advances. Through this means, the unfolding maturity structure of bank assets can serve as an influencing factor on lending and thereby on investment, as a consequence of monetary policy actions, but with a delayed and variable effect depending on the asset maturity structure itself. The concept is somewhat similar to that which Wray (1992:297-309), Palley (1996c:112-117) and Chick and Dow (2002:587-607) seek to capture with the term 'liquidity preference' applied to banks, but they do not take their analysis to the further step of a dynamic unfolding process, nor recognise that banks are to at least some degree locked into maturity compositions arising from the past. Their use of the word 'preference' is predicated on the assumption that the maturity structure is purely volitional on the part of banks. Use of the term 'liquidity preference', as indicated in Chapter 4, also ties the analysis too closely to the liquidity preference concept of Keynes (1936), which is based on broad societal liquidity preference, rather than bank asset maturity structures. The descriptor 'maturity structure', 'maturity spectrum' or 'maturity composition' seems preferable to convey the concept considered here more closely and with less possibility of incorrect associations.

For model equation purposes, one wishes to capture the maturity structure dynamics in as simple a manner as possible without losing the essential mechanism. To this end, the maturity spectrum is divided into three: liquid, short-term and medium/long-term assets. Liquid assets represent immediately spendable balances or those for which such balances are immediately obtainable. Short-term assets need to be distinguished from medium/long-term assets to capture the maturity structure and its progression over time. The medium/long-term assets could be further subdivided for more detailed analyses, but the binary division between short-term and all longer term assets is sufficient to capture the essential mechanism. The proportion of liquid assets in the maturity spectrum at a given point will be a function of the proportion of short-term assets at previous time points, with lags of intervals up to one year. In similar fashion, the proportion of short-term assets will depend on medium/long-term assets at past time points ranging up to several years. This unfolding

maturity structure will be one factor in determining the current maturity structure: the current portfolio preferences of the banks is also a factor. The banks are able to shift to some degree from the unfolding maturity structure towards their current portfolio preference, to the extent that the market transactions they engage in allow such a shift without excessive transaction costs and capital losses.[3]

The extent to which the banks' maturity structure moves into a higher proportion of liquid assets as a result of unfolding past maturity structures will be a factor in determining the volume of new advances. This effect will be more marked under the assumption of credit rationing, since there is then always a fringe of borrowers to whom lending has not been provided. Credit rationing implies a quantitive effect on advances, since demand for advances is not fully met at the prevailing interest rate on advances. The net provision of advances by the banks is partly an asset portfolio decision, and shifts to liquidity arising from past maturity structures lead to a portion of such liquidity being allocated to advances to move towards the banks' current portfolio preference. The consequent increase in advances will enable additional investment to take place.

The maturity structure of bank liabilities also has a time-based unfolding characteristic. Short-term deposits become fully liquid deposits as time proceeds, and medium/long-term deposits become short-term deposits. As indicated in Chapter 4, this will have an effect on the asset portfolio preference of the banks to the extent that they seek a specified relationship between the maturity structure of their assets and that of their liabilities. They would pursue such a relationship to ensure that they always have sufficient liquid or near-liquid assets to meet withdrawals of liquid deposits. Under a regulated minimum cash reserve and liquid asset requirement, the stipulated minimum percentages are a factor in relating asset maturity structure to that of liabilities. But even without a regulated requirement, banks seek to maintain a relationship between asset and

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[3]   Palley (1996c:127-128), in putting forward the notion of endogenous finance, notes the possible additional complexity arising from the financial innovation of "private profit maximizing banks with an incentive to engage in asset and liability management ...".

liability maturity structures for prudential reasons[4]. As the maturity structure of liabilities becomes more liquid, the banks will pursue a more liquid maturity structure of assets. This is a less direct effect than those discussed above which occur within the asset maturity structure itself, but could become significant with large shifts in the maturity composition of deposit liabilities.

In equation form, the unfolding maturity structure effect can be expressed as:

$DU = f(DD , DS , DM)$	Liability maturity structure	E5.5.1
$BD = f(BS , DU)$	Liquid assets	E5.5.2
$BS = f(BM , DU)$	Short-term assets	E5.5.3
$BU = f(BD , BS , BM , BL)$	Asset maturity structure	E5.5.4
$\Delta HN = f(BU , \cdot)$	Basic cash reserves Δ	E5.5.5
$AN = f(BU , \cdot)$	Additional advances	E5.5.6
$I = f(AN , \cdot)$	Investment	E5.5.7

Here, DD, DS, and DM are demand, short-term and medium/long-term deposits giving the liability maturity structure DU. BD, BS, and BM are cash/liquid, short-term and medium/long-term financial assets which together with the level of advances (BL) give the asset maturity structure (BU). These in turn influence basic cash reserves (ΔHN), additional advances (AN) and thereby investment (I).

5.6   Statement of Model

The complete symbolic model for examination and empirical testing can be expressed as follows:

$i_N = i_C + u_C$	short term interest rate	E5.6.1
$j_N = {}_0\!\int^T i_N^{\hat{e}}\, dt$	trajectory of expected short term rates $\equiv \underline{i}_N$	E5.6.2
$j_R = j_N - \acute{P}^{\hat{e}}$	real long-term cost of capital	E5.6.3
$K_D = f(j_R , \acute{C}(i_N) , C(i_N) , \varepsilon_N(i_N) , Z(i_N) , \cdot)$	Demand for capital assets	E5.6.4

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[4]   Vickers (1985:175) for instance maintains that "the management of assets and the management of liabilities are very much interdependent." He describes the various influences which occur in practice, of which prudential or risk considerations form part.

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$K_S = f(i_N , P_M(\varepsilon_N(i_N)) , Z(i_N) , \cdot)$ Supply of capital assets   E5.6.5

$OP = f(OB , OT , \cdot)$ Open market operations   E5.6.6

$DU = a1.DD + a2.DS + a3.DM$ Liability maturity structure   E5.6.7

$BU = b1.BD + b2.BS + b3.BM + b4.BL$ Asset maturity structure   E5.6.8

      where BD = f(BS, DU) and BS = f(BM, DU)

$\Delta HN = f(OP , \Delta FR , BU)$ Basic cash reserves Δ E5.6.9

$HR = 0.025 * (DP)$ DP being private sector eligible

      deposits   E5.6.10

$HB = HA - HN$ or $HB = HR + HX - HN$ Borrowed cash reserves   E5.6.11

$AN = f(BU , \Delta HN , \cdot)$ Additional advances   E5.6.12

$I = f(KD , KS , AN , \cdot)$ Investment   E5.6.13

i_C is the key Reserve Bank policy rate in nominal terms, which affects average short-term lending rates i_N directly through a spread differential (u_C), and affects the nominal cost of capital through longer term expected rates and real cost of capital through expected future inflation. Physical capital demand and supply functions are influenced by the real cost of capital and nominal short-term interest rate and in turn are core factors in the investment function. Open market operations (OP) are reflected as net purchases in a period by the Reserve Bank of bonds and other financial instruments (OB), as well as transfers from Reserve Bank Treasury accounts to Tax and Loan accounts (OT). Net purchases of foreign exchange by the Reserve Bank from the banks is reflected as ΔFR. The liability and asset maturity structures (spectra) are described as combinations of liquid, short-term and medium/long-term liability or asset proportions to give a representative figure between 100 (fully liquid) and 0 (fully illiquid, i.e. all in medium/long-term category). The required cash reserves are determined by the stipulated percentage of the Reserve Bank (currently 2.5%) multiplied by the classes of deposit liabilities defined as eligible. Changes in basic cash reserves (non-borrowed) are reflected as a consequence of open market operations (OP), changes in Reserve Bank foreign reserves which have as their counterpart changes in Reserve Bank deposits of the banks (ΔFR) and the maturity structure of assets held by the banks (BU). Borrowed cash reserves (HB) are equal to actual cash reserves (HA) less non-borrowed reserves (HN), or required (HR)

plus excess (HX) reserves less non-borrowed reserves (HN). The flow of bank advances (AN) is dependent on supply factors such as the asset maturity spectrum of banks as well as changes in basic (non-borrowed) cash reserves and the demand factors arising from cost-of-capital effects. It is the combination of additional advances and capital demand and supply conditions that lead to the determination of investment.

The above model is expressed as at a single instant or moment, with flow variables indicating the change which has occurred between the previous and current instant. Various of the equations will have lag dependencies, i.e. current variables are determined (partly of fully) by the levels of variables at prior instants, which may be one or more periods prior. These lag relationships are made explicit in the econometric exploration of the model in the next chapter, rather than in this section, in order that the essentials of the model can be more clearly conveyed in the above equation set.

5.7   Comparison to other models

The South African Reserve Bank adopted new approaches to the modelling of monetary policy effects with the introduction of inflation targeting in February 2000. It recognised the importance of detailed forecasting models of price transmission and hence inflation. In line with current practice by inflation targeting countries internationally, it developed several specialised price-related models, using economic theoretical, Phillips-curve and vector autoregression (VAR) approaches (Casteleijn 2001:17). Certain of these could be classed as 'technical' models focussed on accurate price and inflation forecasting. The theoretical approach adopted in respect of wider transmission of monetary policy changes into the economy can be discerned from the SA Reserve Bank model developed in respect of the monetary policy transmission mechanism (de Jager and Smal 2001:1-16). Monetary policy transmission in this model framework is confined to interest rate effects, though the four channels from policy interest rate to the macro-economy are recognised as described in Section 5.2. The framework also recognises that there are long and complex lags occurring from policy change to economic consequences, with 6-24 months being the typical range of such lags. The primary effect of interest rates on output is regarded as

being fairly direct, though delayed: a reduction in the policy rate leads to a reduction in market interest rates which leads to an increase in both consumption and investment expenditure resulting from the lower cost of borrowing. The second channel reflected is through the exchange rate, whereby a decrease in the policy rate leads to a lower exchange rate, as a result of lower capital inflows in view of the decreased interest rate differential relative to other countries. The lower exchange rate increases demand for exports, which increases domestic output. The third channel is through asset prices, whereby a reduced policy rate leads to higher equity, property and other asset prices, as terms for their acquisition and holding become more favourable. The higher asset prices lead to increases in both investment and consumption through wealth effects. The fourth channel is through bank credit, whereby a lower policy rate is followed by reduced rates charged for bank lending, and a consequent increase in the volume of lending. This affects both consumption and investment expenditure in the economy.

It is interesting to note in this SA Reserve Bank framework that effects on output are more immediate than effects on prices, which are related to the output gap (relative to 'full employment') and therefore deferred in the causal chain. The framework embraces the Taylor rule (Solow and Taylor 1999:45-54), which is based on the notion that a suitable level for the policy interest rate can be determined from a weighted combination of an inflation 'gap' (actual minus target inflation) and output gap (actual minus potential output) together with the current policy rate (so that adjustment is progressive). Implicit behind this is a neoclassical assumption that the economy is at all times close to its full-employment or potential level and that the degree of inflation is directly related to the extent to which output falls short of or exceeds its potential or 'equilibrium' level. The potential or equilibrium output level is typically defined as the non-accelerating inflation rate of unemployment (NAIRU) level.

Also noteworthy is the absence of any monetary aggregates in the monetary policy transmission mechanism as currently viewed by the SA Reserve Bank in its modelling framework. Guidelines for monetary aggregates (M3 growth) were set by the Reserve Bank from 1986 until 1998 (Casteleijn 2001:5-6), but were

already regarded as having reduced significance from the mid-1990s. The monetary component of the Reserve Bank econometric model presented by De Jager (1998:1-45) has detailed equations for each monetary aggregate (M1A to M3), and does include a link from monetary aggregates to inflation through M3 growth influencing inflation expectations. With the adoption of inflation targeting from 2000, however, it is apparent that the monetarist notion of money supply as a key causal channel has receded even further, in favour of the more direct transmission mechanism from policy rate to aggregate demand which is favoured widely by countries adopting an inflation targeting regime.

The framework developed in this chapter from a Post Keynesian assumption set has a significantly more comprehensive explication of the effects of monetary policy occurring through the banking system. Cost-of-capital effects on investment occur explicitly through a Post Keynesian interaction in physical capital markets. In the exchange rate channel, effects through import prices are specifically taken into account since they affect investment (e.g. relating to imported equipment and components required for capital production). Asset prices feed specifically into the market for physical capital. The effect of monetary policy through bank lending decisions is regarded as a key arena of transmission, and includes various quantitive channels as well as a more explicit consideration of interest rate changes on bank lending volumes. Open market operations, public debt management and foreign reserve flows are explicitly considered in their effects on bank advances. Since the focus of this thesis is on the effects of monetary policy on investment, the further transmission to price inflation is not covered in the model developed in this chapter.

The monetary policy model developed by De Wet, Jonkergouw and Koekemoer (1995:577-597) has extensive coverage of quantitive monetary effects. The model does include open market operations explicitly, as well as effects from public debt management and Reserve Bank interventions in the foreign exchange market. These quantitive changes on the part of the monetary authorities are analysed in terms of their effect on 'basic cash reserves' i.e. non-borrowed cash reserves arising from the money creating processes of the Reserve Bank. Liquid assets are then analysed, first from the viewpoint of

prescribed minimum levels (these were prescribed with significant levels required at that time, but the requirement was reduced to a nominal 5% level subsequently), then in respect of the excess liquid assets held which can be used to obtain accommodation from the Reserve Bank discount window. The analysis recognises a direct relationship between credit extended and money aggregates. Its primary purpose is to trace the effects of monetary policy variables through to broad money supply (M3). The model does not seek to examine the effect from the monetary system to the economy as a whole, nor gives any consideration to the effect on investment in particular. The model also has no reference to or inclusion of maturity structures of assets or liabilities of the banks, either statically or dynamically. Its concern is with monetary policy channels of both the policy interest rate (or rates) and of quantitive measures, through to the effect on monetary aggregates. The tacit presumption is that monetary policy is to be directed towards control of the monetary aggregates (M3 in particular); the underlying assumption set is clearly monetarist in nature with the various monetary processes (e.g. credit extension) viewed in terms of their direct or indirect effect on M3 money supply.

The examination of the monetary aspects of the Bank of England econometric model undertaken by Arestis and Sawyer (2002:529-545) is useful as a recent analysis from a Post Keynesian perspective. The model was established in accordance with the inflation targeting framework adopted by the Bank of England from 1992. Although the model recognises that there is no long-run trade-off between inflation and unemployment (or output), a higher interest rate lowers aggregate demand (in nominal terms) in the short and medium run in relation to potential output and thereby reduces inflation. The policy interest rate can therefore be used to attain a specified target inflation rate. The stock of money is explicitly present, but is determined endogenously in accordance with the price level and other variables rather than being a transmission channel for monetary policy. Monetary policy therefore occurs through the setting of the Bank of England policy rate which affects market interest rates and through these affects both consumption and investment components of aggregate demand. Interest rates also affect the exchange rate, through the differential to foreign rates, and exchange rate movements affect export and import prices,

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also with an effect on aggregate demand. Unlike the SA Reserve Bank framework, the asset price effect is not reflected as a significant monetary policy channel, though money stock is partly a function of wealth holding. The conceptual framework of the Bank of England and SA Reserve Bank models is similar in that both have the policy interest rate transmitting fairly directly to consumption and investment and hence aggregate demand, with inflation determined less directly (and with longer lags) from the relationship of aggregate demand to potential output.

The model of this thesis, by comparison to the above models, has a far more comprehensive coverage of the transmission of monetary policy actions through the banking system, including quantitive as well as interest rate effects. Although a Post Keynesian approach would not take issue with the policy interest rate affecting consumption and investment expenditure, the models of the Bank of England and SA Reserve Bank treat this virtually as a 'black-box' relationship. It is presumed that the central bank can 'steer' the economy towards a desired nominal aggregate demand level, with a lag structure, by which a targeted inflation rate can be attained through the relationship of aggregate demand to potential output. Arestis and Sawyer (2002:540-541) make the point that this accords to monetary policy the aggregate demand management that has traditionally been associated with fiscal policy : what then is the role of stimulatory or contractionary expenditure on the part of the fiscus? Although the causal mechanism of inflation moves away from monetary aggregates in the Bank of England and SA Reserve Bank models (monetary aggregates are determined endogenously and are not within a causal chain), the determination of inflation through the interaction of aggregate demand and potential output does not capture the sources of inflation typically posited by Post Keynesian writers. The Bank of England and SA Reserve Bank models do not recognise quantitive monetary policy channels through the banking system, which would be considered important by Post Keynesians not holding a horizontalist view. Although the Bank of England and SA Reserve Bank models, developed in the spirit of inflation targeting, are compatible to a degree with the model developed in this chapter in that monetary policy measures are transmitted significantly to real macroeconomic magnitudes, the channels and

mechanisms differ materially, and the transmission to investment is not analysed in depth in those models as it is in the model of this chapter.

5.8   Concluding remarks

This chapter has used the theoretical examination of monetary issues from a Post Keynesian perspective undertaken in previous chapters to develop a clearly-formulated symbolic model of the transmission channels from monetary policy actions to investment in the economy.   It is a model which is in accordance with the theoretical precepts generally held by economists in the Post Keynesian tradition.   Within the broad spirit of Post Keynesian monetary thinking, the model development adopted the line in which quantitive channels of monetary policy are recognised in addition to interest rate channels.   This deviates from the horizontalist view held fairly widely among Post Keynesian economists, and which is closely associated with Moore (1988a, 1988b, 1989, 1997) in particular.   There are however long-standing, widely recognised adherents to Post Keynesian views, such as Chick, Dow, Wray, Arestis, Pollin and Palley, who do not adopt a horizontalist view and do give consideration to possible quantitive monetary effects in addition to interest rate effects, and the model is broadly in accordance with their Post Keynesian monetary thinking.

The model developed takes into consideration the operation of banks in transmitting monetary policy into the wider economy.   Certain Post Keynesian writers have explored the mechanisms through which banks transmit monetary effects.   As indicated in Chapter 4, Wray (1992), Palley (1996c), Dow (1996a) as well as Chick and Dow (2002) adopt a liquidity preference approach to examine bank asset portfolio behaviour.   The model of this chapter seeks greater depth to this approach through explicit treatment of the maturity structure of bank asset portfolios, and recognising that these 'unfold' dynamically over time.   The model is formulated in respect of the South African monetary system, though there would be common ground if such a model were to be formulated for another economy having a similar monetary structure.   The nature of the model was compared to that of the models currently used by the SA Reserve Bank , as well as an earlier detailed econometric model developed of the South African monetary system.   A Post Keynesian examination of models used by the Bank of

England served as a further backdrop for comparison. The model developed is markedly different from those used for comparison, especially in having a more comprehensive treatment of the transmission of monetary policy though the banking system, as well as the mechanism through which it affects investment. The model was expressed in such a way that it is able to be formulated in econometric terms, so that it can be examined using actual time series economic data to estimate parameters and test statistical significance. This served to enable the empirical validity of specific aspects of the model as well as the model as a whole to be explored. The econometric formulation and empirical examination is taken up in the next chapter.

CHAPTER 6

EMPIRICAL EXAMINATION : THE SOUTH AFRICAN CASE

6.1   Introduction

In this chapter, the symbolic model developed in the previous chapter is taken through the various steps needed to examine its empirical plausibility in the South African monetary system and economy. Data are identified, compiled and re-formulated so as to be suitable for examination of the model, with raw data being drawn mainly from that prepared on an ongoing basis by the South African Reserve Bank and Statistics South Africa. The time-series and multiple equation nature of the model raises a number of econometric methodology issues, and the approaches adopted are described and provided with justification. The model is expressed in a form which enables econometric analysis to be undertaken, using variables for which data series are obtainable, either directly or in a derived form. The parameters of the model are estimated using econometric techniques, and statistical analysis and tests conducted to assess the degree of correspondence of the model with the reality as manifested by the data. Consideration is given to possible causal direction of relationships. Some simulations using possible monetary policy actions serve to illustrate its operation and implications. This leads to overall consideration of the validity of the model and the Post Keynesian precepts underlying it. Comparisons are made to model relationships posited and tested for the South African monetary system, such as those of De Wet, Jonkergouw and Koekemoer (1995:577-597) and Moll (1999, 2000), in so far as similar variables are covered. Although these are monetary sector-related models, they are not based on Post Keynesian assumptions and are very different in nature and intent, so that scope for comparison is limited.

The chapter comprises coverage of the methodologies, parameters derived, econometric tests conducted, assessments of explanatory power and conclusions reached in the empirical examination of the model. Established econometric techniques are used (Gujarati 1995, 2003; Intrilligator et al 1996; Kennedy 2003). Assessment of the workings of the South African monetary

framework are drawn from Falkena, Fourie and Kok (1995), Gidlow (1988), Schoombie (1996), Nel (1994, 1996), Botha (1997, 1998), Moll (1999, 2000), Meijer (1995, 1997, 2000), Schaling and Schoeman (2000), Casteleijn (2001), and Van den Heever (2001) as well as articles prepared by the Reserve Bank itself, especially De Jager and Smal (2001), Wesso (2002) and Van der Merwe (2004).

6.2   Data Sources

The Reserve Bank of South Africa compiles a wide range of monetary sector-related data for South Africa on a regular, typically monthly or quarterly, basis. However, in a number of instances these do not correspond directly or clearly to the variables contemplated in the symbolic model of the previous chapter. In some cases, such as obtaining data for the net flow of additional advances by banks, it is simply a matter of calculating the change in the reported aggregate from one period-end to the next. But in other cases the mismatch is such as to necessitate the construction of a proxy or closely related variable.   The definitional nature of data variables reported needed to be investigated to ensure that they do in fact provide a close representation of the conceptual variables being examined.

The key policy interest rate is well defined as Bank rate prior to March 1998, and the repo rate subsequent to that date. Any of several short-term market interest rates can be used as representative in the model: the prime overdraft rate is used since it is the rate most closely linked to bank lending. Where applicable, the 3-month NCD (Negotiable Certificate of Deposit) rate is used as a representative money-market rate since it is widely quoted and the instrument extensively traded. The long-term rate which best represents the cost of capital is less apparent: the concept behind this rate incorporates entrepreneurial expectations concerning the trajectory of interest rates over the anticipated duration of investment projects. Since these vary between entrepreneurs and projects, however, and since banks use long-term bond rates as a guide to setting rates for long-term lending (with a risk premium added), a widely quoted long-term bond rate is used (Treasury bond R153). Also, firms could issue their

own long-term bonds to obtain financing at a low-risk, government bond rate plus a risk premium. Obtaining a real long-term rate entails adjusting the nominal rate for future expected inflation. Since the latter is not in the realms of firm data, it is estimated as the difference between rates on conventional long-term Treasury bonds, and those on inflation-linked bonds of similar maturity. The latter were only introduced in South Africa from the year 2000, so actual inflation is used as a proxy to represent expected inflation prior to that year.

The liability structure of banks is covered by SA Reserve Bank data on an ongoing basis, and is of such a form as to be fairly directly usable for the model under consideration.   Liabilities are divided into maturity categories from cheque/transmission and other demand deposits to short-term and medium/long-term deposit categories. Deposit liabilities to the public constitute approximately 65% (2006) of the total capital and liabilities of banks, with the remainder including borrowing from the Reserve Bank, borrowing from other financial institutions, foreign liabilities, and gross capital and reserves. The reporting of the combined asset structure of the banks does not however lend itself to ready combination into maturity categories, since it is divided by the nature of lending or asset holding rather than repayment term. Examples of asset categories which would span more than one maturity cohort are Overdrafts and Loans, and Suspensive Sales and Leases.   Other categories such as NCDs and acceptances are clearly of a liquid nature, and at the other extreme, Mortgage advances are clearly of a long-term, illiquid nature. Under these circumstances, and in view of the model seeking to capture the maturity structure in essence rather than in full detail, the categories of assets reported by the Reserve Bank have been combined as best possible into demand/liquid, short-term and medium/long-term financial assets, and separately those which constitute (by and large) credit extension (advances) to the non-bank business and household sectors.

Open market operations are not reflected fully and explicitly in the data reporting of the SA Reserve Bank, and need to be inferred from a combination of sources. Actual values of bond trade in the domestic market by the Reserve Bank were

reported as a data series until March 1998. The difference in Reserve Bank holdings of government stock from one period-end to the next, together with take-up or repayment of government stock during each period, could give part of the picture subsequent to that date. However, take-up and repayment of government stock by the Reserve Bank are not reported. Open market operations using other financial instruments needed to be compiled from various data series reported at different times by the Reserve Bank. Transfers between Tax and Loan accounts and exchequer account with the Reserve Bank can be inferred from the changes between period-ends of the exchequer account in the liabilities statements of the Reserve Bank, on the assumption that the Treasury is concerned primarily with maintaining working balances with the Reserve Bank. The extent of sterilisation transactions relating to foreign flows cannot be identified in data series separately from other open market operations, so needed to be treated in a combined manner with the rest of open market operations. Reserve Bank intervention by way of foreign exchange transactions with the domestic financial sector can be obtained as the changes occurring in net foreign reserve holdings of the Reserve Bank after deducting the value of gold reserves, which are revalued on a monthly basis using the prevailing gold price. Net holdings are used to eliminate the effect of foreign borrowings and repayments related to reserves.

Levels of required and actual cash reserves of the banks are fortunately reported directly, as are required and actual liquid assets, as defined for regulatory purposes by the SA Reserve Bank. Likewise, bank borrowing from the Reserve Bank discount window to meet cash reserve requirements (the money market shortage) is reported explicitly, though differently over the successive monetary policy accommodation regimes used by the Reserve Bank. The different time series applicable at different times needed to be combined to form a continuous series. Appendix 6.5 at the end of this chapter indicates specific issues relating to the calculation of derived data series.

The model equations of Chapter 5 reflect demand for and supply of capital assets separately, with these interacting together with additional bank advances

to determine investment. The demand and supply of capital assets however cannot readily be measured separately, and official data are not assembled in this separated form. It is necessary therefore to work with data which is the consequence of the demand/supply interaction, in the form of the investment in new capital assets which results. The conceptual separation of demand and supply aspects serves to indicate the Post Keynesian mechanism of investment determination through this interaction. However, in examining the empirical validity of the posited model, little is lost by combining the demand and supply equations into a composite equation which, together with additional advances, determines investment. This combined equation is used in the econometric formulation of the model.

6.3   Econometric Methodology

The econometric methodology used falls into the broad category of multiple linear regression, rather than time series modelling of the Arima (autoregressive integrated moving average, associated with the Box-Jenkins methodology) or of the VAR (vector autoregression) kind. Since Arima modelling is confined to information within the history of each time series itself, it is oriented to forecasting rather than economic explanation. The VAR approach treats all variables as endogenous, with all other variables in the model entering as explanatory variables for each variable, together with lagged values of the variable itself and other variables. Both Arima and VAR approaches are atheoretic in the sense that no causal relationships are assumed in advance. They are therefore not well suited to examining a model derived from theory, and are consequently not used in this chapter. The posited model is a multiple equation model, with certain endogenous variables occurring as explanatory variables, so that issues relating to simultaneous equation estimation need to be considered. In addition, the ubiquitous issues of stationarity and autocorrelation in time series analysis need to be addressed, as well as considering possible collinearity of explanatory variables. Cointegration tests and techniques are used to preserve relationships as far as possible under conditions of non-stationarity.

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The point of departure for model estimation purposes is the Classical Linear Regression Model (CLRM), based on the techniques of ordinary least squares (OLS), which has the desirable property that the estimators derived, under a set of assumptions applicable to many data sets, are Best Linear Unbiased Estimators (BLUE) in accordance with the Gauss-Markov Theorem (e.g. Gujarati 2003:70). The implication is that estimators are a linear function of one or more stochastic variables, that the expected value of each estimator is equal to the true (population) value, and that each estimator has the least variance of all estimators which are linear and unbiased. These qualities, to be strictly valid, require that the data and model equations comply with the assumptions underlying the CLRM, which include zero mean value of stochastic disturbance of dependent variable values for each explanatory variable value, homoskedasticity (equal variance), zero autocorrelation between stochastic disturbances and zero covariance between disturbances and explanatory variable values (ten assumptions can be identified, as described by Gujarati (2003:65-75); the aforementioned give a brief indication of the nature of the assumptions). However, where one or more of the CLRM assumptions are violated, variations or alternatives to the CLRM approach need to be considered. This inevitably introduces additional statistical complexity; however in many cases violations of the CLRM assumptions turn out to be of minor consequence in practice, so that deviation from the CLRM may not justify the additional complexities introduced by alternative approaches. It is nevertheless preferable that consideration be given to the manner and degree to which any assumption is violated, so that possible dangers are highlighted, and justification provided for the approach adopted.

The primary purpose of econometric examination in this chapter can be characterised as structural analysis, in the sense of determination and investigation of underlying relationships based on hypotheses, rather than prediction or policy simulation, using the classification of Intrilligator et al (1996:2-4). The hypothesis testing aspects of econometrics are therefore most pertinent, although a degree of prediction and policy simulation is used to examine the plausibility of the model structure posited. The hypothesis testing

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makes use of the conventional statistical techniques of evaluating the degree of confidence with which a null hypothesis can be rejected, using statistical distributions related to the normal distribution (t, chi-square) and comparison tests. These are well established techniques, and are used here without further explanation. The hypothesis tests indicate the degree of confidence which can be placed on the estimated parameters of equations in the model formulated, using the data assembled for the purpose.

Stationarity is a major issue with the data used, as is generally the case in working with time-based economic data. In most cases, the time series are not stationary in their unmodified form, due to price inflation and growth trends as well as other secular movements. It is necessary then to adopt econometric techniques for dealing with non-stationarity, in order to identify regression relationships which are not spurious. One common technique is first differencing, which renders stationary a series which is integrated of order one, i.e. I(1). Second differencing can similarly be used on a series which is I(2). These are used where difference relations are of primary concern rather than relationships between levels. However, differencing removes information relating to the level of the series (first differencing) and growth (second differencing), which detracts from the analysis where levels are of primary concern. Cointegration techniques enable this information to be preserved, and are therefore favoured where they are necessary and can be validly used. The cointegration approach can be applied to regression models where the regressand and regressors considered are integrated of the same order, e.g. all I(1) or all I(2). The first step in contemplating cointegration relationships (after establishing non-stationarity) is therefore determination of the order of integration of each series. If they show the same order of integration, and a cointegration relationship can be established, a regression model can be validly estimated, even though the series are non-stationary. Confirmation of the cointegration relationship can be provided by showing that the time series of residuals from the regression model are I(0), i.e. stationary (Granger and Newbold 1986:262-264). An error correction mechanism (ECM) can be used to supplement the regression model based on the cointegration relationship. The ECM

progressively moves the predictions of the model over time towards the relationship defined by the cointegration regression model. It can be visualised as reflecting short-run behaviour towards a longer-run underlying relationship given by the cointegration regression (Granger and Newbold 1986:225-226). In this thesis, the concern is with the underlying, sustained relationship rather than the short-run adjustment process, so that estimating an ECM is not strictly necessary, though improving short-run model forecasts.

Collinearity (alternatively termed multicollinearity), referring to the existence of linear stochastic relationships between two or more regressors, can easily arise with the nature of model contemplated here, since the regressors are drawn from economic time series of a monetary orientation, which could well have interrelationships between themselves. Existence of collinearity does not break the assumptions underlying the CLRM, and the estimators remain consistent, unbiased and efficient (BLUE). The negative consequence of collinearity lies in increased standard errors of estimators derived from data samples, which decrease the confidence with which estimators in a model equation can be accepted as statistically significant. Collinearity needs to be regarded as a matter of degree rather than being present or absent: in stochastic terms, there is frequently some extent of linear association between explanatory variables. It is only when the extent of collinearity is high that statistical significance becomes difficult to establish. High collinearity is revealed through a model equation estimation showing a high co-efficient of determination (R^2) but low statistical significance of parameter estimates. Where this arises in the estimation process, there are several approaches to improving the estimation, such as exploring the relationship explicitly between the regressors, and dropping one where two are closely associated, or incorporating the relationship between the two specifically in the estimation process. These approaches are used in the modelling process. As Gujarati (2003:348-349) argues, collinearity should be regarded in much the same light as micronumerosity (low number of data points relative to estimators), needing to be taken into account, but not necessarily invalidating the estimation process.

The presence of autocorrelation between successive stochastic disturbance terms in model estimation using time series data is widespread, and needs to be considered in the model estimation of this chapter. Presence of such autocorrelation does not affect the unbiased property of CLRM estimators, but does affect their efficiency, i.e. they are no longer BLUE in respect of the efficiency criterion. An adapted least squares approach (Generalised Least Squares) can be used to render the estimators BLUE in the presence of autocorrelation. Alternatively, the time series can be transformed through differencing processes so that the model to be estimated no longer contains autocorrelated disturbance terms. Techniques such as the Cochrane-Orcutt iterative procedure can also be applied to residual (disturbance term) values to correct the autocorrelation. The test used to determine whether significant autocorrelation is present is the Durbin-Watson d test. This provides a statistic ranging between 0 and 4, with 0 indicating perfect positive autocorrelation, 4 indicating perfect negative autocorrelation, and 2 indicating absence of autocorrelation. Upper and lower bounds around 2 can be determined, within which autocorrelation can be considered to be negligible. The Durbin-Watson d test is applied in each regression analysis, and further steps taken if the degree of autocorrelation is excessive in the context of the regression.

The possibility of simultaneous-equation bias arises from occurrence of dependent variables as explanatory variables in other equations of a simultaneous equation set. This gives rise to some degree of correlation between the (now explanatory) variable and the disturbance term of the equation (e.g. Gujarati 2003:724-727), and violates one of the assumptions of the CLRM, that there is no correlation between any explanatory variable and the disturbance term. If there is significant correlation between dependent variables and the residual term of an equation in which they appear as regressors, use of CLRM estimation gives rise to estimators which are not consistent i.e. do not tend asymptotically to their true value as sample size increases. The Hausman test can be used to determine whether simultaneous-equation bias is significantly present, or individual checks of correlation between variables and residual terms can be conducted. With the presence of simultaneous-equation bias, the two

stage least squares approach (2SLS) using instrumental variables provides consistent estimators. However, the degree of simultaneous-equation bias is frequently small in practice in the case of equation sets based on theoretical economic relationships since the occurrence of dependent variables as regressors is limited. Furthermore, where the simultaneous equation set can be written as a recursive set, i.e. in triangular form such that each dependent variable only appears as a regressor in subsequent equations, no simultaneous-equation bias occurs, and CLRM estimation is fully valid. Even where a small degree of simultaneous-equation bias exists, CLRM may provide better estimation results than the 2SLS approach due to the additional estimation variability introduced by pre-estimating proxy or instrumental variables. These issues are assessed in the model estimation process to determine the most suitable approach to use. It should be emphasised that a degree of judgement is entailed in the approach to be used, since there is typically a trade-off between the robustness provided by the CLRM approach but where there is a minor departure from the assumptions of the CLRM, and the strict theoretical correctness of alternatives which however introduce greater estimation variability through the additional steps adopted in the estimation process.

The test most widely used to determine stationarity of time series is the Augmented Dickey-Fuller test, based on the Dickey-Fuller test, but which additionally takes into account possible correlation between residual values. The test (in direct or augmented form) is based on the null hypothesis that the time series has a unit root, which would result in sustained movement away from its initial value or mean. If this null can be statistically rejected, the series is regarded as stationary. The augmented test introduces lagged points of the series to correct autocorrelation between residual (disturbance term) values within the test procedure. The same (ADF) test may be used on the residuals resulting from a cointegrating regression to determine whether the series are cointegrated, though the tests have different critical values due to use of an estimated cointegrating parameter vector. The tests in this context are frequently referred to as Engle-Granger (EG, or AEG if augmented) after the authors of the critical values and application of the test to cointegration. Two

additional stationarity tests, those of Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS), are used to corroborate the results of the ADF tests, especially in view of recognition that any one of the stationarity tests available (including the ADF test) has limitations. The Phillips-Perron test makes use of non-parametric methods to control for higher-order serial correlation in a series. While the ADF test corrects for higher order serial correlation using lagged differenced terms, the Phillips-Perron test makes a correction to the t-statistic of the coefficient from a first-order autoregression to adjust for serial correlation. These and most unit root tests are inclined to overstate rather than understate the likelihood of a unit root, i.e. the power of the tests is limited (Gujarati 2003:818-819). The KPSS test however uses a null hypothesis that the series has no unit root (is trend stationary), so is less inclined to overstate the likelihood of a unit root.

The concepts and testing process of Granger causality are used to determine whether there is an indication of a causal relationship from key monetary variables through to investment in the economy. Granger causality examines causal relationships in a time-sequencing and information sense which may not necessarily imply causality in a conventional physical or economic sense. The test examines the stochastic relationship of one variable with lagged values of a second, as well as lagged values of itself, to examine whether lagged values of the second variable contribute information to improve prediction of the first variable. The two variables are then interchanged. This indicates whether the relationship is significantly stronger in one direction than the other. If this is the case, the relationship is considered one of 'Granger causality' in that direction. Although not proof of physical or economic causality, the test contributes evidence that such a causal relationship exists.

6.4   Model Specification and Parameter Estimation

The model developed in Chapter 5 can be expressed in a form amenable to econometric examination as set out below, together with definitions of each variable. Here, the variables are either obtainable from economic time series data, or are able to be derived from combinations or operations on such data.

Some are closely related variables to those of the conceptual model (e.g. inflation expectations) due to the conceptual variable itself not being clearly measurable in practice.

$$IN = IC + IA \qquad \text{E6.4.1}$$

$$IR = IN - PIE \qquad \text{E6.4.2}$$

$$JN = 1/T * \sum_{0}^{T} IN \qquad \text{E6.4.3}$$

$$JR = JN - PIE \qquad \text{E6.4.4}$$

$$ERX = e1*IN + e0 + e2*OF + e3*TY \qquad \text{E6.4.5}$$

$$PMR = a1*ERX + a0 + a2*TY \qquad \text{E6.4.6}$$

$$PKX = b1*IN + b0 + b2*TY \qquad \text{E6.4.7}$$

$$CER = c1*IN + c0 + c2*TY \qquad \text{E6.4.8}$$

$$OP = OB + OD \qquad \text{E6.4.9}$$

$$DU = (0.8*DD+0.15*DS+0.05*DM)/(DD+DS+DM) \qquad \text{E6.4.10}$$

$$DT = DD + DS + DM + DG \qquad \text{E6.4.11}$$

$$BU = (0.8*BD+0.15*BS+0.03*BM+0.02*BL)/(BD+BS+BM+BL) \qquad \text{E6.4.12}$$

$$BT = BD + BS + BM + BL \qquad \text{E6.4.13}$$

$$HR = 0.025*DP \qquad \text{E6.4.14}$$

$$HND = h1*(OP+OT) + h2*OF \qquad \text{E6.4.15}$$

$$HB = HA - HN \quad (\text{or } HN = HA - HB) \qquad \text{E6.4.16}$$

$$ANR = l1*HNR + l2*HND + l3*BU \qquad \text{E6.4.17}$$

$$KIR = k1*ANR + k2*JR + k3*CEG + k4*CER + k5*ERX + k6*PKX$$
$$+ k7*IR + k8*PMR + k0 + k9*TY \qquad \text{E6.4.18}$$

IC   policy interest rate (repo rate, Bank rate until March 1998)

IA   margin of nominal short-term rate over policy rate

IN   interest rate nominal short-term (prime overdraft rate)

IR   interest rate real short-term (real prime overdraft rate)

JN   nominal long-term cost-of-capital rate (R153 used)

JR   real long-term cost-of-capital rate

PIE   expected inflation rate

ENX   nominal effective exchange rate, base year 2000

ERX   real effective exchange rate index, base year 2000

TY	time trend, base year 2000
OB	open market purchases of bonds
OD	open market purchases, instruments other than bonds
OP	open market purchases total
OT	net transfers Reserve Bank to T&L accounts
DD	demand deposits non-government
DS	short-term deposits non-government
DM	medium and long-term deposits non-government
DG	deposit liabilities of government held by banks
DT	total bank liability deposits held including government
DP	deposit liabilities of banks to non-government, defined as eligible
DU	deposit maturity structure measure
	$(0.8*DD+0.15*DS+0.05*DM)/(DD+DS+DM)$
BD	liquid assets held by banks
BS	short-term financial assets held by banks
BM	medium and long-term financial assets held by banks
BL	loan credit extended by banks (stock concept)
BT	bank financial assets total
BU	asset maturity structure measure
	$(0.8*BD+0.15*BS+0.03*BM+0.02*BL)/(BD+BS+BM+BL)$
OF	Reserve Bank net purchases of foreign exchange in domestic market
FR	gross foreign reserve holdings of Reserve Bank
FRD	change in gross foreign reserve holdings of Reserve Bank
HR	required cash reserves
HN	non-borrowed cash reserves
HNR	non-borrowed cash reserves, real
HB	borrowed cash reserves
HA	actual cash reserves
HAA	actual cash reserves adjusted to include all bank vault cash
HND	increase in non-borrowed cash reserves
HAD	increase in total cash reserves
AN	net new lending by banks, nominal
ANR	net new lending by banks, real

KI   new investment expenditure in economy, nominal

KIR   new investment expenditure in economy, real

CE   consumption expenditure in economy, nominal

CER   consumption expenditure in economy, real

CEG   consumption expenditure growth, real

PKX   value (price) index of assets in the economy, nominal

PMX   import prices, expressed as index, base year 2000

PMR   import prices in real terms, nominal index deflated by CPIX

Relationships are expressed here in linear form: certain equations (e.g. KIR) may conceivably produce a closer explanatory fit if expressed in logarithmic form. This possibility was tested in the process of equation estimation. Most of the equations are better specified in linear form in view of the linear conceptual nature of the relationship (e.g. HNR, ANR). The stochastic residual term applicable to each behavioural equation is not reflected above to improve readability; where referred to explicitly, the character U followed by a digit is used, e.g. U1. A constant is included in equations where appropriate, shown symbolically in lower case with second character 0. A time trend variable (TY) is included as a possible explanatory variable where a time trend could be present. It is used in the form TY-80 to provide a suitable magnitude, since TY is based to 100 in year 2000 (value 80 in 1980). If the presence of the constant showed itself to be statistically insignificant in the regression analysis, then the constant was dropped from the regression. The focus is on the influence of monetary policy variables through intermediate aggregates. For instance, in the consumption expenditure equation, the interest rate (short rate, influenced by the policy rate) is treated explicitly as an explanatory variable, with a constant and stochastic trend, and with the residual term serving as a proxy for a number of possible variables which could be included as regressors. The aim is not to provide a fully-fledged behavioural equation for consumption expenditure, but to capture the link of interest rates through consumption expenditure to investment expenditure. A similar approach is taken to equations for exchange rate, import prices and asset values, which could each be the subject of extensive model specification exercises in their own right.

Each variable, explanatory as well as endogenous, was tested prior to equation estimation to determine its stationarity or order of integration, using the Augmented Dickey Fuller (ADF), Phillips-Perron and KPSS tests. A summary of these test statistics is shown in Appendix 6.1 to 6.3 at the end of this chapter. The assumption of an intercept or trend for test purposes was based on the nature of each series, e.g. consumption expenditure is likely to have an intercept and trend, an interest rate is likely to have an intercept only. As expected, most nominal Rand-value variables, whether flows or levels, show ADF test statistics within (below in absolute terms) the critical distribution values, so that the null hypothesis of a unit root cannot be rejected at a high confidence level (95% or 99% confidence interval). The exception is the Reserve Bank quantitive transaction variables (OB, OD, OP, OT, OF, FRD). Non-stationarity applies likewise to most of the variables expressed in real Rand terms (base year 2000 prices). The nominal values have both a price and volume time trend, and the real values still have a secular time trend (generally stochastic rather than deterministic). In respect of interest rates, the ADF test statistics support the alternative hypothesis of no unit root and the implied stationarity in the case of the long-term real rate. Nominal rates and the real short-term rate, using a general (CPIX) price deflator, fall short of stationarity at the 90% confidence level. All variables used with the exception of real GDP are indicated as stationary in first differences, in most cases at the 99% confidence level. The Phillips-Perron tests confirm the stationarity results of the ADF tests in all but one of the cases, being that of JR, which shows a PP test statistic slightly below the 90% confidence level. The KPSS tests however show JR as stationary. The KPSS tests by and large confirm the stationarity of variables of the other two tests, though showing real long-term interest rates as stationary, in line with the ADF rather than PP test.

An approach was adopted of expressing the variables to be used for econometric estimation in a form which is as close to stationarity as possible without losing level information where levels are of conceptual significance. This renders the statistical procedures valid in a number of cases without needing to

use the techniques of cointegration. However, where stationarity could not be obtained without losing information which could be important to the analysis, cointegration techniques were used to ensure statistical validity in spite of the variables being non-stationary. In the case of consumption expenditure for instance, the series was brought closer to stationarity by deflating the variable by a price index (CPIX) and partly correcting for a secular growth trend through using the logarithm of the real variable.

Examination of the equation structure of the multiple-equation model as specified reveals that it is in fact recursive in nature. It can be arranged in triangular form such that endogenous variables do not appear as explanatory variables in prior equations. This arises from the sequential manner in which the relationships are specified from monetary policy input variables through intermediate stages to investment in the economy as a consequence, together with the model specification being kept as simple as possible, so that conceivable feedback interactions are not incorporated. The implication of the recursive structure is that issues of simultaneous equation bias do not arise to any significant degree, and individual equations can validly be estimated without needing to take into consideration the effects of other equations in the model. It reduces the complications which could otherwise arise from adopting a two-stage least squares and instrumental variable or similar procedure.

The key behavioural equations for purposes of this chapter are those for changes in non-borrowed cash reserves (ΔHN), net new advances (AN or ANR) and investment spending (KI or KIR), and the estimation of each is covered below to indicate the issues arising and justify the approach adopted. Two of the three involve non-stationary variables in their initial form, so require a combination of seeking stationary forms of the variables, together with using cointegration approaches where stationarity cannot be attained without losing level information. The sample period used for the regression analyses is Q1 1991 to Q4 2006, with quarterly data, giving 64 data points for each variable.

The non-borrowed (basic) reserves[1] equation seeks to determine whether there is an econometrically demonstrable relationship between such reserves held by clearing banks and the quantitive interactions that the Reserve Bank undertakes through open market purchase or sale of financial instruments, transfers between Treasury Tax and Loan accounts with clearing banks and Treasury accounts with the Reserve Bank, and transactions with domestic parties in respect of foreign exchange holdings. The data for these variables are assembled in nominal Rand terms in the first instance. The explanatory variables are flow variables, so it is appropriate to consider changes in HN, i.e. ΔHN or HND, which is thereby also equivalent to a flow. The ADF unit root tests show that HND as well as the explanatory variables are stationary at the 95 or 99% confidence level, without further modification: HND -6.95, OP+OT -4.38 and OF -2.95, compared to critical values of: 1% -3.53, 5% -2.91, 10% -2.60. This is confirmed by the PP and KPSS tests, other than for OF, which shows borderline in the PP test but stationary in the KPSS test. It is treated as stationary in view of the KPSS confirmation. The regression analysis provides an equation in which the estimated parameters of the substantive regressors are significant at the 99% confidence (1% error probability) level. Stationarity of the residuals of the regression is shown by an ADF statistic of -6.78 relative to a 1% critical value of -3.54, substantiating the regression relationship:

$$HND = 0.026*(OP+OT) + 0.088*OF \qquad\qquad E6.4.19$$

$$t: \qquad (2.58) \qquad\qquad (6.10)$$

$$R^2 = 0.31 \qquad\qquad DW = 0.86 \qquad\qquad F = 26.9$$

A Cochrane-Orcutt procedure was used to adjust for autocorrelation of residuals in the regression in view of the DW test statistic being below the lower bound.

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[1] Non-borrowed or basic reserves are equal by definition to total cash reserves less borrowed reserves. The latter is equivalent to the money market shortage, or Reserve Bank accommodation. In view of the change from Bank rate as SA Reserve Bank policy rate to the repo rate from March 1998, the accommodation provided by the SA Reserve Bank is reflected as different data series prior to and after this date. The series were directly merged for the purpose of model estimation since both reflect the Rand value of borrowing (at non-penalty rates) by banks to meet cash reserve requirements.

It also needs to be noted that there is an additional complication in determination of cash reserves in that vault cash held by the banks was progressively excluded from qualifying as cash reserves between 2001 and 2004: details are provided in Appendix 6.5.

The co-efficients change slightly with the adjusted equation, though both remain significant. The results are shown in Appendix 6.6.

Although the coefficients of open market operations together with Tax and Loan account transfers show as statistically significant, it had been expected that this relationship would be stronger, with co-efficients closer to one, in view of such transactions supposedly affecting non-borrowed reserves directly. The matter was investigated further. One possibility was that the open market operations data did not reflect closely the value of open market operations actually undertaken. Since the Reserve Bank does not show open market operations explicitly in consistent data series over the period considered (1991 to 2006), the data had to be assembled indirectly from related data series. This applies in particular to open market operations themselves (excluding Tax and Loan account transactions), since a variety of financial instruments are used, from Treasury bonds to reverse repo transactions, deposit swaps and the Reserve Bank's own debentures, and the Reserve Bank has changed its usage materially at different times. Data series may reflect open market operations in certain instruments, but not others, when usage changes. Open market operations in Treasury bonds have not been shown explicitly since April 1998 in Reserve Bank data, as indicated above, and transactions in Reserve Bank debentures and reverse repurchase agreements were not shown prior to that. A second possibility was that, over the period considered, the Reserve Bank has been undertaking transactions in the various instruments primarily for specific portfolio management purposes, with transaction levels low relative to cash reserves in the economy, and having little systematic pattern, resulting in the effect on cash reserves being minor in statistical terms. A third possibility was that the Reserve Bank allows the money market shortage (borrowed reserves) to vary within a fairly wide band without engaging in open market operations to bring it to a target level, and banks adjust to the variation in accommodation readily without behaviour change, so that open market operations have a greater effect on total actual cash reserves rather than non-borrowed reserves.

These issues were taken up with the Reserve Bank[2]. It was confirmed that the Reserve Bank has used a varying spread of financial instruments for money market transactions, and that a data series is not compiled which gives a consistent and complete value of all open market operations engaged in. It was confirmed further that, with the main focus being on the policy interest rate in its monetary policy framework, the exact magnitudes of open market operations are not regarded as having significant consequence for monetary policy. Many such transactions are indeed undertaken for purposes of portfolio modification, and would appear 'ad hoc' in considering monetary policy. The Reserve Bank policy focus is towards ensuring that the money market shortage is at all times at such a level that the Reserve Bank policy interest rate is transmitted firmly and rapidly into the money market. It was confirmed further that, provided the Reserve Bank is satisfied that the money market shortage is sufficient to ensure this transmission, it may allow the magnitude to vary over a significant band. All three possible sources of a weaker-than-anticipated relationship between open market operations and changes in non-borrowed reserves were therefore consistent with the manner in which the Reserve Bank views and undertakes monetary policy in practice.

It needs to be noted that the above open market operations issues apply to money market transactions rather than to transfers between Tax and Loan accounts and Reserve Bank. The latter can be more explicitly derived from Reserve Bank statements of liabilities, and have been used more expressly for monetary stabilisation purposes (e.g. to reduce the monetary effects of an accumulation of foreign reserves). Tax and Loan account shifts can be shown as a separate variable from open market operations in financial instruments, so that the effects of each can be identified, or the two combined. However, treated as individual regressors, OP shows greater significance than OT, with a t-statistic of 2.69 compared to 0.25. The low significance of OT could be due to its non-continuous usage together with its use to counteract effects of foreign

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[2]   I wish to thank Dr J P van den Heever, Head of Research of the SA Reserve Bank, for the useful discussion concerning these issues.

reserve transactions. The combination of OT and OF shows higher explanatory significance than OT, with a t statistic of 3.66, though this is lower than OF on its own. A low value of R^2 despite the parameter estimates being statistically significant, is an indication of other explanatory variables, which are not of a monetary policy nature, not being present as explanatory variables in the regression.

In view of the above, an alternative possible relationship of Reserve Bank quantitive operations to cash reserves was examined, expressed as a relationship to total rather than non-borrowed reserves. The regressand was again expressed in difference form so that all variables are flow rather than stock magnitudes. The alternative equation specification examined is:

$$HAD = 0.006*(OP+OT) + 0.097*OF \qquad \text{E6.4.20}$$
$$\text{t:} \qquad (0.49) \qquad\qquad (5.45)$$
$$R^2 = 0.025 \qquad DW = 1.34 \qquad F = 1.55$$

Stationarity of HAD is shown by an ADF test statistic of -5.15; the explanatory variables are likewise stationary at the 95 or 99% confidence level, as shown in the previous regression. Stationarity of the residuals of the regression is shown by an ADF statistic of -4.75 relative to a 1% critical value of -3.54, i.e. the residuals are stationary at the 99% confidence level. The significance of the estimated coefficient of OP+OT (0.49) was far lower than in the previous equation, falling below a threshold which could be considered significant. The influence of foreign exchange transactions again shows as highly significant. It is apparent that there is no stronger a relationship of open market operations to total reserves than to non-borrowed reserves. Using changes in total reserves on an adjusted basis as dependent variable, in which all bank vault cash is included with total reserves to remove possible distortion arising from the progressive removal of vault cash over 2001 to 2004, did not produce materially different results.

The new advances (net new lending by banks) equation seeks to establish whether there is a relationship, and the nature of any such relationship, between new advances and the level, or change, in non-borrowed cash reserves, which

are in turn affected by Reserve Bank open market, Tax and Loan account and foreign reserve transactions, as well as (possibly) the maturity structure of the financial asset holdings of banks. The Rand-value variables were converted to real terms to move them closer to stationarity. Both level and change in level of non-borrowed cash reserves were included as explanatory variables. Alternative lags were tested, and only the most significant used in the final equation to avoid unnecessary complexity. The regression analysis provides the equation:

E6.4.21

$$ANR = 3.18 * HNR + 0.365 * (HND(-1) + HND(-2)) + 3864 * BU(-1) + 6042 * IND$$

t: (4.35)   (0.53)   (4.51)   (3.58)

R^2 = 0.33   DW = 0.71   F = 9.93

Unit root tests show HND and IND to be stationary at the 99% confidence level, ANR, HNR and BU stationary at the 90% confidence level. The residuals of the equation are nevertheless stationary at the 99% level (ADF statistic -4.46), indicating a likely cointegration relationship between the level variables which are borderline stationary. The above equation includes interest rate changes (IND) explicitly as an explanatory variable so that its influence is apparent. However, estimating a similar equation without IND as an explanatory variable shows similar degrees of significance of the other explanatory variables. Using a Cochrane-Orcutt procedure to adjust for autocorrelation of residuals in the regression gives slightly changed co-efficients in the adjusted equation, with significance of explanatory variables remaining as previously, though with reduced t statistics. The results are shown in Appendix 6.6.

The investment equation seeks to capture the relationship between the variables pertinent to monetary policy, as determined in the earlier equations of the model, and investment in the economy. Investment (gross domestic fixed capital formation) is expressed in real terms to bring it closer to stationarity. Explanatory variables for new advances and consumption expenditure are similarly expressed in real terms. In view of the secular growth in the economy, the real time series for investment and consumption expenditure remain non-stationary with a unit root (ADF) test showing test statistics of 2.33 and 3.42 compared to a critical value of -2.91 at the 5% level (95% confidence). In view of

the importance of preserving level information in the equation variables, and the dangers of modifying by a GDP index when investment and consumption are components of GDP, the equation relationship needs to be justified on the basis of a cointegration relationship between variables, rather than using differencing.

The equation specified and tested is: E6.4.22

$KIR = 0.187*ANR(-1) + 744*CEG + 0.417*CER(-2) - 123.7*ERX - 103.6*PKX - 743.7*JR - 759.7*PMR$

t: (7.15)   (3.21)   (21.9)   (-5.00)   (-2.86)

(-4.70)   (-13.65)

$R^2 = 0.99$ $DW = 1.09$ $F = 1366.5$

A unit root (ADF) test on the regression residuals shows them to be stationary at the 99% confidence level (test statistic -4.73, 1% critical value -3.54). This indicates a cointegrated relationship between regressand and explanatory variables, given that all variables are stationary in first differences. A further test of cointegration, using the Johansen test procedure, confirms the cointegration relationship, with the hypothesis of zero cointegrating vectors being rejected, and the hypothesis of a single cointegrating vector not being rejected. Using a Cochrane-Orcutt procedure to adjust for autocorrelation of residuals in the regression gives slightly changed co-efficients in the adjusted equation, with significance of explanatory variables remaining as previously, though with reduced t statistics. The results are shown in Appendix 6.6.

An error correction mechanism (ECM) formulated and estimated for the above investment equation is as follows:

E6.4.23

$KIRD = -2865.0 + 0.060*ANRD + 403.3*CEGD + 0.274*CERD(-2) - 47.2*ERXD + 5290*PKXD - 220.5*JRD - 12737*PMRD - 0.034*(KIR(-1) - KIR_F(-1))$

t: (-1.23)   (2.07)   (1.31)   (3.91)   (-0.56)

(0.57)   (-1.20)   (-1.09)   (-1.2)

$R^2 = 0.44$ $DW = 1.45$ $F = 5.45$

This expresses the short-run dynamics in adjusting to the long-run cointegrated relationship. The estimated equation shows a negative co-efficient on the error term of the long-run relationship (KIR(-1)-KIR$_F$(-1)), indicating corrective behaviour towards the long-run equation. In accordance with Granger's representation theorem (e.g. Gujarati 2003:824-825), the existence of an ECM equation in which estimation shows a negative co-efficient on the error term, provides additional confirmation of a cointegration relationship in the long-run equation. The coefficient estimation shows a t value of -1.2, which is somewhat low in demonstrating statistical significance, so the confirmation needs to be viewed in conjunction with the other evidence of a cointegration relationship. As indicated earlier in the chapter, the primary concern is with the long-run relationship, though the ECM provides additional confirmation of the cointegration relationship as well as providing a mechanism for more precise period-to-period forecasting if needed.

The less central behavioural relationships for purposes of this chapter were estimated with the short-term interest rate as the primary monetary policy related explanatory variable, together with a time trend and constant. The import price equation is formulated with the exchange rate as primary influencing variable of a monetary nature, which in turn is influenced by interest rates. This approach was adopted on the basis that there could be a range of other possible explanatory variables, but it is the relationship to monetary policy variables that is pertinent here. It is not hypothesised that the quantitive monetary variables under the control of the Reserve Bank have significant effects on these variables, so the monetary explanatory variables are confined to those arising from the policy interest rate. Variations of the equations with the quantitive variables included were estimated to confirm that their influence was not significant. The one exception to this is the possible effect of foreign exchange transactions by the Reserve Bank on the exchange rate, and this was included as a candidate explanatory variable for the exchange rate equation. The co-efficient estimated is statistically significant. The positive co-efficient on the foreign exchange transactions variable is consistent with the Reserve Bank using such transactions for the most part to reduce short-term fluctuations rather

than to alter the exchange rate resulting from market forces, so that increased Reserve Bank purchases of foreign exchange are associated with periods of relative Rand strength, or relative Rand weakness with Reserve Bank selling of foreign exchange for Rands.

The equations estimated are as follows:

ERX =   `   E6.4.24

$$331.8 - 2.87*IN + 2.06*IRD + 1.97*IR(-1) - 0.521*10^{-3}*OF(-1) - 67.06*LOG(TY-80)$$

(13.00) (-4.58) (2.76)   (4.17)   (-3.15)   (-9.84)

$R^2 = 0.686$ DW $= 0.48$ F $= 24.08$

Residuals : ADF test statistic -2.76, stationary at 90% confidence (critical value -2.61).

PMR =   E6.4.25

$$-2.615 + 0.0139*ERX + 1.74*(100/ERX) + 0.343*(100/ERX(-1)) + 0.00548*(TY-80)$$

(-4.04)   (4.45)   (5.28)   (3.06)   (3.34)

$R^2 = 0.857$ DW $= 0.50$ F $= 83.59$

Residuals : ADF test statistic -3.32, stationary at 95% confidence (critical value -2.91).

$$LOG(CER) = 11.59 + 0.0171*(100/IN) + 0.529*LOG(TY-80)$$ E6.4.26

            (233.8)   (4.53)   (24.3)

$R^2 = 0.961$ DW $= 0.117$ F $= 707.6$

Residuals : ADF test statistic -2.92, stationary at the 95% confidence level.

$$LOG(PKX) = 3.023*LOG(YDX) + 0.0263*(100/IN) - 0.0556*LOG(TY-80)$$ E6.4.27

            (54.47)   (4.12)   (-3.82)

$R^2 = 0.985$ DW $= 0.25$ F $= 1927.7$

Residuals : ADF test statistic -3.83, stationary at the 99% confidence level.

Each equation shows a significant coefficient, of the expected sign, relating to the interest rate, changes to it or to its inverse. In these equations, not all the variables used are stationary, so the regression substantiation relies on a cointegration relationship. The high R^2 values need to be regarded with caution in this light. The test of stationarity of the residuals is used to support the cointegration relationship. Further consideration of the cointegration is not

pursued since these are subsidiary equations for present purposes. Corrections for autocorrelation are shown in Appendix 6.6.

The equation for the long-tem cost of capital rate (JN) in terms of short-term rates seeks to express that there is flow-through from short rates to long rates so that the monetary policy rate affects rates across the term spectrum, including those on which the cost of long-term borrowing for investment spending are based. The Post Keynesian position is that the long rates are based on market perceptions of the trajectory of short-term rates. Provided a relationship exists through which the policy rate can influence long rates, it is not crucial here to examine in detail the exact nature of that relationship. The future trajectory of actual short term rates historically was taken as a proxy to examine approximately the connection from short to long rates. The trajectory of future short rates was combined to form a predicted long rate by taking a forward moving average of short rates with varying horizons into the future. These were then compared to actual long rates through examining the regression relationship between the two, allowing a constant in the equation. Examination at various time horizons showed the greatest correspondence between long rates predicted on this basis and actual long rates, to be for a future time horizon of around 8 to 10 quarters (2 to 2.5 years). This is intuitively plausible, given the lead times of capital investment projects and business planning time periods. The regression relationship shows an R^2 statistic of 0.745, a t-statistic on the moving average of short rates of 12.9 and F-statistic of 166. Residuals from the regression are stationary at the 95% confidence level, and close to the 99% level. The relationship therefore provides support for the proposition of the long rate being related to an expected future trajectory of short rates, though of course it is being assumed that the actual trajectory of short rates is a reasonable proxy for the expected trajectory, which would be difficult to measure.

The other relationship of interest in the context of this thesis is that between the maturity structure of assets in the combined balance sheets of banks, and that of their (deposit) liabilities. The hypothesis for examination is that banks adjust the

maturity structure of their asset holdings to maintain a prudential relationship of asset structure to liability structure. The liability structure is less amenable to their direct control, even though they may engage in some degree of liability management, since depositors are able to transfer funds from liquid to term deposits of varying duration at their volition, and term deposits move to increasing liquidity with the effluxion of time. The anticipated relationship is therefore from liability maturity structure (explanatory) to asset maturity structure.

The equation specification used includes the effects of changes in cash reserve holdings explicitly as well as the liability maturity structure, with constant and time trend terms. The equation with estimated coefficients and t-statistics is as follows:

$$BU = 10.92 + 4.00*DU + 6.16*10^{-5}*HA - 2.80* LOG(TY-80) \qquad E6.4.28$$

t: (13.01)   (4.23)   (5.28)   (-6.58)

$R^2 = 0.52$ DW = 0.72   F = 21.6

The asset maturity structure is positively related to that of liabilities, with the t-statistic of 4.23 indicating statistical significance. Neither BU nor DU is stationary at the 95% confidence level, due to a trend in maturity structures towards greater liquidity over the time period considered. The residuals from the regression are nevertheless close to stationary at the 95% confidence level, using an ADF test, with the test statistic being -2.86 compared to a 5% critical value of -2.91. The estimation results give an indication of a relationship between BU and DU. With an adjustment for autocorrelation using a Cochrane-Orcutt procedure, the co-efficient on DU remains significant. The adjusted regression results are shown in Appendix 6.6.

6.5   Statistical and In-sample Tests

To provide an indication of whether stochastic causality from key monetary policy variables to investment could be shown, the Granger causality principles and test were used. As indicated, Granger causality is based on predominance of time sequencing and information content between variables, so is not a perfect indicator of physical causality. It is however a contributor to evidence of physical (economic) causality. The policy variables tested for possible stochastic

causal influence over investment were the policy interest rate (IC through IN), foreign reserve interactions with the domestic market (OF) and open market operations using bonds and other instruments (OP) or transfers between Tax and Loan accounts and exchequer accounts with the Reserve Bank (OT). The test assumes that the variables used are stationary. To satisfy this requirement, the variables being tested were expressed in differenced form where necessary to render them stationary. This applied in particular to investment (KIR), which has a secular trend when expressed in real terms, but was applied also to the real short-term interest rate (IR) in relating it to investment changes so that both are in first difference form. The differenced forms are depicted as KIRD and IRD.

The results of the Granger causality tests in respect of interest rate and investment, at a range of plausible lags, is as follows:

F-statistics at specified lags:	1 lag	2 lags	3 lags	4 lags
H_0: IRD does not cause KIRD	4.71	3.37	5.41	4.06
H_0: KIRD does not cause IRD	1.62	2.74	2.21	1.45
Critical F-values at 5% level	4.00	3.15	2.76	2.53

The F-values can be compared to critical distribution values, with numerator degrees of freedom given by the number of lags and denominator degrees of freedom given by the number of data points less the number of parameters estimated (number of variables, in this case two, times number of lags). A range of lags is used over which effects could plausibly occur. At 1, 2, 3 and 4 lags the null hypothesis that IRD does not cause KIRD is rejected by the F-test, so that causality from IRD to KIRD is affirmed, whereas at all four lags the null hypothesis that KIRD does not cause IRD is accepted by the F-test. This is an indication of unidirectional causality from IRD to KIRD, with little reverse causality (feedback). It is notable that the causality is strongest at a lag of three quarters.

A Granger causality test applied to foreign reserve transactions in the domestic market by the Reserve Bank (OF) with a similar range of plausible lags shows results as follows:

F-statistics at specified lags:	1 lag	2 lags	3 lags	4 lags
H_0: OF does not cause KIRD	4.80	2.40	1.70	1.25
H_0: KIRD does not cause OF	0.60	1.27	0.43	1.40
Critical F-values at 5% level	4.00	3.15	2.76	2.53

This indicates a significant causality relationship from OF to KIRD with a single lag period. For lags from 2 to 4, although the results suggest that causality runs more from changes in net foreign reserves to changes in investment than in the reverse direction, the significance levels are too low to substantiate this. The results suggest a short-run unilateral causality from OF to KIRD.

For a Granger causality test applied to changes in gross foreign reserve holdings (FRD) of the Reserve with a similar range of plausible lags, the results are:

F-statistics at specified lags:	1 lag	2 lags	3 lags	4 lags
H_0: FRD does not cause KIRD	5.21	6.78	5.86	4.70
H_0: KIRD does not cause FRD	1.55	0.50	1.09	0.67
Critical F-values at 5% level	4.00	3.15	2.76	2.53

The results indicate with statistical significance that causality runs from changes in gross foreign reserves to changes in investment, with little reverse causality or feedback, at all four lag periods. This could however result from increases in the gold price being followed by increased investment, as well as by increased gross reserves (prior to sterilisation) resulting from international capital flows into the economy in advance of investment activity. It may therefore not be a result of monetary policy related interventions.

In the case of money market operations, in the form of bond purchases/sales by the Reserve Bank and transfers to/from Tax and Loan accounts, the Granger causality tests show little causal relationship in either direction, with all test statistics well below the critical F-values. This may be due to the Reserve Bank making little use of open market operations for monetary policy purposes during the period, with transactions being carried out in the main for technical purposes (e.g. portfolio adjustments) rather than with monetary policy intent, as discussed above.

For the relationship from non-borrowed reserves to investment, both expressed in difference form to ensure stationarity (i.e. HNRD and KIRD), the Granger test results over four lag periods give:

F-statistics at specified lags:	1 lag	2 lags	3 lags	4 lags
H_0: HNRD does not cause KIRD	5.51	2.83	2.00	1.60
H_0: KIRD does not cause HNRD	3.61	1.98	2.86	2.47
Critical F-values at 5% level	4.00	3.15	2.76	2.53

The Granger causality tests show a significant causal relationship from HNRD to KIRD at a one period lag, with significance falling for longer lag periods.

Examination of the direction of causality between changes in bank lending levels (ANRD) and changes in investment likewise provides support for the dominant causation being from lending changes to investment changes rather than vice versa. The Granger test results over four lag periods are:

F-statistics at specified lags:	1 lag	2 lags	3 lags	4 lags
H_0: ANRD does not cause KIRD	5.22	4.05	2.49	2.08
H_0: KIRD does not cause ANRD	0.23	0.61	1.07	0.77
Critical F-values at 5% level	4.00	3.15	2.76	2.53

The causality is significant for the lag period up to 2 quarters, but becomes less so for longer lag periods. The test statistics are nevertheless more strongly supportive of the direction of causality being from lending changes to investment changes than the reverse direction, even at the higher lag periods. The stronger relationship at short lag lengths indicates a fairly rapid influence from new lending to investment, which could be expected on the basis that the borrowing is obtained for investment purposes with the investment expenditure occurring within a few quarters of financing.

An in-sample simulation of the model as specified and estimated was carried out to view its behaviour relative to actual historical outcomes. For this purpose, the monetary policy related variables are treated as exogenous, and all intermediate variables set free to be determined through the equations of the model. This

means for instance that the input variables to the investment equation are as determined by model equations rather than actual values, so that the entire equation sequence of the model is being tested. If the simulation results for investment, as the final outcome variable, show a reasonably close correspondence to actual investment values recorded historically, this indicates that the model provides a plausible representation of the mechanisms occurring in reality.

Appendix 6.4 of this chapter shows a graph of the simulation by comparison to actual investment values, over the historical period 1996 to 2005. It can be seen that the model does indeed track actual investment fairly well. In quantitative terms, the difference between model and actual investment averages 2.0% in absolute terms over the simulation period, or a root mean square error of 2.5%. If the ECM is used, the difference between model and actual values decreases marginally. Of course, as in all in-sample tests, the parameter estimates were obtained using the historical data to which the comparison is being made. The in-sample test does nevertheless confirm that the model is plausible and does not exhibit any marked and unexpected deviations from reality.

6.6   Policy Simulations

The purpose of these simulations is to examine how the model behaves in the case of variations of key monetary policy variables from the levels which actually occurred historically. It gives an indication of how the model reacts to such policy variable changes, and what the relative magnitudes are from monetary policy variable changes to investment in the economy. It suggests the magnitudes of effects of monetary policy actions on the real economy, on the basis of the model providing a fairly close representation of the relationships occurring in reality.

The model was set up in such a way that alternative forecasts could be produced, still within the historical data period, by varying monetary policy related variables from the values which actually occurred historically. The comparison was made relative to a model forecast set using the model

equations, rather than to actual investment levels recorded in the data, so that the effects of variable changes on investment through the model can be isolated from differences between model forecasts and actual data when actual monetary policy variables values are used. As shown in the previous section, the model provides in-sample forecasts which are within a few percent of actual investment levels, but these could cloud the identification of differential effects occurring purely through monetary policy variable changes. The model in-sample forecast of investment using actual data of monetary policy variables served as a baseline from which the effects of monetary policy variable changes could be examined.

The first such simulation considers the effect of the key policy interest rate being increased by one percentage point above the rate actually adopted. The increase was introduced with effect from the first quarter of 2003 to allow for comparisons over the following two years as well as the initial year. It provides a recent comparison period, and avoids the economically turbulent period over 2001/2002. The rate was maintained at one percentage point above the actual rate through to the end of the simulation period (end 2005). The effect was measured as the percentage change in investment level relative to the baseline level. The simulation shows a reduction in investment in the initial year (2003) of 0.78% relative to baseline, of 2.51% in 2004, and of 3.0% in 2005. The interest rate increase therefore has a progressive effect in reducing investment, with the greatest impact being in the second year, and decreased additional impact in the third year (an additional 0.5%).

A second simulation indicates the effect if the interest rate increase is reversed after a period of one year, i.e. it reverts to its actual historical level from the first quarter of 2004. In this case (the 2003 effect being as previously) the effect over the year 2004 is a reduction of 1.12% relative to baseline, and investment only returns to the baseline level over the course of 2005. This indicates that the effect of an interest rate increase, even though introduced for a limited period to address particular circumstances, has an effect extending for at least a year after the rate increase is reversed. The model simulation does show the investment

level eventually returning to the level which would have prevailed without the rate increase, though forfeited investment is not recovered.

A third simulation shows the effect of a reduction of the policy interest rate by one percentage point, also from the beginning of 2003. The effects are somewhat stronger than those of an interest rate increase. The investment level increases by 0.86% in the initial year, 3.0% in the second year, and 3.65% in the third. Policy interest rate effects are therefore not perfectly symmetrical, with one percentage point change producing a greater stimulatory effect than dampening effect. Confining the interest rate reduction to a one year duration, confirms that again the stimulatory effect is sustained for approximately an additional year beyond the reversal.

A fourth simulation considers the effect of open market operations, with the interest rate not being changed from its actually occurring values. Additional open market operations purchases to the value of R20bn over the course of the year 2003 (R5bn per quarter), not continued thereafter, show an increase in investment in the initial year of 0.02%, rising to 0.07% in the second year, and declining to 0.04% in the third year. Additional open market operations sales of the same magnitude show an equivalent dampening effect on investment. Effects of a similar change in foreign reserves purchases/sales by the Reserve Bank from the domestic banking sector show a somewhat stronger effect, with investment increases of 0.07%, 0.11% and 0.08% in years 2003, 2004 and 2005, and with similar decreases for a change in the opposite direction. As indicated earlier in the chapter, the effects of open market operations may be understated in the regression equations due to the Reserve Bank having used them mainly for portfolio management purposes over the historical period considered. The effect if more actively used could be closer to that of foreign reserve transactions.

6.7   Comment on Model Validity

As with all symbolic and econometric models, the model posited, specified and tested in this chapter is a simplified portrayal of reality and cannot be expected to

replicate reality in its full detail. Nevertheless, the in-sample forecasts show it to produce results for investment in the economy which are within a few percent of actual figures. Forecast accuracy increased marginally by introducing an error correction mechanism (ECM) to the longer-term, structural relationships. However, it is the underlying relationships rather than forecasting accuracy that are pertinent to this thesis. The direction of econometric relationships found through the regression analyses are in accordance with the economic concepts put forward and hence broadly support the conceptual framework used. The coefficients obtained in regression analysis are in most cases significant, generally at a 95% or 99% confidence level, in terms of established econometric and statistical procedures.

Consideration has been given to issues of stationarity, collinearity, autocorrelation and simultaneous-equation bias where applicable. A path has been pursued between rendering series stationary, but losing important information in the process, and the techniques of cointegration which do not require stationarity of variables under defined conditions. This has provided regression equations which capture essential relationships without these being weakened unduly to comply with statistical approaches based on stationarity and other data assumptions.

The determination of Granger causality, though not establishing physical causality, provides support for the various monetary policy variables having a causal relationship through to investment in the economy, rather than being a response to economic circumstances, which variations in investment might engender. For instance, higher investment would be associated with higher consumption levels, which could lead to concerns over (or actual) inflation increases, and this could be met with a change in monetary policy variables as a reaction. Although this directional sequence may well occur, the Granger causality tests support the notion that monetary policy actions are primary in the sense of having causal effects into the economy rather than being purely reactive or accommodatory. The model captures a monetary policy nexus of this nature.

The policy simulations show the nature and magnitudes of economic variables reflected by the model behaviour to be plausible, against the backdrop of actual historical magnitudes from a recent period for the South African economy. The policy interest rate has significant effects on investment, with these being spread over several quarters, and this is as intuitively anticipated. Some studies have been undertaken which indicate that the interest rate effect through the cost of capital mechanism on investment is not a major effect in magnitude (e.g. Botha 1997:555-567). The fact that the interest rate effects in the model simulations of this chapter are more substantive (a 1% interest rate increase reduces investment by slightly more that 1%) is likely to arise from the recognition of additional influence channels beyond that of cost of capital. In particular, the effects through exchange rate change, asset prices and consumption spending are recognised. The possible effects of quantitive actions by the monetary authorities are also recognised in the model, and provide a plausible mechanism and magnitudes for the consequences of quantitive actions for investment behaviour.

The econometric analysis undertaken by Moll (1999:34-64) provides some interesting aspects of comparison. Moll was primarily examining the relationship of monetary policy variables (the policy interest rate in particular) to monetary aggregates, exploring the usefulness of monetary targets or guidelines, and of both interest rates and monetary aggregates to real economic activity. He found very little relationship from policy interest rate to monetary aggregates, and that there was little indication of a causal relationship from monetary aggregates to consumption expenditure and GDP, whether expressed in nominal or real terms. He found however that there was a significant relationship between interest rates and both consumption and investment components of output (GDP). He observes that, "This appears to support the Post-Keynesian contention of Whittaker and Theunissen (1987) that causation runs from the interest rate to credit, expenditure and output, and thence to money, which passively adjusts to demand." (Moll 1999:53). He tests the lags in influence from interest rates to consumption and investment, and finds the maximum effect to be three quarters

following the interest rate change in the case of consumption, and four quarters in the case of investment. These results broadly corroborate the model relationships found in this chapter, although the historical period considered by Moll was 1980 to 1996, as against 1991 to 2006 in this chapter.

The model of De Wet, Jonkergouw and Koekemoer (1995), owing to its different approach and purpose, has few estimated equations to which comparisons can be made. The focus is on determination of monetary aggregates, and the presumption is that monetary policy measures are taken with a view to attain a desired monetary aggregate level or growth rate. The closest parallel is an equation for the supply of credit, but this is specified as a relation to liquid asset holdings of banks, real GDP, and the banks' interest rate margin over the Reserve Bank's Bank rate. The supply of credit is expressed in level terms (total credit extension), so that the strong relationship to GDP obtained without significant time lags would be expected under both a monetarist and Post Keynesian persuasion, as would be the relationship to the level of liquid assets held by banks. The relationship that would be more pertinent for comparison is that of basic cash reserves in terms of the influence of the channels of monetary policy actions. This however is expressed as an identity, based on the presumption that monetary policy actions of a quantitive nature feed directly through to basic cash reserves in a fully predicable, technical manner. The model of De Wet et al does not therefore show econometrically that there is indeed a firm relationship of this nature. The analysis of this chapter, using a behavioural equation, indicates on the contrary a somewhat clouded relationship, and the reasons for this were explored. It needs to be noted that the time period over which the model of De Wet et al was estimated, 1986 to 1992, was almost entirely prior to that of this chapter, and was a period in which the monetary policy framework was more orientated towards control of monetary aggregates, albeit indirectly using the policy interest rate (Meijer 2000:2-7; Nel 1994:14-15, 24).

6.8   Concluding remarks

The symbolic model formulated in accordance with a Post Keynesian view of

monetary operation, and expressed in a form amenable to econometric specification, thus shows itself to be a fully plausible portrayal of the relationships between monetary policy variables and investment in the real economy. The specification and determination of parameters using econometric techniques and statistical procedures produce equations with (in most cases) statistically significant parameters which accord with the direction of change and approximate influence magnitudes posited from the theoretical analysis. This in itself lends support to the validity of the Post Keynesian theoretical structure developed, and is further supported by the Granger causality tests and policy simulations. The causality tests suggest primary influence from monetary policy variables to investment through the financial system, and the magnitudes of the influence suggest that it occurs not only through a cost of capital channel. Influences through the degree of new credit provided by banks (incorporating credit rationing behaviour) as well as through exchange rate, asset prices and indirectly through consumption expenditure, form a part of the model and the magnitude and test statistics of co-efficients arising from the model estimation suggest that these influence channels may well be significant.

From the process of assembling data and of estimating and testing the model, as described in this chapter, it is apparent that the policy framework and approach to the conduct of monetary policy adopted by the Reserve Bank could have a significant bearing on how monetary policy translates through to the real economy (investment in particular) as well as to prices. There may well be economic effects arising from monetary policy actions which the monetary authorities don't take full cognisance of due to their adherence to a specific conception of monetary policy and an associated policy framework. This applies in particular to quantitive transactions in the domestic money and capital market. The implications that the Post Keynesian precepts captured in the econometric model examined in this chapter could have for monetary theory and policy, especially those relating to investment levels in the economy, are taken up in the next chapter.

CHAPTER 6 : APPENDIXES 6.1 to 6.6

APPENDIX 6.1   **Unit Root Tests**   **Augmented Dickey Fuller**

	Test		**Critical value**			**First differences**		
Variable	**Statistic**	**1%**	**5%**	**10%**	**Statistic**	**1%**	**5%**	**10%**
IN	-1.98	-3.53	-2.91	-2.59	-5.04	-3.53	-2.91	-2.59
IR	-1.89	-3.53	-2.91	-2.59	-6.83	-3.53	-2.91	-2.59
JN	-0.94	-3.54	-2.91	-2.59	-6.34	-3.53	-2.91	-2.59
JR	-3.41	-3.53	-2.91	-2.59	-5.18	-3.53	-2.91	-2.59
ENX	-1.60	-3.53	-2.91	-2.59	-5.85	-3.53	-2.91	-2.59
ERX	-1.72	-3.53	-2.91	-2.59	-5.68	-3.53	-2.91	-2.59
OB	-7.33	-3.53	-2.91	-2.59	-13.32	-3.53	-2.91	-2.59
OD	-4.56	-3.53	-2.91	-2.59	-7.53	-3.53	-2.91	-2.59
OP	-4.46	-3.53	-2.91	-2.59	-7.53	-3.53	-2.91	-2.59
OT	-3.47	-3.53	-2.91	-2.59	-7.83	-3.53	-2.91	-2.59
OP+OT	-4.38	-3.53	-2.91	-2.59	-7.02	-3.53	-2.91	-2.59
OTA	-4.64	-3.53	-2.91	-2.59	-8.63	-3.53	-2.91	-2.59
OF	-2.95	-3.53	-2.91	-2.59	-8.58	-3.53	-2.91	-2.59
FRD	-5.01	-3.55	-2.92	-2.60	-6.79	-3.55	-2.92	-2.60
PMR	-1.47	-3.53	-2.91	-2.59	-4.68	-3.53	-2.91	-2.59
CER	3.42	-3.53	-2.91	-2.59	-3.38	-3.53	-2.91	-2.59
LN(CER)	2.54	-3.53	-2.91	-2.59	-3.02	-3.53	-2.91	-2.59
PKX	0.58	-3.53	-2.91	-2.59	-3.01	-3.53	-2.91	-2.59
HA	2.58	-3.53	-2.91	-2.59	-5.15	-3.53	-2.91	-2.59
HAA	3.94	-3.53	-2.91	-2.59	-5.52	-3.53	-2.91	-2.59
HN	0.82	-3.53	-2.92	-2.60	-6.95	-3.53	-2.92	-2.60
HNR	-2.61	-3.53	-2.92	-2.60	-8.10	-3.53	-2.92	-2.60
HB	-1.44	-3.53	-2.92	-2.60	-8.29	-3.53	-2.92	-2.60
BU	-2.73	-3.53	-2.91	-2.59	-6.84	-3.53	-2.91	-2.59
DU	-1.90	-3.53	-2.91	-2.59	-6.90	-3.53	-2.91	-2.59
ANR	-2.73	-3.53	-2.91	-2.59	-6.94	-3.53	-2.91	-2.59
YDX	2.48	-3.53	-2.91	-2.59	-2.47	-3.53	-2.91	-2.59
PIX	0.55	-3.53	-2.91	-2.59	-4.79	-3.53	-2.91	-2.59
KIR	2.33	-3.53	-2.91	-2.59	-2.69	-3.53	-2.91	-2.59

APPENDIX 6.2   Unit Root Tests   Phillips-Perron

Variable	Test Statistic	1%	Critical value 5%	10%	First differences Statistic	1%	5%	10%
IN	-1.54	-3.53	-2.91	-2.59	-5.47	-3.53	-2.91	-2.59
IR	-1.84	-3.53	-2.91	-2.59	-7.58	-3.53	-2.91	-2.59
JN	-0.80	-3.53	-2.91	-2.59	-7.12	-3.53	-2.91	-2.59
JR	-2.53	-3.53	-2.91	-2.59	-5.50	-3.53	-2.91	-2.59
ENX	-1.66	-3.53	-2.91	-2.59	-6.54	-3.53	-2.91	-2.59
ERX	-1.62	-3.53	-2.91	-2.59	-7.18	-3.53	-2.91	-2.59
OB	-5.89	-3.53	-2.91	-2.59	-8.44	-3.53	-2.91	-2.59
OD	-3.76	-3.53	-2.91	-2.59	-6.92	-3.53	-2.91	-2.59
OP	-3.78	-3.53	-2.91	-2.59	-7.12	-3.53	-2.91	-2.59
OT	-3.20	-3.53	-2.91	-2.59	-7.44	-3.53	-2.91	-2.59
OP+OT	-3.55	-3.53	-2.91	-2.59	-6.68	-3.53	-2.91	-2.59
OTA	-3.83	-3.53	-2.91	-2.59	-6.97	-3.53	-2.91	-2.59
OF	-2.62	-3.53	-2.91	-2.59	-6.86	-3.53	-2.91	-2.59
FRD	-3.54	-3.56	-2.92	-2.60	-5.58	-3.56	-2.92	-2.60
PMR	-1.28	-3.53	-2.91	-2.59	-6.58	-3.53	-2.91	-2.59
CER	6.69	-3.53	-2.91	-2.59	-2.64	-3.53	-2.91	-2.59
LN(CER)	3.94	-3.53	-2.91	-2.59	-4.14	-3.53	-2.91	-2.59
PKX	1.67	-3.53	-2.91	-2.59	-4.11	-3.53	-2.91	-2.59
HA	2.46	-3.53	-2.91	-2.59	-8.78	-3.53	-2.91	-2.59
HAA	3.86	-3.53	-2.91	-2.59	-4.37	-3.53	-2.91	-2.59
HN	-0.79	-3.53	-2.92	-2.60	-7.77	-3.53	-2.92	-2.60
HNR	-3.03	-3.53	-2.92	-2.60	-9.59	-3.53	-2.92	-2.60
HB	-1.57	-3.53	-2.92	-2.60	-8.17	-3.53	-2.92	-2.60
BU	-3.23	-3.53	-2.91	-2.59	-10.80	-3.53	-2.91	-2.59
DU	-1.92	-3.53	-2.91	-2.59	-6.81	-3.53	-2.91	-2.59
ANR	-2.22	-3.53	-2.91	-2.59	-6.84	-3.53	-2.91	-2.59
YDX	5.29	-3.53	-2.91	-2.59	-2.76	-3.53	-2.91	-2.59
PIX	0.78	-3.53	-2.91	-2.59	-5.93	-3.53	-2.91	-2.59
KIR	4.63	-3.53	-2.91	-2.59	-3.19	-3.53	-2.91	-2.59

APPENDIX 6.3   Unit Root Tests   Kwiatkowski-Phillips-Schmidt-Shin (KPSS)

Variable	Test Statistic	Critical value 1%	5%	10%	First differences Statistic	1%	5%	10%
IN	0.58	0.74	0.46	0.35	0.07	0.74	0.46	0.35
IR	0.16	0.74	0.46	0.35	0.11	0.74	0.46	0.35
JN	0.82	0.74	0.46	0.35	0.22	0.74	0.46	0.35
JR	0.22	0.74	0.46	0.35	0.10	0.74	0.46	0.35
ENX	0.90	0.74	0.46	0.35	0.42	0.74	0.46	0.35
ERX	0.55	0.74	0.46	0.35	0.18	0.74	0.46	0.35
OB	0.11	0.74	0.46	0.35	0.18	0.74	0.46	0.35
OD	0.13	0.74	0.46	0.35	0.10	0.74	0.46	0.35
OP	0.12	0.74	0.46	0.35	0.07	0.74	0.46	0.35
OT	0.46	0.74	0.46	0.35	0.29	0.74	0.46	0.35
OP+OT	0.21	0.74	0.46	0.35	0.06	0.74	0.46	0.35
OTA	0.49	0.74	0.46	0.35	0.50	0.74	0.46	0.35
OF	0.44	0.74	0.46	0.35	0.05	0.74	0.46	0.35
FRD	0.60	0.74	0.46	0.35	0.19	0.74	0.46	0.35
PMR	0.50	0.74	0.46	0.35	0.12	0.74	0.46	0.35
CER	0.95	0.74	0.46	0.35	0.66	0.74	0.46	0.35
LN(CER)	0.96	0.74	0.46	0.35	0.46	0.74	0.46	0.35
PKX	0.89	0.74	0.46	0.35	0.55	0.74	0.46	0.35
HA	0.98	0.74	0.46	0.35	0.42	0.74	0.46	0.35
HAA	0.97	0.74	0.46	0.35	0.74	0.74	0.46	0.35
HN	0.91	0.74	0.46	0.35	0.20	0.74	0.46	0.35
HNR	0.81	0.74	0.46	0.35	0.12	0.74	0.46	0.35
HB	0.94	0.74	0.46	0.35	0.47	0.74	0.46	0.35
BU	0.47	0.74	0.46	0.35	0.50	0.74	0.46	0.35
DU	0.74	0.74	0.46	0.35	0.36	0.74	0.46	0.35
ANR	0.55	0.74	0.46	0.35	0.11	0.74	0.46	0.35
YDX	0.94	0.74	0.46	0.35	0.69	0.74	0.46	0.35
PIX	0.98	0.74	0.46	0.35	0.17	0.74	0.46	0.35
KIR	0.90	0.74	0.46	0.35	0.46	0.74	0.46	0.35

APPENDIX 6.4   Comparison of investment forecasts
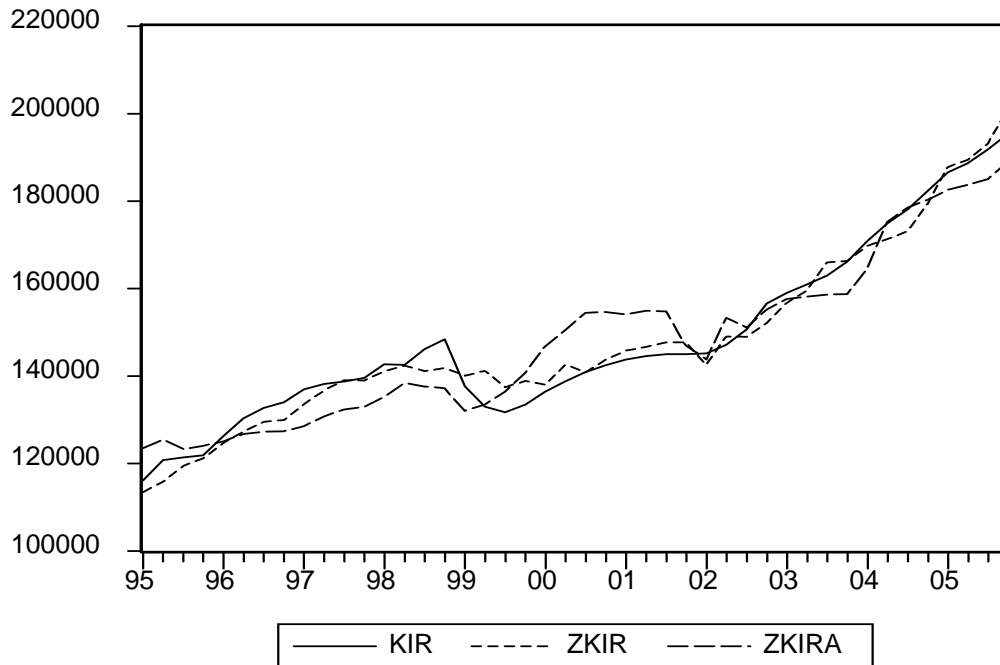
KIR   is actual investment

ZKIR is forecast investment, using the model equation for investment with actual
        data of explanatory variables

ZKIRA is forecast investment, using the output of prior model equations, through
          intermediate equations, as inputs to the investment equation

APPENDIX 6.5   DATA DERIVATION

1. **Open market operations in bonds and debentures**

   The SA Reserve Bank may use a range of financial instruments to engage in open market operations. During the 1990s, government bonds were extensively bought and sold, whereas in the 2000s there has been greater use of the Reserve Bank's own debentures and reverse repo transactions. The Reserve Bank currently provides data on Reserve Bank operations in Reserve Bank debentures, reverse repos and foreign exchange swaps. However, these series do not exist prior to April 1998. Transactions in government bonds are provided to March 1998. A series was formed consisting of net purchases of government bonds to March 1998, and net increases in Reserve Bank borrowing through reverse repos and Reserve Bank debentures from April 1998, to obtain a series reflecting deliberate Reserve Bank market transactions not directly related to foreign reserves over the analysis period (i.e. from Q1 1991).

2. **Government bond holding**

   A series was compiled of q-to-q differences in Reserve Bank holding of government bonds as a possible (partial) indicator of Reserve Bank market transactions. However, data are not available to isolate market transactions undertaken by the Reserve Bank from take-up or repayment of Treasury issues directly. The series was therefore not used.

3. **Corporation for Public Deposits**

   The Corporation for Public Deposits holds its bank account with the Reserve Bank, and operates as a subsidiary in receiving and placing government deposits in various market instruments. Its activities could therefore potentially have an effect in increasing or reducing non-borrowed reserves. A series was compiled of its net purchases of financial assets. However, this was found econometrically to have a negligible effect on non-borrowed (or total) reserves. The series was therefore not used further as a part of open market operations.

4. **Tax and Loan account transfers**

   A series was compiled of the net q-to-q change in the level of government deposits with the Reserve Bank. This could be the result of deliberate transfers between

Treasury Tax and Loan accounts with commercial banks and accounts with the Reserve Bank, or of changing use of the Treasury accounts with the Reserve Bank. Since the Treasury is mainly concerned with holding working balances with the Reserve Bank, following the introduction of Tax and Loan accounts in 1993, significant changes in Treasury account deposits with the Reserve Bank from then are likely to be mainly a reflection of deliberate Tax and Loan accounts transfers.

5.   Foreign Reserves

The foreign reserve holdings of the Reserve Bank were used to determine foreign reserve transaction effects (i.e. commercial bank holdings were excluded), since the concern is with transactions directly involving the Reserve Bank.   The gold component of foreign reserves was removed, since the revaluation of gold holdings at a market-related price each month could distort the estimate of Reserve Bank foreign exchange transactions in the domestic market.   The net change in q-to-q foreign reserves was derived and converted to Rand values at the average Rand-dollar exchange rate for the quarter.   The change was corrected for changes resulting from Reserve Bank foreign borrowing/repayment transactions relating to reserves.   The resulting series should then give a close indication of Reserve Bank foreign exchange transactions with domestic parties expressed in Rands.

6.   Total Cash Reserves

Total cash reserves carried by banks have the complication that the inclusion of bank vault cash as reserves has changed over time. Bank vault cash was included in full until August 2001, 75% from September 2001 to August 2002, 50% from September 2002 to August 2003, 25% from September 2003 to August 2004, and fully excluded from September 2004.   An adjusted bank vault cash series was therefore calculated to take account of the phased removal from reserves, and this added to bank deposits placed with the Reserve Bank. An alternative series of bank deposits with the Reserve Bank plus total bank vault cash throughout was also examined econometrically in case the phased removal of vault cash created distortions in econometric relationships. Changes in the latter series were found to have a slightly, but not materially, closer relationship to reserve Bank open market operations and foreign reserve transactions.

7.   Borrowed Reserves

These are not reflected consistently in source data series over the time period of analysis, in view of the shifts which occurred in the Reserve Bank methods of accommodation. They are reflected as Bills discounted in the early 1990s, as overnight loans from May 1993 to March 1998, and as resale agreements from the introduction of the repo system (March 1998) to the present. A series was constructed combining the accommodation provided over these changing arrangements.

8.   Other Reserves figures

Required Reserve Bank deposits relating to cash reserve requirements are explicitly reflected in source data series, though need to be added to the qualifying bank vault cash to reach total required reserves. Excess Reserve Bank deposits held by banks are explicitly reflected. Non-borrowed reserves data are not provided, but are readily calculated as total reserves less borrowed reserves.

9.   Change period

A change period of 6 months (2 quarters) rather than a single quarter has been used in the econometric analyses. This means that relationships of transactions occurring over 2 quarters to level changes across the 2 quarters are examined. This reduces q-to-q noise effects to some degree.

APPENDIX 6.6   REGRESSIONS WITH COCHRANE-ORCUTT CORRECTION

Adjusted variables are indicated with subscript A.

$$HND_A = 0.023*(OP+OT)_A + 0.071*OF_A \qquad\qquad A6.4.19$$

t: (2.01)   (6.10)
$R^2 = 0.17$ DW = 1.31   F = 11.8

Residuals : ADF test statistic -7.99, stationary at 99% confidence (critical value -3.53).

$$A6.4.21$$
$$ANR_A = 1.64*HNR_A + 0.25*(HND(-1)+HND(-2))_A + 5570*BU(-1)_A + 4156*IND_A$$

t: (2.20)   (0.47)   (5.46)   (3.14)
$R^2 = 0.15$ DW = 1.17   F = 3.56

Residuals : ADF test statistic -4.30, stationary at 99% confidence (critical value -3.53).

$$A6.4.22$$
$$KIR_A = 0.16*ANR(-1)_A + 790.5*CEG_A + 0.39*CER(-2)_A - 136*ERX_A - 53.2*PKX_A$$
$$- 464*JR_A - 650*PMR_A$$

t: (5.52)   (2.31) (16.72)   (-3.98)   (-1.19)
(-2.67)   (-9.19)
$R^2 = 0.985$ DW = 1.64   F = 603.6

Residuals : ADF test statistic -4.76, stationary at 99% confidence (critical value -3.53).

$$ERX_A = \qquad\qquad\qquad\qquad ` \qquad\qquad A6.4.24$$
$$88.83 - 1.69*IN_A + 0.19*IRD_A + 0.72*IR(-1)_A - 0.232*10^{-3}*OF(-1)_A - 16.6*LOG(TY-80)$$

(8.60)   (-3.50)   (0.91) (1.93)   (-1.78)   (-5.85)
$R^2 = 0.40$ DW = 1.29   F = 7.58

Residuals : ADF test statistic -4.22, stationary at 99% confidence (critical value -3.53).

$$PMR_A = \qquad\qquad\qquad\qquad\qquad\qquad\qquad A6.4.25$$
$$-0.218 + 0.004*ERX_A + 0.873*(100/ERX)_A + 0.230*(100/ERX(-1))_A + 0.002*(TY-80)$$

(-1.17)   (1.55)   (3.36)   (3.79)   (2.98)
$R^2 = 0.78$ DW = 1.60   F = 52.5

Residuals : ADF test statistic -3.73, stationary at 99% confidence level.

$$LOG(CER)_A = 1.82 + 0.0057*(100/IN)_A + 0.107* LOG(TY-80) \qquad\qquad A6.4.26$$

(145.8) (2.06)   (22.1)
$R^2 = 0.92$ DW = 0.86   F = 333.9

Residuals : ADF test statistic -2.72, stationary at 90% confidence (critical value -2.59).

$$\text{LOG(PKX)}_A = 3.09^* \text{ LOG(YDX)}_A + 0.012^*(100/\text{IN})_A \qquad\qquad \text{A6.4.27}$$

$$\qquad\qquad (54.47) \qquad\qquad (4.12)$$

$$R^2 = 0.96 \qquad\qquad DW = 1.11 \qquad\qquad F = 1417.6$$

Residuals : ADF test statistic -3.60, stationary at the 99% confidence level.

$$BU_A = 4.46 + 3.29^*DU_A + 6.82^*10^{-5}*HA_A - 1.38^* \text{ LOG(TY-80)} \qquad \text{A6.4.28}$$

$$\quad (9.76) \quad (2.57) \qquad (5.28) \qquad\quad (-5.25)$$

$$R^2 = 0.32 \qquad\qquad DW = 2.0 \qquad\qquad F = 9.51$$

Residuals : ADF test statistic -4.75, stationary at the 99% confidence level.

CHAPTER 7

IMPLICATIONS FOR MONETARY THEORY AND MONETARY POLICY IN SOUTH AFRICA

7.1   Introduction

The Post Keynesian theoretical framework developed in previous chapters together with the symbolic and econometric model developed and tested provide a basis for considering what the implications of the analysis could be both for monetary theory and for the pursuit of monetary policy in South Africa. It was apparent that the difference in theoretical view within the Post Keynesian camp between those having a purely endogenous view of credit and money and those holding a view in which quantitive policy influences are considered as possible, is material.   In formulating a symbolic and econometric model, this thesis has aligned itself with the latter view, though being fully open to the possibility that the econometric testing process could show the quantitive influences to be negligible in practice. The econometric analysis did however provide support for the quantitive influences being strong enough to warrant attention, even though less strong than the interest rate channel.   The implications of this from a theoretical perspective are examined below before considering the implications of the entire framework and model formulation for the conduct of monetary policy, focussing on South Africa in particular.

The implications for monetary policy in South Africa are examined below in respect of each potential arena of monetary policy: interest rate channel, open market operations, public debt and cash management, foreign flows and exchange rate, as well as the credit structure of the clearing banks. These need to be considered against the prevailing monetary policy framework, both current and over the past few decades, to indicate the alternative approaches which could follow from the analysis and model equations of prior chapters.   The chapter seeks to identify those areas of monetary policy which could be pursued in such a manner as to provide greater benefit to the economy through investment effects, without incurring disproportionate harm in other aspects of the economy. Although the discussion of policy implications is specific to the

South African monetary structure, there could well be parallel implications for other economies in which the monetary structure is not fundamentally dissimilar to that of South Africa. Given that the present monetary policy framework in operation in South Africa is one of inflation targeting, the implications under an inflation targeting framework in particular are examined, and could be more widely pertinent in view of the increasingly widespread adoption of the inflation targeting approach internationally.

7.2   Endogeneity Issues

The econometric analysis of the previous chapter provided some support for the occurrence of quantitive influences from Reserve Bank actions through the banking system to the economy more widely. The relationship from foreign reserve transactions conducted by the Reserve Bank with the banks through changes in basic cash reserves held by the banks, to net new lending showed statistically significant coefficients, and that of open market operations less so, but still showing a degree of statistical significance. A Post Keynesian in the horizontalist mould would maintain that money provision by the banks is entirely demand determined, with the banks setting their lending rate at a mark-up (or margin) above the central bank policy rate, or a weighted mix of interest rates on funds obtained, and that this 'price' serves as the predominant monetary policy determinant of bank credit extension, which in turn gives rise to monetary deposits. In this view, the banks draw from the central bank discount window whatever borrowed cash reserves are required to maintain required reserves at the level stipulated by the monetary authorities to support the monetary deposits that eventuate. Under this portrayal, there would be no significant relationship between quantitive transactions undertaken by the Reserve Bank in the domestic economy and new lending by banks, since the latter would be purely a function of the demand for credit at the interest rate set.

In the Post Keynesian view put forward by Dymski (1992, 1994), Wray (1992, 1996), Pollin (1991, 1996), Dow (1996a, 1996b), Chick and Dow (2002) and others, however, quantitive influences occur on the extent of new advances provided by banks through liquidity preference, credit rationing, portfolio

balancing or similar processes taking place within banks. These writers examine such quantitive effects in terms of bank behaviour in the granting of credit, with reference in particular to changes in bank lending behaviour over economic fluctuations or cycles. But this raises the possibility that quantitive transactions on the part of the central bank could influence the behaviour of banks in providing credit[1]. It is not that such transactions by the central bank would overshadow interest rate effects, but that they would serve as a secondary channel of influence. If such quantitive effects do occur and are significant, and the monetary policy framework adopted by the monetary authorities does not recognise their significance for the economy, then the monetary interventions taken could well be less effective than potentially achievable, with unnecessary negative consequences to the economy.

Dymski (1992, 1994) examines the issue in terms of exogenous, Keynesian uncertainty. This is the fundamental uncertainty, not reducible to statistical distributions or risk, referred to in earlier chapters. Banks are characterised as firms "whose function is to assess and absorb default and liquidity risks in financial markets" (Dymski 1992:317). The extent of new lending provided therefore depends on the willingness of banks to assume greater default and liquidity risks. Under uncertainty, large swings may occur in bank expectations of loan outcomes (repayment or default) as well as in their degree of risk aversion. During a tranquil period, with low and predictable default rates, banks gain confidence in their expectation formation, and become less risk averse. But in the nature of Keynesian uncertainty, a tranquil period can give way to a turbulent one at any time. When this eventuates, the expectations of banks are no longer closely matched by the occurrences in reality, their confidence in such expectations is diminished, and they become more risk averse. This leads to varying degrees of new lending provision, albeit lending interest rates may not have changed, at different time periods owing to changing expectations. The quantitive variation could be placed under the label 'credit rationing', and Dymski

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[1] Bernanke and Gertler (1995:27-48) refer to this as the 'credit channel' of monetary policy transmission, and examine it from a New Keynesian perspective, maintaining that "allowing for a credit channel of some type is important for understanding the response of the economy to changes in monetary policy." (1995:29).

uses this term (1992:318-319). The changing default expectations operate in conjunction with portfolio management of both asset and liability sides of banks' balance sheets: lending reductions, for instance, lead to portfolio shifts towards other financial assets, with banks also seeking changes in their liability structures accordingly, using liability management. It is these quantitive variations linked to uncertainty that underpin the systemic crises propounded by Minsky (1982, 1986). Dymski's focus is on the inherent quantitive variation within banks in the provision of credit, rather than how this is influenced by monetary policy measures. Nevertheless, he regards quantitive variation in credit provision by banks as an inevitable consequence of Keynesian uncertainty, which is an underlying precept held by virtually all economists in the Post Keynesian mould. This forms part of a heterodox view of "the economy as a fragile latticework of structural debtor-creditor relations …" (Dymski 2006:388).

In Wray's (1992:297-310) counter-argument to the horizontalist, pure endogenous view of money, the changing liquidity preference of banks in respect of their asset holdings, together with credit rationing, leads to changes in the proportion of bank assets being held in the form of high-powered money. He points out that credit provision and hence money creation occur in an inverse relation (he uses the term 'asymmetrical') to bank liquidity preference, in that falling profit expectations on the part of firms (likewise perceived by banks) lead to reduced attractiveness of lending by banks with a corresponding greater preference for liquidity. Wray (1992:304-306) takes his liquidity preference argument forward in a form that operates through prices (both asset prices and interest rates) as a means through which equality in expected returns is attained. This shifts the focus from purely quantitive effects. He does however maintain that "Banks do not fully accommodate the demand for credit – they always use a combination of price and quantity rations in their loan-making activity." (Wray 1992:305). He does also assert that "Central banks also necessarily rely on a combination of quantity and price constraints to implement monetary policy." (Wray 1992:307). Wray though does not examine specifically how this occurs. Dow (1996a:497-508) likewise pursues a critique of horizontalism based on a combination of bank liquidity preference and systematic credit rationing. She

regards the argument she puts forward as being "fully in the spirit of the endogenous credit approach." (1996:498). She argues that credit rationing may be applied to an entire class of borrowers (for instance small firms) and thereby be a macroeconomic phenomenon. Dow (1996a:504-506) provides evidence that credit rationing occurs, at least in respect of lending to small firms, so that banks cannot be regarded as purely price-setters and quantity-takers, as implied by a horizontalist view. It is this approach to departure from a pure endogenous money view that is taken forward in Chick and Dow (2002:587-607), as discussed in Chapter 4.

The distinction between the horizontalist view of endogenous money and one in which quantitive monetary variables play a role is expressed in the accommodationist versus structuralist debate in Post Keynesian monetary economics which commenced from the late 1980s (e.g. Pollin 1991:366-396, Fontana 2002:148-156). The accommodationist characterisation refers to views in which the central bank is regarded as providing accommodation to banks from its discount window fully and completely on demand, with the banks serving as a 'frictionless' channel for credit provision in accordance with demand at the interest rate set in accordance with the central bank's discount rate. A structuralist characterisation however refers to views in which the banks themselves (and other financial institutions) have an influence on the level of credit extension, and thereby on monetary aggregates, through their liability and asset management actions, as well as through financial innovation and lending activity being transferred away from bank balance sheets or being undertaken by non-bank financial institutions. Credit rationing behaviour by banks also forms part of the structuralist view. Structuralist views are explicitly expounded by Pollin (1991, 1996), Palley (1996a, 1996b, 1996c) and Wray (1992, 1996) amongst other Post Keynesian writers, and all entail the possibility of quantitive monetary policy linkages into the economy through the banking system in addition to the interest rate mechanism. The views of Dow (1996a) and Chick

and Dow (2002) could be placed within the structuralist characterisation, even though they don't themselves adopt this classification[2].

Pollin (1991:366-396, 1996:500-501) regards the degree to which borrowed and non-borrowed cash reserves with the central banks can be shown as substitutes in bank lending behaviour as one key determinant of whether the structuralist or accommodationist approach offers a more accurate portrayal of reality.   He undertook empirical tests for the American economy using data over the period 1953 Q3 to 1988 Q4, from which he concludes that the two sources of cash reserves are not fully or readily substitutable.   His analysis examines the estimation results of a linear equation relating borrowed to non-borrowed reserves, with a constant term included. A significant estimated co-efficient on non-borrowed reserves, with overall significance of the equation, would indicate high substitutability, suggesting that banks shift seamlessly from non-borrowed to borrowed reserves to maintain total cash reserves at the level needed to support the credit extension which arises from market demand.   He finds the relationship not to be significant, which he cites in support of a structuralist argument.   This would imply that bank lending could be influenced by the non-borrowed component of reserves, since it is not simply substituted with borrowed reserves, so that the central bank could potentially influence credit extension through measures which affect non-borrowed reserves (e.g. open market operations).   Pollin (1996:507-512) also examines the ratio of loans (credit extension) to total cash reserves over the same period. He finds that the ratio was not stationary over time, which he cites as further evidence in support of a structuralist view, since the shift in the ratio would indicate the presence of liability management, innovation and other measures by banks to sustain increased credit extension levels without full resort to corresponding increases in cash reserves. Pollin (1996:501) concedes that fellow Post Keynesians Palley (1991) and Moore (1991) have expressed doubt over whether these results are clear evidence of structuralism, since a weak relationship between borrowed and non-borrowed reserves could arise from other factors, such as variations in non-

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[2]   Subsequently Dow (2006:46) does explicitly place Dow (1996a) and Chick and Dow (2002) under the structuralist banner.

borrowed reserves not needing immediate compensation from borrowed reserves due to excess reserve holding, and the changing ratio of loans to reserves possibly resulting from technology and borrower behaviour change over time, equivalent to a secular trend in the money multiplier.

The empirical results of Chapter 6 of this thesis indicate some support for the structuralist view, though in a different context from that examined by Pollin (1991, 1996). The relationship of non-borrowed reserves to new (additional) lending showed statistically significant coefficients. A relationship of changes in total reserves to new lending could occur under an accommodationist dispensation, with a required reserve ratio in operation, on the basis that banks would be increasing total reserves, with borrowed reserves as necessary, to meet required reserve levels corresponding to deposit liabilities arising through credit extension provided. However, the significant relationship in respect of non-borrowed reserves indicates an influence through non-borrowed reserves resulting from central bank transactions (open market operations, foreign exchange intervention, etc): if the banks simply varied borrowed reserves seamlessly to adapt to credit demand, it would be expected that there would be no significant relationship between non-borrowed reserves and new lending. Further, the Granger causality tests indicated a stronger causality direction from changes in non-borrowed reserves to new investment than vice versa. These results are of course for South Africa, with a different monetary structure from that of America, and for a different time period, but do offer support to the structuralist possibility in principle.

Palley (1996b:516-531) argues in favour of a structuralist model, but analyses the departure from accommodationism in terms of liability management as well as asset portfolio selection on the part of banks. These are no doubt important components of a structuralist approach, but do not expressly incorporate any monetary influences from the central bank[3]. Based on this analysis, Palley suggests the adoption of a theory of endogenous finance, in which sources and

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[3] Palley (1996b:517) nevertheless states that "structuralists emphasize *both* the private initiative of banks, *and* the stance of the monetary authority."

forms of financing outside those provided by banks play a significant role. The idea put forward by Palley is that the broader financial system (including for instance trade financiers) is able to adapt and innovate in the provision of financial arrangements to such an extent that it meets any given demand for finance; hence total finance provision can be regarded as endogenous even though banks themselves may be subject to restrictions in credit provision. Palley (1996b:524-528) makes the distinction between money as a medium of exchange and money as a means of settlement, which provides a basis for considering credit arrangements beyond the banking sector. The approach however does not offer a basis on which monetary policy influences can be examined. It does nevertheless emphasise the flexibility of the financial system in finance provision, which is associated with endogenous money.

Lavoie (1996b:535-543) confirms that the Post Keynesian view of money endogeneity places the policy interest rate as the key instrument of monetary policy, which is in line with recent trends in conduct of monetary policy, including the adoption of inflation targeting. However, the widespread (mainstream) presumption is that the policy interest rate is used as a means to adjust or manage aggregate demand so that it does not become excessive relative to aggregate supply, thereby curbing inflation. Lavoie (1996b:536) points out that in the Post Keynesian analysis, inflation is typically regarded as being driven by unit wage rates, with prices determined as a mark-up to these. Inflation is therefore viewed in most instances as being of a cost-push nature. Since interest rates enter into the cost structure of firms and workers, interest rate increases can potentially contribute to cost-related inflation. Furthermore, the interest rate needs to be regarded as a distributional variable between entrepreneurs, rentiers and workers in that lower interest rates favour the incomes of entrepreneurs (profit less interest) and workers (lower interest on household borrowing) while worsening the incomes of rentiers (property holders, financiers) which is positively related to interest rates[4]. With these complications

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[4] Lavoie assumes that higher interest rates imply higher incomes to lenders: this may well not be the case for financial institutions, since income depends on the margin of lending above borrowing rates, which margin may remain unchanged with an increase or decrease in interest rates. Also, higher interest rates may lead to an increase in loan defaults, which would reduce lenders' income.

to the use of interest rates as the key monetary policy variable, Lavoie (1996b:540-542) contemplates the use of direct credit restrictions, or influences, over the asset side of bank balance sheets, as a possible instrument of monetary policy. He points out that several prominent Post Keynesians, including Minsky (1986) and Rousseas (1986) as well as Moore (1988a), have suggested this possibility as flowing from a Post Keynesian monetary analysis. The logic behind this line of thinking is that use of interest rate changes for monetary policy purposes may be ambivalent in their effects on the economy, so that influences more directly on the extension of credit by banks, being the source of money creation and increased economic activity, may be desirable. Moore (1988a:132-136) expresses doubts as to whether any such controls would prove effective in practice in view of the propensity of the financial system to innovate: additional credit extension could be shifted to institutions or instruments beyond the control of the authorities. The debate is tantamount to one of whether money endogeneity is inexorable regardless of the monetary policy framework adopted (Moore's inclination) or whether the degree of endogeneity could be curbed through monetary policy measures (as suggested by Minsky and Rousseas). Lavoie (1996b:542) expresses himself in favour of direct credit controls, which he concedes would need to be widely encompassing to be effective.

In his examination of money supply endogeneity in the case of South Africa, Nell (2001:313-317) uses the accommodationist/structuralist distinction, though he reflects a liquidity preference approach separately from that of structuralism. He uses the liquidity preference label to indicate a view in which feedback causality occurs from money supply to bank lending (a reflux mechanism), which is not the liquidity preference notion as pursued in the work of Wray (1992), Dow (1996a), and Chick and Dow (2002), referred to above. For purposes of this thesis at least, the adoption of such a feedback view is fully compatible with the structuralist characterisation, and could be regarded as a strand within it. Nell seeks to examine empirically whether the money supply in South Africa has been endogenous in nature under the various monetary frameworks in operation from 1966 to 1997. He does this by testing the relationships between credit extension, money supply (M3), monetary base, money multiplier and money

income. He shows using cointegration techniques that causal direction is predominantly from credit extension to money supply and monetary base, with a bi-directional relationship between money income and money supply. The tests suggest bi-directional causality between monetary base and credit extension in the period 1996 to 1979, and stronger causality from credit extension to monetary base than the reverse in the period 1980 to 1997. The empirical tests broadly support an endogenous money view rather than a monetarist view in which monetary aggregates serve as a causal channel. The study however does not examine specifically the nature of bank behaviour in credit provision, with a corresponding test hypothesis, nor does it consider non-borrowed reserves as a variable, so does not show clear evidence of whether an accommodationist or structuralist portrayal is supported.

If a structuralist characterisation of the monetary system is the closer portrayal of reality (compared to accommodationist), the possibility arises that monetary policy instruments of a quantitive nature, used in conjunction with interest rates, could be effective, without having to be sweeping, widely encompassing or drastic as would be the case with direct credit controls. They could be deployed continuously in a market-oriented and subtle manner without regulatory prescription and extensive monitoring. The distinction between structuralist and accommodationist portrayals is crucial in this respect to considering monetary policy alternatives within a Post Keynesian analytical framework. With this thesis examining a hypothesis within the structuralist characterisation, and the empirical analysis of Chapter 6 providing support to this characterisation in the case of South Africa, implications for monetary policy of a quantitive but market-oriented (rather than prescriptive) nature can be contemplated, and this serves as a theme over the remaining sections of this chapter.

7.3   Interest Rate Channel

A fundamental aspect of the Post Keynesian framework examined in this thesis is that monetary variables are a central component in the entire economic process, and are bound into determination of real economic outcomes. Although monetarist and many neoclassical theories have maintained a money–real

economy dichotomy, monetary policy regimes have shifted in many countries over the past two decades towards openly recognising a policy interest rate determined by the central bank as being a key, predominant, or even the only, instrument of monetary policy. This followed a period in which, under the influence of monetarism, central banks sought to maintain a monetary aggregate growth rate within pre-specified target ranges or guidelines, but in which the targets or guidelines were frequently breached. In the monetarist view, central banks were expected to be able to control the specified monetary aggregate closely, but in practice they were not able to do so. As indicated, in the case of South Africa, the guideline range was not achieved in 7 out of 11 years in which they were used (1986-1997). Since the Reserve Bank was avowedly pursuing monetary aggregate targets or guidelines over this period, interest rates were at times portrayed as being partly or significantly market determined, and this was stated in monetary policy reports and Governor's addresses in the case of South Africa (e.g. de Kock 1988). This may have been due to the Bank preferring not to be seen as too strongly in control of interest rates, to avoid intensified criticism when rates are uncomfortably high which could heighten public pressures on the Bank. The role of the Reserve Bank in determining the key policy rate exogenously was more explicitly recognised over the course of the 'eclectic' period from the move away from monetary aggregate targeting (1997) to the introduction of inflation targeting in 2000. Nevertheless, Casteleijn (2001:4-5) regards the policy interest rate as having been the key instrument of policy from 1986, even though monetary aggregate targets were being pursued, implying that monetary aggregates were influenced indirectly using the policy interest rate, rather than directly through quantitive channels. Meijer (2000:3-4) adopts a similar view. With the introduction of inflation targeting, it is fully and explicitly recognised that the Reserve Bank uses its key policy rate as the primary instrument of monetary policy.

In the present monetary policy framework in South Africa, the policy interest rate is regarded unambiguously as the primary instrument for attainment of a broad (CPIX) inflation rate within a pre-specified target range, with the Reserve Bank having price stability as its primary (even overriding) policy objective, under an

inflation targeting regime (van der Merwe 2004:2-4). The policy interest rate is therefore regarded predominantly as an instrument through which to influence price level changes in the economy (not monetary aggregates). It is recognised by the Reserve Bank that the interest rate has an effect on aggregate demand through four main transmission mechanisms as described by De Jager and Smal (2001:5-9). But its purpose is regarded as being to maintain aggregate demand in such a relationship to aggregate supply that excessive inflation pressures are avoided or curbed, in view of the primary Reserve Bank focus on price stability. Possible negative (or positive) effects on aggregate supply, especially through investment, are relegated to the wings, being regarded as the responsibility of other economic actors, in view of the Reserve Bank needing to concentrate its attention on achieving an inflation rate within the target range. The question arises whether the single-minded focus on the inflation target could result in unnecessary restriction of investment, with attendant negative consequences for employment generation, economic growth and increasing productive capacity.

The inflation targeting regime adopted in South Africa can be characterised as fully-fledged inflation targeting in which government sets the target (range) after consultation with the central bank, and the central bank is then given full instrument independence in pursuing the target. Having government set the targets is intended to ensure that they are not set so stringently as to compromise other government economic objectives relating to economic growth, employment generation and income distribution. Unduly low targets could lead to monetary policy measures which are excessively restrictive: the Reserve Bank recognises the possible effect on the real economy under this circumstance whereby "very stringent policy measures . . . could distort domestic production, consumption, saving and investment." (van der Merwe 2004:5). Allied to this, the Reserve Bank adopts a 'flexible' approach in its monetary policy actions in which a gradual reduction in inflation is sought towards target levels, "taking the effect of its actions on other economic variables into consideration." (van der Merwe 2004:12). It is clear that the Reserve Bank regards the key policy interest rate used to provide borrowed reserves to banks from its discount window, the repo rate, as its predominant instrument for exercising monetary policy actions

under the inflation targeting regime (van der Merwe 2004:4). The Reserve Bank's approach can therefore be characterised as one of using the policy interest rate to pursue a primary (generally overriding) objective of domestic price stability, expressed as an inflation target range, with effects of its actions on the real economy being a secondary concern, relying on inflation targets not being too stringent, and its own gradualist approach, to avoid unnecessary restriction or distortion to real economic activity.

It is part of the Post Keynesian conceptual scheme explored in this thesis that monetary policy actions (intended or otherwise) can have significant effects on the real economy, and this includes effects of the key policy interest rate. The empirical analysis of Chapter 6 showed the relationship from the key policy interest rate, through the interest rate spectrum, to lending activity by banks and thence to investment levels, to be significant over the period examined. This indicates that the policy interest rate of the Reserve Bank has significant implications for economic growth, employment generation and productive capacity, even though it is being used predominantly as a means to influence price levels. Despite the target inflation range being set so as not to be 'excessively stringent' and the Reserve Bank adopting a 'flexible' rather than immediate approach to attaining the target range, it is virtually inevitable that the predominant focus on the price effect of interest rates will at times result in an outcome of sub-optimal investment levels with negative consequences for the real economy.

Some possible means of ameliorating these negative consequences are taken up under the quantitive measures in subsequent sections of this chapter. However, in respect of interest rates themselves, the negative consequences are likely to be ameliorated through maintaining the key policy rate within a fairly narrow band, to reduce the negative effect on investment of periods of high interest rates as well as reducing the negative impact of upward interest rate shifts. This can be achieved, in the absence of major economic shocks (e.g. a massive increase in oil prices), through highly artful conduct of monetary policy, recognising that it needs to be concerned at least as much with inflation

expectations and behaviour of economic actors in response to statements concerning monetary policy, as the effects of interest rate changes themselves. Although this aspect of monetary policy is generally understated by the Reserve Bank and government (probably deliberately since too great awareness by economic actors could diminish its effectiveness), the extensive publicity given to monetary policy committee meetings and statements, and to any other statements by the Reserve Bank Governor, seems to indicate that the Reserve Bank is fully cognisant of the importance of this 'psychological' operation of monetary policy. A Post Keynesian view would be inclined to place this aspect of monetary policy as being more effective in attaining inflation targets than changes in interest rates themselves, since the effects of interest rates on prices are regarded as ambivalent, and price level changes are not ascribed closely to monetary variables over which a central bank has control. The 'psychological' conduct of monetary policy could be regarded almost in the vein of an informal incomes policy, operated through moral suasion and the implied threat of interest rate increases. Some form of incomes policy, even in this informal guise, would be regarded in a Post Keynesian framework as being necessary for the curbing of inflation, as discussed in Chapter 3.

In so far as the changes of interest rates themselves are concerned, Dalziel (2001:76-86) develops an analysis under Post Keynesian assumptions in which the marginal debt-capital ratio is central to the generation of inflation. The marginal debt-capital ratio refers to the change in debt financing of firms relative to the total value of capital. The idea is that the extent to which additional debt financing increases relative to internal financing by firms in undertaking new investment, has direct implications for inflation. Dalziel (2001:76-83) develops a formal model justifying this linkage, in which liquidity preference on the part of households, expressed as the ratio of money to wealth holding, is also an important component. The line of reasoning stems from the credit expansion process of banks in undertaking the financing of new investment. The financing of investment needs to be validated by the willingness of households to hold permanent funding of the additional capital, in the form of equity ownership. It is the degree to which there is a shortfall in this validation that serves as a source

of inflation. Dalziel's background argument and model development is extensive; the above seeks only to capture the central nature of the analysis. The equation which Dalziel posits as indicating the inflation effect from this mechanism is:

$$p \; = \; [\,(d - h)/h\,].g \qquad\qquad\qquad E7.3.1$$

where p is the inflation rate, d the marginal debt-capital ratio, h the money-wealth ratio and g the supply-side capacity economic growth rate (Dalziel 2001:82). g is actually the growth rate in capital stock (investment to previous capital stock), so there is a presumption that this is broadly indicative of supply-side capacity growth. Inflation is therefore positively related to supply-side capacity growth as well as the relative difference between marginal debt-capital and money-wealth ratios.

Although Dalziel (2001) provides a comprehensive theoretical development of this relationship based on a Post Keynesian conceptual framework, he does not present any empirical evidence that such a relationship actually holds in reality. He explores the possibilities for such a relationship in a monetary policy framework (Dalziel 2001:108-123), to examine whether the conceptual framework would imply that monetary policy actions aimed at curbing inflation could be undertaken in such a manner as to minimise negative economic growth effects. One positive implication for monetary policy conducted in an inflation targeting framework is that an increase in the base (policy) interest rate is likely to decrease the marginal debt-capital ratio to some degree, through a combination of the relative costs of debt and internal funds moving towards internal funds, and interest rates on lending relative to the base rate increasing as a result of the increased lending risk perceived by banks. However, with only a single policy instrument in the form of the base interest rate, inflation reduction cannot be delinked from economic growth reduction, so that some sacrifice of growth will generally occur in the process of combating inflation. A second monetary policy instrument is needed to influence the marginal debt-capital ratio separately from the interest rate which is used to curb nominal aggregate demand, and Dalziel (2001:120-121) suggests a variable capital gains tax as one possible instrument, selective control on credit provision as another. The

former would reduce the marginal benefit to firms of inflation, the latter would reduce the marginal debt-capital ratio directly.

Dalziel (2001:121-122) indicates diagrammatically that the effects of interest rate changes used for inflation control purposes could in principle be countered in their effects on economic growth by using a second policy instrument which is linked to the marginal debt-capital ratio. However, he does not spell out in any detail how such a policy mechanism would operate, nor provide any empirical indication of its likely efficacy. His analysis and proposed policy approach also rests on the premise that the marginal debt-capital ratio mechanism as posited is the primary mechanism generating inflation, even though he does not provide empirical evidence of its occurrence. Furthermore, if it is indeed a mechanism of inflation, it is still possible that it is not the sole mechanism: there could be related forces operating, or even a distinct second mechanism (for instance in the more widely considered arena of income contestation). The analysis is nevertheless useful in demonstrating the possibility that inflation generation could reside in the finance provision–investment channel of the economy, as well as highlighting that a second (or more) instrument of monetary policy, in addition to the policy interest rate, is necessary if effects on investment and economic growth resulting from use of the policy interest rate to achieve inflation targets are to be effectively ameliorated.

7.4 Open Market Operations and Tax and Loan Account transfers

Open market operations and Tax and Loan account transfers are considered together since both have the effect of altering the level of non-borrowed reserves held by banks, as described in earlier chapters. Together they constitute the key means, or instrument, with which the Reserve Bank could potentially exercise quantitive influence over bank lending in a continuous, market-related manner. This contrasts with changes in required cash reserve ratios or liquid asset reserve ratios, which, although also of a quantitive nature, can only be changed periodically through regulation. The empirical analysis of Chapter 6 provided support to the proposition that open market operations and Tax and Loan account transfers have an effect through cash reserves held by banks, more

strongly through non-borrowed reserves than through total reserves, on new bank lending. This is in accordance with the structuralist portrayal of the workings of the monetary system as described above, in which quantitive influences can occur in conjunction with (or addition to) interest rate influences. The implication is that open market operations and Tax and Loan account shifts could be used as an active and ongoing instrument of monetary policy. This contrasts with their being regarded as a means to make technical or portfolio adjustments, and to maintain the money market shortage at an appropriate level, without being regarded as having broader monetary significance, under the current inflation targeting framework.

The possibility arises that open market operations and Tax and Loan account transfers could be used to influence a second variable in the economy, such as envisaged in the case of the marginal debt-capital ratio suggested by Dalziel (2001), where the policy interest rate is used to pursue an inflation rate target, precluding its use towards the simultaneous attainment of a desired level of the second variable. More in line with the theme of this thesis, it could be used to ameliorate the negative effects on investment of a policy interest rate which is set predominantly to achieve a price stability (inflation) objective. The monetary policy dilemma which may frequently occur can be illustrated by the situation facing the Reserve Bank in the second quarter of 2006. The inflation rate remained well within the 3 - 6% target range, at 3.5 - 4.0%, with little sign of increasing inflation expectations or second round effects of oil price increases. However, private sector credit extension was growing at a rate of close to 25% per annum, with the business component above 20%. The latter indicates high new lending levels by banks to firms, far in excess of GDP or investment growth rates (exceeding these by around 10 percentage points), which are therefore unlikely to be sustainable. It holds the ominous portent of a sharp downward correction in investment levels (as well as asset prices) in the event of a rise in the policy interest rate. Under a range of mixed signals, the Reserve Bank elected to leave the repo rate unchanged at 7.0% at its April MPC meeting, but to increase it at its June MPC meeting to 7.5%. It is possible under such a situation that quantitive measures through open market operations and Tax and

Loan account shifts could be used to restrain the high growth in credit extension in order to ameliorate the occurrence of a subsequent correction, without (significantly) increasing the policy interest rate (or instituting a smaller increase than would otherwise be necessary). The effect would be one of stabilising the investment trajectory, and damping speculative asset price inflation, while still focussing policy interest rate decisions on the inflation objective.

Post Keynesian writers in monetary economics appear not to have (as yet) fully recognised the possibility for central bank influence on bank lending through open market operations under the structuralist view. Palley (1996c:103-125) for instance develops the structuralist view of money in some depth, including expression using a symbolic model, but states that the "principal additional insight is that the private initiatives of the banking sector matter for the determination of the money supply." (1996c:112). He proceeds to describe the core difference between the structuralist and accommodationist model in terms of the active management by banks of their asset and liability composition. The symbolic model contains no variable relating to open market operations or similar central bank transactions. Curiously, he refers obliquely to the idea that open market operations could have a role: "In a sense, banks perform their own internal open market operations between their portfolios and those of the non-bank public." (Palley 1996c:116). Granger causality tests he conducts on American economic data for the period 1973 to 1990 indicate a predominant causal direction from monetary base to bank lending rather than vice versa, but he does not take up the possible implications this could have for conduct of monetary policy (1996c:117-123). Likewise, Fontana (2002:148-164), who examines the structuralist approach in some depth, focuses on a liquidity preference analysis of the asset holding of banks, as well as using a monetary circuit concept to reconcile flow and stock aspects of money, but these remain in the realms of bank behaviour. Dow (1993:26-42, 165-172, 1996a:497-508) argues the case of endogenous (but not horizontalist) money according to which bank behaviour changes in respect of their composition of asset holdings through liquidity preference, but without a quantitive influence from the central bank. Chick and Dow (2002:600-606) come closest to recognising the possibility

of the central bank using both open market operations and the key interest rate as instruments of monetary policy, stating for example: "Rather, monetary policy consists of a combination of quantity effects and price effects, none of which is deterministic." (2002:605). They do not however further explore the possibility that the central bank could use open market operations as a secondary, separate instrument of monetary policy to the key policy interest rate, with such quantitive measures being used to modify the effects on the economy that are likely to result from a particular policy interest rate stance. Dow (2006) likewise does not pursue this possibility explicitly, though does refer to "discouraging banks' borrowing of reserves ('frown costs')" and "using open market operations to manipulate market rates" as being features of a structuralist approach (2006:37).

Perhaps a reason for hesitance in advancing the structuralist view towards open market operations as a secondary instrument of monetary policy, is the conventional notion that the interest rate and money supply are directly linked in an inverse relationship. However, there is much evidence that no such direct inverse relationship exists. The fact that the South African Reserve Bank was unable to attain pre-specified money supply targets or guidelines through use of the interest rate instrument in the majority of years in which such targets/guidelines were set and pursued from 1986 to 1997 (Moll 1999:40-41), is one specific example of evidence that there is no such direct linkage. Other countries such as America and Britain had similarly poor results in seeking to achieve money supply targets during the 1980s. An endogenous money view does entail a demand for credit function in which the interest rate is one explanatory variable, and credit demand gives rise to money holding, but the relationship is not direct or immediate. The structuralist portrayal of endogenous money renders the link between interest rate and money supply even more tenuous, since there are significant quantitive effects on credit provision, whether through bank portfolio behaviour, credit rationing or central bank transactions, and thereby on money supply. A structuralist view hence opens the way in conceptual terms for quantitive measures such as open market operations to be used as a separate policy instrument to the policy interest rate. It would still be

recognised however that the two instruments could not be deployed in a severely contradictory manner. For instance, very tight restrictions on levels of non-borrowed cash reserves through open market operations, while maintaining a low policy interest rate, could lead to an increase in bank lending interest rates as a result of excess demand for credit, which would steepen the yield curve from short to long interest rates. This could lead to excessive use of short-term borrowing (from non-central bank sources) by banks, which the central bank may consider to be a threat to financial stability. Similarly, a very high policy interest rate is likely to curb credit provision even if open market operations are undertaken to bolster banks' non-borrowed reserves. The central bank could also risk losing control over short-term interest rates as a result of borrowed reserves (the money market shortage) diminishing to close to zero. However, between these extremes, there would be considerable scope for the use of open market operations as an instrument of monetary policy, taking full cognisance of the key interest rate and its effects as the primary policy instrument and influence channel.

One possible sphere in which open market operations could be applicable as a secondary policy instrument in an inflation targeting framework is that of asset price inflation. A dilemma of monetary policy under inflation targeting has been the extent and manner in which asset price inflation should be taken into consideration, since the inflation target itself is generally based on consumer prices only. Strict pursuit of the inflation target could lead to large asset price increases being virtually ignored, yet these could eventually feed into consumer price increases through higher rentals, consequent higher wage demands, wealth effects, and other processes. Bernanke and Gertler (1999:17-51) examine this issue in some depth, though from a New Keynesian rather than Post Keynesian perspective. They distinguish between asset values arising from fundamental factors and non-fundamental factors, where the latter are associated with speculative excesses, but recognise that it is virtually impossible to identify the extent to which fundamental or non-fundamental factors are operative. They recognise that asset value cycles are damaging to the economy, but also that a deliberate measure to counteract an excessive asset

price rise could lead inadvertently to an over-rapid decline, causing a financial panic which could be more damaging than if the cycle were left to run its course. They take cognisance of the effect of asset prices through the credit extension process, in that assets are used as collateral, so that borrowing capacity rises and falls with asset prices, but also that bank balance sheets and default risks are affected by the asset value changes. A financial implosion of similar nature to that portrayed by Minsky (1982, 1986) is described (though not specifically attributed to Minsky).

Bernanke and Gertler (1999:23-26) undertake various simulations of monetary policy rules instituted within an inflation targeting framework, using a simple macroeconometric model. Their core equation for the exercise of monetary policy is one in which the policy interest rate is determined as a combination of a steady-state nominal interest rate and a portion of expected inflation. This is similar to a Taylor rule (Solow and Taylor 1999:45-54), with the output gap omitted for simplicity, and using expected rather than past inflation. Their main conclusion from the simulations is that asset price increases do have inflationary effects, and that asset price cycles are damaging to investment and consumption in the real economy, but also that sharp anti-inflationary monetary policy directed towards asset prices can lead to a collapse in asset prices with greater negative impact on the real economy than non-intervention. They therefore advocate that monetary policy under inflation targeting concentrate only on the consumer-price inflation effects of asset price increases, not on asset values themselves. They are however presupposing that the central bank exercises monetary policy only through the single instrument of the interest rate. Their advocating no direct consideration of asset values is in the vein of accepting that the policy interest rate instrument is broad-ranging in its effects ('blunt'), and therefore seeking to avoid unpredictable negative consequences through possible asset deflation. However, with a quantitive measure such as open market operations acting separately from the policy interest rate, the possibility arises of ameliorating asset price volatility without the policy interest rate having to deviate from its (consumer) inflation targeting focus. Quantitive measures could be used to curb the extent of bank lending used for speculative purposes, which would be a

contributor to asset price inflation, without increasing the policy interest rate and consequent cost of borrowing.

7.5   Foreign Flows and Exchange Rate

Both theoretical justification and the empirical analysis of Chapter 6 demonstrated the clear effect of changes in foreign reserves (net) held by the Reserve Bank on non-borrowed (and total) cash reserves of the banks. Thus sustained interventions by the Reserve Bank in the foreign exchange market, by way of net purchase or sale of foreign exchange from/to domestic banks, have a quantitive monetary effect, unless offset (sterilised) by open market operations or Tax and Loan account transfers of similar magnitude. Under the monetary analysis put forward and examined in this thesis, any net quantitive effects on bank cash reserves may translate through to effects on investment through the bank credit system. The monetary policy implication of this is that changes in net foreign reserve holdings of the Reserve Bank need to be fully neutralised through other quantitive actions, unless a quantitive impact is specifically identified by the Reserve Bank as being desirable for monetary policy purposes. In similar vein, it implies that any sustained programme to increase (or reduce) net foreign reserve holdings over a period needs to be pursued with caution, and with countervailing quantitive measures as necessary, to produce a quantitive effect on the banking system which is in accordance with prevailing Reserve Bank policy intentions.

The Post Keynesian arguments that flexible exchange rates are inherently volatile, potentially unstable and subject to speculative forces raises the question of whether Reserve Bank measures could or should be adopted to decrease exchange rate volatility of the local currency, or even to seek to steer it towards an economically desirable target range. The Reserve Bank intervened heavily in the foreign exchange market during the massive currency speculation which occurred in 1998 (Schaling and Schoeman 2000:5-9), but has stated repeatedly in subsequent years that it has adopted a stance of allowing the Rand currency to attain whatever value occurs through market forces, i.e. allowing complete flexibility in the external Rand value. Reserve Bank statements since 1998 do

not even indicate that the Reserve Bank engages in intervention transactions with a 'leaning against the wind' purpose in order to reduce volatility. The Reserve Bank may well engage in such transactions, but it would seem wishes to dispel any possible notion that potential speculators may harbour that it would resist movement of the exchange rate in either direction, in order to dissuade speculators from engaging in a tussle such as occurred in 1998. The 1998 episode resulted in the net open foreign currency position of the Reserve Bank, primarily as a result of forward transactions, increasing from US$12.7bn to US$23.2bn in a period of five months. The determination of the Reserve Bank to reduce this open position as rapidly as possible over 2000 and 2001 was arguably one of the underlying causes of the massive depreciation of the Rand currency in late 2001 (by 34% compared to a year earlier). Even though the Reserve Bank was able to bring the net open position to zero in May 2003, and had built up net foreign reserves to approximately US$23bn by the end of 2006, it is no doubt still concerned that international speculative flows can easily exceed such an amount. In view of the very large funds under the control of private-sector international institutions, fear of a speculative episode is justified in any small open economy, whether the exchange rate regime is of a flexible nature or entails some form of link or peg.

As indicated in Chapter 5, the Reserve Bank recognises the exchange rate as one of the important channels for transmission of monetary policy. This is based on the policy interest rate having an effect on the exchange rate, primarily through a higher risk-rated domestic interest rate giving rise to higher foreign capital inflows, but also through a higher domestic interest rate reducing imports and thereby current account outflows. The Reserve Bank further recognises that shifts in the exchange rate produce monetary effects in the domestic economy. The calculation of a Monetary Conditions Index (MCI) which combines both domestic policy interest rate and a change in the trade-weighted exchange rate with suitable weightings into a single index would provide a formalisation of this combination. The relative weightings reflect an estimate of the influence of the interest rate and of a change in the exchange rate on domestic economic activity. Central banks of various countries calculate an MCI and use it as an

indicator in arriving at monetary policy decisions (Dalziel 2001:112-113). The South African Reserve Bank does not overtly incorporate such an index into its monetary policy decision process, but may informally undertake such a calculation internally. Statements following MPC meetings reflect a reluctance to indicate the role or weight accorded to exchange rate factors. There can be little doubt that the increase in inflation rate to well above the upper end of the target range during 2002 (peaking at 11.3% in October 2002) was strongly related to the steep currency depreciation of late 2001. The exchange rate is therefore clearly a material factor in monetary policy consideration in South Africa, both through being part of the transmission channel of policy changes in interest rate and through its effect on domestic monetary conditions.

The Post Keynesian analysis adds to this the perspective of the exchange rate (in South Africa or any country pursuing a flexible exchange rate regime) being inherently volatile or unstable (e.g. Davidson 2002:173-178). This implies that the Reserve Bank cannot rely on market forces to move the exchange rate to a fundamental equilibrium level, nor to sustain it at or close to any particular level. The implication is that ongoing intervention of a 'leaning against the wind' nature at the very least is necessary to reduce the inherent volatility, but that a degree of exchange rate management beyond volatility reduction is desirable. It is eminently possible for the Reserve Bank to calculate an exchange rate range which is desirable at any period, in terms of both contributing to broader economic outcomes and the attainment of inflation targets. It is also possible for the Reserve Bank to engage to some degree in foreign currency transactions with a view to attaining or sustaining an exchange rate within or close to such a target range[5]. In view of the potential magnitude of international speculation as well as inherent volatility, the exchange rate preferred range may not be attainable. For this reason, it is likely to be preferable for such a preferred range not to be announced publicly: not attaining the range could diminish the credibility of the Reserve Bank, any known commitment to an exchange rate

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[5] This is a relatively moderate departure from fully flexible exchange rates by comparison to many Post Keynesian views. Davidson (2002:231-249) for instance pursues a Post Keynesian approach which could be characterised as a fixed-but-readily-adjustable architecture with an international agency serving to co-ordinate the adjustment process.

level could attract a speculative attack, and any indication of an exchange rate preference could blur the focus on commitment to an inflation rate target under the current policy framework. However, management of the currency towards a preferred exchange rate range without public announcement of the range, would be preferable under the Post Keynesian analysis to leaving exchange rate determination to market forces with no equilibrium 'anchor' to the volatility which may occur.

The empirical assessment of Chapter 6 showed a significant relationship between the exchange rate level (in real trade weighted terms) and investment, as well as a significant relationship of investment to import prices (expressed as an index relative to domestic prices). Since the relationship to the exchange rate level has a negative coefficient, this could be interpreted as resulting both indirectly from lower export demand and more directly from the higher local currency cost of importing capital equipment. The negative coefficient in the relationship to relative import prices could be interpreted as a combination of relative capital equipment prices and of higher import prices curbing domestic demand more widely. To the extent that monetary policy measures affect the exchange rate, these then translate through to domestic investment through these relationships. Although the exchange rate is influenced by the policy interest rate adopted by the Reserve Bank, it is likely to be influenced also by foreign exchange transactions undertaken by the Reserve Bank, and the exchange rate equation estimated in Chapter 6 gives an indication of this relationship. This provides support to the contention, within the Post Keynesian analysis, that monetary policy actions affect investment in the economy partly through the exchange rate. It has the further implication that an exchange rate range could be identified which is favourable to domestic investment, and this range could be informally (not publicly) pursued as described above. Although the effects of exchange rate volatility or unpredictability itself on investment was not econometrically examined in Chapter 6, the Post Keynesian analysis would suggest that reduction of such volatility through Reserve Bank foreign exchange market intervention would further increase domestic investment through lifting

the mec curve as a result of expected higher returns, owing to the reduced uncertainty.

7.6   Bank Credit Structures

 As indicated in earlier sections of this chapter, the Post Keynesian structuralist view recognises the asset portfolio compositions of banks (and liability compositions indirectly) as a significant arena for the occurrence of monetary influences affecting the real economy. The model and empirical analyses of this thesis explore and find supporting evidence for the proposition that bank credit structures in themselves are an element in the transmission of monetary policy actions to investment, and into the real economy more widely. Although various Post Keynesian writers examine this issue in terms of a liquidity preference concept applied to the asset side of banks' balance sheet (e.g. Dow 1996a:497-508, Chick and Dow 2002:587-607), this term is avoided here in favour of asset composition or maturity structure[6]. As pointed out earlier in this chapter, these analyses also do not examine the connection of monetary policy actions to bank credit structures and the effect that monetary policy may therefore have on investment or other real economy magnitudes through this route.   This connection could include influences through the maturity composition of financial assets used in open market operations, which is an additional aspect of open market transactions to the value of the transactions undertaken, as well as through public debt management actions undertaken by the Treasury, or central bank on its behalf.

The empirical assessment of Chapter 6 showed a significant relationship between the maturity structure of the financial asset holdings of banks and additional (new) bank advances. It showed in turn a relationship from additional bank lending to investment spending, so that investment would be influenced by bank asset composition through this route. The maturity structure variable is expressed as a weighted degree (proportion) of liquid or short-term assets, i.e. it

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[6]   As discussed in Chapter 5, the term 'liquidity preference' in this context may give rise to lack of clarity, since Keynes' original use of the term applied to the holdings by economic actors of bank liabilities.

increases as the asset maturity structure shifts towards the liquid or short-term end of the spectrum, reflecting bank lending and investment as positively related to more liquid or short-term asset composition. The possible explanation of this relationship is that banks become more willing to place funds into lending, to the extent that their asset composition becomes more liquid or short-term in composition. This could be combined with a decreased perception of risk, and a lessening of credit rationing stringency, to the extent that their asset holdings are more liquid or realisable in the short term. Reserve Bank transactions through open market operations could in turn affect the maturity structure of bank financial assets fairly directly, since a significant proportion of bank assets is comprised of Treasury and Reserve Bank securities. The Reserve Bank is a major participant (in conjunction with the Treasury) in the government bond and Treasury bill market, as well as in transactions using its own debentures, so that the maturity of the financial assets which it places in the financial market through its sale, purchase, issue and redemption activities serves as a significant determinant of the asset maturity structure of banks (as well as other financial institutions). The Reserve Bank is therefore clearly in a position to influence the maturity structure of bank asset holdings, and could use this influence as a means (together with the policy interest rate and quantitive measures) to conduct monetary policy.

The empirical analysis also showed a relationship between bank asset maturity structure and the maturity structure of bank liabilities, probably arising from the prudential requirement (not presently materially regulated, since the 5% liquid asset requirement is generally below the banks' own prudential requirements) to maintain a suitable relationship between the two so that fluctuations in deposit withdrawals can be met with a high probability. Although the cash reserve requirement administered by the Reserve Bank relates to the deposit liabilities of the banks, it is not used in an active sense, and does not entail any significant influence on liability maturity composition. The liability maturity composition of banks could therefore be regarded as a useful indicator of possible increasing systemic risk, in conjunction with the maturity composition of financial assets, rather than as a transmission medium for certain aspects of monetary policy.

Increased systemic risk would be indicated by increased liquidity (shorter maturity composition) of bank liabilities relative to assets. It is however the asset composition that plays the more central role.

The monetary policy implication of recognising a role of bank credit structures in transmission of monetary effects to the real economy is therefore that the central bank would monitor the maturity structure of bank asset holdings and modify the maturity of financial assets that it uses in engaging in market transactions, in such a way as to shift the bank asset maturity structure towards a more desirable composition.   Determination of the bank asset composition that is desirable under alternative economic circumstances is an area that could be identified for further theoretical and empirical research.   An initial, broad approach would be to seek to attain a stable trend in bank asset maturity structures over time, in particular over periods of economic volatility. This would imply adjusting maturities of financial assets used in transactions to counteract deviations in bank asset maturity composition from a stable trend.   Such measures would at least be likely to counteract financial instability of the Minsky (1982, 1986) kind. A refinement of the approach could be sought over time as monetary policy relationships through the bank credit structure are more precisely determined, and institutional arrangements put in place in order that open market operations as well as public debt management can be undertaken in such a manner that bank asset composition can be taken into consideration in determining maturities for new issues of Treasury and Reserve Bank securities or transactions in existing securities.   This could potentially enable higher average investment levels to be attained in the economy without undue risk of financial instability.   The maturities of financial asset issues or transactions engaged in by the monetary authorities can potentially be varied entirely or largely independently of the volume of such issues or transactions undertaken, so that maturity variation could be used as a separate instrument of monetary policy to that of interest rates and quantitive influence through cash reserve holdings of banks.

7.7　Monetary Policy Context

As with central banking in most countries of the world, the conceptual framework under which monetary policy is undertaken by the South African Reserve Bank has changed markedly in response to prevailing economic thinking over the past 50 years. Various writers have classified the conceptual frameworks used and identified the period over which they were in operation (e.g. Meijer 1995:363-370). Very cursorily, the conceptual framework moved from one of direct quantitive controls using liquid asset ratios and credit extension restrictions in the 1960-1981 period, to a transition towards a market-related approach in accordance with the De Kock Commission report over 1981-1985, to a cash reserve-based system using the policy interest rate to try to attain money supply target or growth guidelines from 1986-1997, to a mixed money supply and inflation guideline arrangement in 1998-1999 in the lead-in to inflation targeting, and to full inflation targeting from 2000 (Casteleijn 2001:4). It is therefore not inevitable that the current conceptual framework of inflation targeting will persist indefinitely. The framework is born out of an era during which inflation was an ever-present and recalcitrant threat, in which monetary policy measures adopted in many instances proved ineffective in combating inflation pressures adequately. The resolute focus on inflation, to the virtual abandonment of other possible objectives of monetary policy, is perhaps understandable against such a background. It is however possible that, as central banks gain confidence that they can indeed maintain a tight rein over inflation through the inflation targeting framework, they will increasingly contemplate additional objectives (albeit secondary to price stability) in the conduct of monetary policy. This could apply likewise in the case of the South African Reserve Bank, especially since it operates in a country in which there are pressing economic needs relating to employment generation, income distribution, investment and growth.

The analyses of this thesis have indicated that neither Post Keynesian monetary theory in general nor the more specific and extended analysis and model posited under the structuralist rubric are fundamentally incompatible with an inflation

targeting regime[7]. Although Post Keynesian monetary theory does not accord to monetary policy the central or entire capacity to control or curb inflation, the societal focus on inflation targets through a government–central bank agreement would nevertheless be recognised as a major contributor to combating inflation. Use of the policy interest rate as primary monetary policy instrument is also fully compatible with a Post Keynesian framework, whether accommodationist or structuralist. The variation lies in recognising additional potential instruments of monetary policy, and additional economic objectives which could be beneficially pursued, under the structuralist Post Keynesian framework. The implication is that the additional monetary policy instruments and objectives posited in this thesis could be adopted, whether partly or entirely, as an adaptation or extension under an inflation targeting regime, rather than necessitating a marked departure from it.

Even if price stability is retained as the overriding objective in an inflation targeting regime, the secondary policy instruments indicated could be used to enhance the attainment of inflation rate goals. As pointed out, excessive credit extension growth which is judged to be a possible threat to future inflation could be tempered through using open market operations and Tax and Loan account transfers, where other economic factors are such as not to warrant a policy interest rate increase. A greater degree of non-publicised intervention in the foreign currency market in order to reduce volatility of the domestic currency exchange rate would reduce inflation from import price effects, placing less pressure on use of the policy interest rate to reduce pass-through effects from exchange rate changes. Use of financial asset transactions to influence bank asset maturity structures would assist in curbing shifts to excessive bank asset liquidity or short maturity which could lead to new bank lending moving to an unsustainable level, with excessive nominal demand eventually giving rise to higher inflation. The additional instruments could therefore be used as

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[7]   Setterfield (2006:657-670) recently argues that the compatibility is subject to the condition that "the policy authorities explicitly acknowledge both the influence of aggregate demand on real economic activity and the distributional conflict at the core of the inflation process." (2006:670).

complementary channels to the primary instrument of the interest rate while retaining the essential features of the inflation targeting framework.

In terms of alternative policy frameworks to that of inflation targeting, the use of quantitive transactions could serve as a market-related substitute for direct credit controls. The latter can of course achieve more severe restriction to bank credit expansion due to their legally prescriptive nature, but this is at the expense of market distortion as well as enforcement and compliance costs. Use of quantitive transactions also enables policy influence to be instituted and varied on an ongoing basis as economic circumstances change, rather than being introduced sporadically after negative economic factors become apparent, as occurred with the 'corset' direct controls over credit expansion which were adopted in the 1970s in South Africa, Britain, and other countries. Transactions to influence bank asset maturity structures could similarly be used on an ongoing basis to achieve less harshly and at lower economic cost the credit expansion goals for which direct credit controls may otherwise be advocated. Although, as indicated earlier in this chapter, various Post Keynesian writers (e.g. Rousseas 1986, 1998) contemplate the necessity for direct credit controls, due to regarding credit provision as central to the monetary transmission mechanism, they might well shift the emphasis to market-related quantitive measures, if it was apparent that these could achieve comparable influence over the credit provision process.

7.8   Concluding remarks

The implications then of the Post Keynesian analysis and empirical examination undertaken in this thesis are significant both for theoretical issues concerning money endogeneity within the Post Keynesian camp, and for the conduct of monetary policy in South Africa. The analysis supports the structuralist rather than accommodationist strand within Post Keynesian thinking concerning credit provision and endogenous money. It thereby contributes to substantiation and extension of ideas within the structuralist view of money and credit. Post Keynesian writers in the structuralist mould have examined the role of the financial structure and behaviour of clearing banks as a factor in money and credit determination. They have tended however not to take the further step of

relating this to possible policy measures and actions which could be undertaken by the central bank.

This chapter has examined the implications of a structuralist portrayal, as borne out by the model developed in Chapter 5 and the empirical relationships found in Chapter 6, for the potential avenues for the conduct of ongoing, market-related monetary policy. It has presented the possibility that three additional instruments of monetary policy could be used, albeit as secondary instruments, to that of the policy interest rate. These are quantitive measures through open market operations, Tax and Loan account transfers and similar transactions, more active exchange rate management, and deliberate management of the maturity composition of financial assets provided to the banking system in order to influence the maturity composition of clearing bank asset holdings. It was argued that all four of these instruments and channels have an effect on investment in the economy, through the banking system. It was argued in particular that concentration on the policy interest rate as the single instrument of monetary policy with an overriding price stability (inflation) objective could have unduly restrictive consequences for investment (and real economic magnitudes generally), and that the use of the additional three instruments of monetary policy offers the possibility of diminishing such restrictive consequences. It was found that such an approach, under Post Keynesian precepts, is not fundamentally incompatible with the inflation targeting framework currently in operation in South Africa, and could be adopted as a modification or extension to the inflation targeting approach.

CONCLUDING PERSPECTIVE

In considering the relationship between monetary policy and investment, this thesis commenced with an examination of economic thought concerning money and investment from the time of Ricardo in the early nineteenth century. This was undertaken against the backdrop of determining how and when the transition occurred from a classical dichotomy in which monetary and real economic forces are distinct, to an analytical framework in which monetary and real forces are inextricably interlinked. Although several steps were identified along this path, it was found that the full conceptual shift to such a framework occurred in the work of Keynes, partly in the *Treatise* (1930), and more fully in the *General Theory* (1936). With economic thinking and research within the mould broadly carrying the Post Keynesian label specifically seeking to maintain and further develop economic analysis based on this monetary–real force interconnection, it was monetary economic research of a Post Keynesian orientation that was given particular attention in developing the arguments and models over the course of the thesis.

In view of the close association between investment and economic growth, formally presented growth theories from the time of Ramsey (1928), through those of Harrod and Domar which followed Keynes' *General Theory*, those of Solow, Swan, Tobin, Sen and others in the 1950s and 1960s, the development finance propositions of McKinnon, Shaw, Thirlwall, Kapur and others in the 1970s and 1980s, to the advent of endogenous growth theory from the mid-1980s, were examined in Chapter 2 to determine the role accorded to monetary forces in such models and frameworks. It was found that monetary forces by and large were not fully bound into the determination of economic growth in the intrinsic manner envisaged by Keynes and Post Keynesians in their conception of money and monetary analysis. The models and frameworks contained much of a useful nature in analysing growth issues, including investment as a key variable, but in-depth consideration of the monetary policy–investment relationship, under the precept of intrinsic monetary–real interconnection, needed to be pursued further through examining monetary research work and

programmes undertaken by economists using a conceptual framework broadly of a Post Keynesian or similar nature.

The ideas and economists which could be labelled 'Post Keynesian' are wide-ranging and diverse, and Chapter 3 of this thesis sought to bring together a coherent portrayal of the tenets and vision concerning money that could be ascribed to the Post Keynesian grouping. The principle of effective demand as put forward by Keynes (1936) is a core departure point for Post Keynesians, and the connection of this to interest rates and mec in a monetary equilibrium was shown. The view of money supply endogeneity is closely associated with Post Keynesianism, and the implications of this were explored. The finance motive posited by Keynes subsequent to the *General Theory* was discussed as part of the Post Keynesian analysis of endogenous money and as a possible link between money and investment. International flows were shown not to be neutral in the Post Keynesian scheme, even under fully flexible exchange rates, giving rise to a further channel of monetary influence on the real economy. Inflation was shown not to be strongly related to monetary variables in the Post Keynesian analysis, being ascribed to multiple causes including conflict in the relative determination of incomes or wages. This opened up the possibility of several channels through which monetary policy actions could affect real economic magnitudes and investment in particular.

One of the themes of Post Keynesian monetary analysis, pioneered by and associated with Minsky (1982, 1986) in particular, is the operation of the bank credit structure as a significant factor in determining both financial and real economic effects. Minsky's instability thesis was used in Chapter 4 as a point of departure in exploring the possible effects of bank credit structures, both as a force in their own right and as a component in the transmission mechanism from monetary policy actions to economic outcomes. This refers in particular to the asset and liability compositions of banks, but also to the flows of credit which alter asset and liability structures over time. The manner in which these both affect bank behaviour, and are affected by it, were examined. This showed the implications from a theoretical point of view, stemming from a Post Keynesian

perspective, of the bank credit structure as it changes over time for bank lending and thereby credit extension, through which investment in the economy is influenced. Consideration of the effects of bank credit structure raised the issue of whether money, arising from credit provision, could indeed be considered purely endogenous in nature (the horizontalist view within Post Keynesian writing), or whether some modification of this was necessary in view of bank credit structure effects. The issue of credit rationing by banks, for instance, is one aspect through which a purely endogenous view requires re-examination. This possible modification was identified and examined as a significant issue, since the thesis was proceeding to examine several channels of influence from monetary policy to investment, and was taken up in subsequent chapters in view of the theoretical and policy implications arising from a shift away from a pure endogenous view.

A symbolic model of monetary effects on investment was constructed in Chapter 5, in accordance with the Post Keynesian conceptual framework developed in earlier chapters, and focussing on possible channels of monetary policy influence. The full range of possible monetary influences, including quantitive channels such as open market operations and public debt management as well as foreign flows, was covered. This placed the model as conceptually open to monetary effects and channels beyond the setting and transmission of interest rates in the economy. The symbolic model hence allowed for the possibility of money and credit not being fully endogenous in accordance with the horizontalist view, with the degree and significance of non-interest influences to be explored through empirical examination. The model was formulated specifically in respect of the South African economy, though there would be at least some similar characteristics in other economies with similar monetary regimes. Comparisons to previous models developed in the case of South Africa, including that of the South African Reserve Bank itself, as well as to Post Keynesian analyses of models of other economies (Britain in particular), demonstrated the Post Keynesian nature of the model and the greater depth of consideration of the bank credit structure in transmitting monetary influences to investment. The model was formulated in terms of influence channels between variables, with

expression in symbolic equations, and with these then combined to form a coherent multiple equation symbolic model. The manner of formulation was deliberately conducted in such a way that the symbolic model could be taken to the next step of empirical examination.

The empirical formulation of Chapter 6 required variables to be expressed in forms for which data are institutionally collected on an ongoing basis, or data to be reworked in such a way as to provide a representation of the symbolic variables of the model. Various practical obstacles were addressed in assembling time series data for each variable to be examined. Levels and flows were carefully distinguished, and conventions compiled to indicate the degree of liquidity or maturity of credit structures. The econometric methodologies and techniques used were described and justified, and each equation then explored using these approaches. The empirical examination showed strong and statistically significant effects from monetary variables through to investment. The effect from policy interest rate to investment would be anticipated by most Post Keynesians (and economists of other persuasions), though was stronger than many might anticipate due to effects operating through consumption spending as well as more directly on investment. The effects relating to quantitive influences were more pertinent to debates and development of monetary theory within the Post Keynesian mould. The empirical examination did provide support to the proposition that quantitive influences operate from Reserve Bank action through the bank credit system to investment. This was the case both in respect of quantitive transactions such as open market operations and Tax and Loan account transfers, and in respect of foreign exchange transactions. There was also supporting evidence for changing asset maturity structures of banks being a factor in determining credit provision and thereby in influencing investment. Granger causality tests provided some indication of causal direction of influences, though it was recognised that this reflects time sequencing rather than strict causal chains. The empirical examination confirmed the Post Keynesian conceptual framework and the model developed as being at least a plausible portrayal of monetary policy influences on investment in the South Africa monetary system. The indication of monetary

policy influences on investment through quantitive channels, including bank credit structures playing a role, raises interesting questions both for monetary theory in the Post Keynesian mould, and for the conduct of monetary policy in South Africa, and these were taken up in Chapter 7.

The theoretical discussion concerning endogeneity within Post Keynesian discourse was framed in the accommodationist versus structuralist portrayal of the monetary system, as put forward by Pollin (1991) and others. The empirical support shown in Chapter 6 for the structuralist view was placed in theoretical context of the various contributions on the differentiation over the course of the 1990s and more recently. It was argued that the model and empirical support of Chapter 6 of this thesis move a step beyond the structuralist coverage put forward so far by Post Keynesian writers adopting a structuralist view, in that it entails monetary policy influences through a structuralist framework, in addition to influences arising within the banking system itself. It is this aspect that makes a structuralist view particularly pertinent from a monetary policy standpoint. It holds out the possibility that quantitive influences could be used by the central bank as additional instruments of monetary policy to that of the policy interest rate in order to improve the outcome of monetary policy for investment, and the real economy more widely, relative to that which would be achievable through focus entirely or predominantly on the interest rate instrument.

The possible monetary policy instruments identified would operate in a market-related manner rather than requiring prescriptive regulatory controls. Open market operations and Tax and Loan account transfers would operate through influencing non-borrowed reserves (and to a degree on borrowed and total reserves), which in turn influences new bank lending under the structuralist framework posited. More active exchange rate management would occur through a higher degree of deliberate intervention in the foreign exchange market, taking cognisance of market flows and exchange rate changes, and engaging in sterilisation transactions as necessary to modify quantitive effects on the domestic monetary system which run counter to the prevailing desired monetary policy stance. Taking deliberate account of the maturity structures of

bank assets and liabilities, and issuing or undertaking transactions in securities of such maturities in order to influence bank asset composition, would enable monetary policy to be pursued through this channel towards a dynamic, unfolding maturity trajectory which best serves the economy from an investment, growth and stability viewpoint.

It was found that the monetary policy framework under an inflation targeting regime as adopted in South Africa from 2000, and as increasingly adopted elsewhere, is not fundamentally averse to or directly incompatible with the approach to monetary policy arising from the structuralist conclusions of this thesis. The policy interest rate remains the most central instrument of monetary policy, albeit with recognition that a 'psychological' influence process needs to occur in combination with the actual variation of the key interest rate. The additional three instruments and channels could be introduced progressively, and adjusted in respect of how extensively or forcefully they operate, without a dramatic departure or revision of the inflation targeting framework. It would of course entail a conceptual shift of the monetary authorities towards recognition that quantitive measures have significant economic consequences, and that these can be deliberately monitored and used for policy purposes. The vestiges of monetarist thinking remanent in inflation targeting frameworks, whereby inflation is still perceived as a purely monetary phenomenon to be addressed by the central bank, would need to give way to a conceptual scheme in which monetary policy variables are closely tied to economic activity and magnitudes in a range of ways acting through the financial system. But the actual institutional structures of inflation targeting could remain in place, with gradual modification.

In order to achieve the advantages which the additional monetary policy instruments and channels could offer, in respect of attaining economic investment objectives in particular, research would need to be pursued on an ongoing basis to determine the specific relationships between the variables which could be used for monetary policy purposes, and the consequences occurring through the banking and financial system to the economy as a whole. This would enable monetary measures to be taken and refined in accordance

with the changing behavioural parameters of the financial system. This thesis has examined the linkage from the various actions of the monetary authorities which could potentially be used for monetary policy purposes, to investment in the economy, taking account of the monetary effects of the banking system. A Post Keynesian theoretical framework has enabled the full range of possible influences to be explored, accepting intrinsic linkages between monetary and real economic forces, without the constraint of a classical, neoclassical or monetarist dichotomy between monetary and real analysis. The linkages identified theoretically and explored empirically hold out the possibility that monetary policy could be pursued more beneficially towards the realisation of investment and consequent growth objectives for the economy.

Bibliography

Allen, F. and Carletti, E. 2006. Credit risk transfer and contagion. *Journal of Monetary Economics*, Vol 53, 89-111.

Allen, F. and Gale, D. 2002. Financial Contagion, in *Financial Crises, Contagion, and the Lender of Last Resort*, edited by C. Goodhart and G. Illing. Oxford, UK: Oxford University Press.

Arestis, P. (ed) 1988. *Post-Keynesian Monetary Economics.* Aldershot, Hants: Edward Elgar.

Arestis, P. 1989. On the Post Keynesian challenge to neoclassical economics: a complete quantitative macro-model for the U.K. economy. *Journal of Post Keynesian Economics,* Vol 11 No 2, 611-627.

Arestis, P. (ed) 1993. *Money and Banking: Issues for the Twenty-First Century.* London: Macmillan.

Arestis, P. 1996a. Post Keynesian economics: towards coherence. *Cambridge Journal of Economics*, Vol 20, 111-135.

Arestis, P. (ed) 1996b. *Keynes, Money and the Open Economy.* Cheltenham: Edward Elgar.

Arestis, P., Basu, S. and Mallick, S. 2005. Financial globalisation: the need for a single currency and a global central bank. *Journal of Post Keynesian Economics*, Vol 27 No 3, 507-531.

Arestis, P. and Demetriades, P. 1993. Financial liberalisation and Economic Development, in *Money and Banking: Issues for the Twenty-First Century,* edited by P. Arestis. London: Macmillan, 287-303.

Arestis, P. and Howells, P. 1992. Institutional Developments and the Effectiveness of Monetary Policy. *Journal of Post Keynesian Economics*, Vol 26 No 1, 135-157.

Arestis, P. and Howells, P. 1996. Theoretical reflection on endogenous money: The problem with Convenience Lending. *Cambridge Journal of Economics*, Vol 20 No 5, 539-551.

Arestis, P. and Sawyer, M. 2002. The Bank of England macroeconomic model: its nature and implications. *Journal of Post Keynesian Economics*, Vol 24 No 4, 529-545.

Arestis, P. and Sawyer, M. 2006. (eds) *A Handbook of Alternative Monetary Economics.* Cheltenham: Edward Elgar.

Asimakopulos, A. 1991. *Keynes's General Theory and Accumulation*. Cambridge: Cambridge University Press.

Bain, A.D. 1964. Monetary control through open-market operations and reserve-requirement variations. *Economic Journal*, Vol 74, 137-146.

Barber, W. J. 1967. *A History of Economic Thought.* Middlesex, England: Penguin.

Barens, I. And Caspari, V. 1997. Own-rates of Interest and their relevance for the existence of underemployment equilibrium positions, in *A 'Second Edition' of The General Theory,* edited by G.C. Harcourt and P.A. Riach. London and New York: Routledge, 283-303.

Barro, R.J. and Sala-I-Martin, X. 1995. *Economic Growth.* Singapore: McGraw Hill.

Bell, S. 2001. The role of the state and the hierarchy of money. *Cambridge Journal of Economics*, Vol 25, 149-163.

Bernanke, B.S. and Gertler, M. 1990. Financial fragility and economic performance. *Quarterly Journal of Economics*, Vol 105 No 1, 87-114.

Bernanke, B.S. and Gertler, M. 1995. Inside the Black Box: The Credit Channel of Monetary Policy Transmission. *Journal of Economic Perspectives*, Vol 9 No 4, 27-48.

Bernanke, B.S. and Gertler, M. 1999. Monetary Policy and Asset Price Volatility. *Economic Review* (Federal Reserve Bank of Kansas City symposium paper), Vol 84 No 4, 17-51.

Bernanke, B.S. and Mishkin, F.S. 1997. Inflation Targeting: A New Framework for Monetary Policy? *Journal of Economic Perspectives*, Vol 11 No 2, 97-116.

Bhaduri, A. 2006. Endogenous economic growth: a new approach. *Cambridge Journal of Economics,* Vol 30, 69-83.

Bibow, J. 1995. Some reflections on Keynes's 'finance motive' for the demand for money. *Cambridge Journal of Economics,* Vol 19, 647-666.

Blaug, M. 1974. *The Cambridge Revolution: Success or Failure?* London: Institute of Economic Affairs.

Blaug, M. 1990. *Economic Theories, True or False?* Hants, England: Edward Elgar.

Blaug, M. 1996. *Economic Theory in Retrospect.* 5th edition. Cambridge, England: Cambridge University Press.

Blinder, A.S. 1987. Credit rationing and effective supply failures. *Economic Journal*, Vol 97, 327-352.

Blinder, A.S. 1999. *Central Banking in Theory and Practice.* Massachusetts: MIT Press.

Bohm-Bawerk, E. v. 1888. *The Positive Theory of Capital.* (Translated by W. Smart.) New York: G.E. Stechert & Co.

Botha, D.J.J. 1997. The South African Reserve Bank and the Rate of Interest. *South African Journal of Economics*, Vol 65 No 4, 532-567.

Botha, D.J.J. 1998. On Central Banking. *South African Journal of Economics*, Vol 66 No 2, 287-298.

Caballero, R. J. and Krishnamurthy, A. 2006. Bubbles and capital flow volatility: Causes and risk management. *Journal of Monetary Economics*, Vol 53, 35-53.

Caprio, J. and Honohan, P. 2000. Restoring Banking Stability: Beyond supervised capital requirements. *South African Journal of Economics*, Vol 68 No 1, 8-45.

Carvalho, F.J. 1992. *Mr Keynes and the Post Keynesians*. Cheltenham: Edward Elgar.

Carvalho, F.J. 1996. Paul Davidson's rediscovery of Keynes's finance motive and the liquidity preference versus loanable funds debate, in *Keynes, Money and the Open Economy,* edited by P. Arestis. Cheltenham: Edward Elgar, 68-84.

Carvalho, F.J. 1997. Financial innovation and the Post Keynesian approach to the "process of capital formation". *Journal of Post Keynesian Economics*, Vol 19 No 3, 461-488.

Casteleijn, A.J.H. 2001. South Africa's Monetary Policy Framework. *Conference papers on the monetary policy frameworks in Africa*, 17 to 19 September, Pretoria.

Chick, V. 1982. A comment on "IS/LM: an explanation". *Journal of Post Keynesian Economics*, Vol 4 No 3, 439-444.

Chick, V. 1983. *Macroeconomics after Keynes*. Oxford: Philip Allan.

Chick, V. 1992. *On Money, Method and Keynes*, edited by P. Arestis and S.C. Dow. New York: St. Martin's Press.

Chick, V. 1993. Sources of Finance , Recent Changes in Bank Behaviour and the Theory of Investment and Interest, in *Money and Banking: Issues for the Twenty-First Century,* edited by P. Arestis. London: Macmillan, 55-74.

Chick, V. 1997. Some reflections on financial fragility in banking and finance. *Journal of Economic Issues*, Vol 31 No 2, 535-542.

Chick, V. and Dow, S.C. 1996. Regulation and differences in financial institutions. *Journal of Economic Issues*, Vol 30 No 2, 517-523.

Chick, V. and Dow, S. 2002. Monetary policy with endogenous money and liquidity preference: a nondualistic treatment. *Journal of Post Keynesian Economics*, Vol 24 No 4, 587-607.

Clower, R.W. 1965. The Keynesian counterrevolution: a theoretical appraisal, in *The Theory of Interest Rates*, edited by F.H. Hahn and F.P.R. Brechling. London: Macmillan, 103-125.

Clower, R.W. 1967. A reconsideration of the microfoundations of monetary theory. *Western Economic Journal*, 1-9. Reprinted in Clower (1969).

Clower, R.W. (ed) 1969. *Monetary Theory: Selected Readings*. Middlesex, England: Penguin Books.

Clower, R.W. 1995. *Economic Doctrine and Method*. Hants, England: Edward Elgar.

Clower, R.W. 1999. Post-Keynes monetary and financial theory. *Journal of Post Keynesian Economics*, Vol 21 No 3, 399-414.

Cottrell, A. 1994a. Post-Keynesian monetary economics. *Cambridge Journal of Economics*, Vol 18, 587-605.

Cottrell, A. 1994b. Endogenous money and the multiplier. *Journal of Post Keynesian Economics*, Vol 17 No 1, 111-120.

Cohen, A.J., Hageman, H. and Smithin, J. (eds) 1997. *Money, Financial Institutions and Macroeconomics*. Massachusetts, USA: Kluwer Academic Publishers.

Cramp, A.B. 1971. *Monetary Management Principles and Practices.* London: George Allen & Unwin.

Cross, R. 1993. Hysteresis and Post Keynesian economics. *Journal of Post Keynesian Economics*, Vol 15 No 3, 305-335.

Dalziel, P. 1996. The Keynesian multiplier, liquidity preference, and endogenous money. *Journal of Post Keynesian Economics*, Vol 18 No 3, 311-330.

Dalziel, P. 2000. A Post Keynesian theory of asset price inflation with endogenous money. *Journal of Post Keynesian Economics*, Vol 22 No 2, 227-245.

Dalziel, P. 2001. *Money, credit and price stability*. New York, USA: Routledge.

Dalziel, P. 2002. The triumph of Keynes: what now for monetary policy research? *Journal of Post Keynesian Economics*, Vol 24 No 4, 511-527.

Davidson, P. 1978. *Money and the Real World.* 2nd edition. London: Macmillan.

Davidson, P. 1980. Post Keynesian economics: solving the crisis in economic theory. *The Public Interest*, Specific issue, 151-173.

Davidson, P. 1982. *International Money and the Real World*. London: Macmillan.

Davidson, P. 1986. Finance, funding, saving, and investment. *Journal of Post Keynesian Economics*, Vol 9 No 1, 101-110.

Davidson, P. 1989. On the endogeneity of money once more. *Journal of Post Keynesian Economics*, Vol 11 No 3, 488-490.

Davidson, P. 1991. *Controversies in Post Keynesian Economics*. Vermont: Edward Elgar.

Davidson, P. 1993. Reforming the world's money. *Journal of Post Keynesian Economics,* Vol 15 No 2, 153-180.

Davidson, P. 1994. *Post Keynesian Macroeconomic Theory*. Cambridge: Cambridge University Press.

Davidson, P. 1996. What revolution? The legacy of Keynes. *Journal of Post Keynesian Economics,* Vol 19 No 1, 47-60.

Davidson, P. 2002. *Financial Markets, Money and the Real World*. Cambridge: Cambridge University Press.

Davidson, P. 2004. The future of the international financial system. *Journal of Post Keynesian Economics,* Vol 26 No 4, 591-605.

Davidson, P. 2006. Can, or should, a bank inflation target? *Journal of Post Keynesian Economics,* Vol 28 No 4, 689-703.

De Jager, S. 1998. *The framework of the monetary block's equations in the South African Reserve Bank econometric model.* Occasional Paper No 11, July 1998, South African Reserve Bank.

De Jager, S. and Smal, M.M. 2001. *The monetary transmission mechanism in the South Africa.* Occasional Paper No 16, September 2001, South African Reserve Bank.

De Kock, G.P.C. (Chairman) 1985. *Commission of inquiry into the monetary system and monetary policy in South Africa: Final report*. Pretoria: Government Printer.

De Kock, G.P.C. 1986. *Money supply targets and exchange rate policy in South Africa.* Address delivered in Johannesburg, May 1986.

De Kock, G.P.C. 1988. *Interest rate fallacies.* Address delivered in Cape Town, May 1988.

De Wet, G.L., Jonkergouw, E. and Koekemoer, R. 1995. An econometric model for monetary policy in South Africa. *South African Journal of Economics*, Vol 63 No 4, 577-597.

Deleplace, G. and Nell, E.J. (eds) 1996. *Money in Motion.* London: Macmillan.

Dennis, G.E.J. 1981. *Monetary Economics.* New York: Longman.

Domar, E. 1946. Capital expansion, rate of growth and employment. *Econometrica,* Vol 14, 137-147.

Dow, S.C. 1986. Post Keynesian monetary theory for an open economy. *Journal of Post Keynesian Economics*, Vol 9 No 2, 237-257.

Dow, S.C. 1993. *Money and the Economic Process*. Vermont, USA: Edward Elgar.

Dow, S.C. 1996a. Horizontalism: a critique. *Cambridge Journal of Economics*, Vol 20, 497-508.

Dow, S.C. 1996b. Keynes's philosophy and post Keynesian monetary theory, in *Keynes, Money and the Open Economy,* edited by P. Arestis, Cheltenham: Edward Elgar, 34-49.

Dow, S.C. 2006. Endogenous money: structuralist, in *A Handbook of Alternative Monetary Economics,* edited by P. Arestis and M. Sawyer. Cheltenham: Edward Elgar, 35-51.

Dow, S.C. and Hillard, J. 2002. *Keynes, Uncertainty and the Global Economy.* Cheltenham, UK: Edward Elgar.

Dunn, S.P. 2000. Whither Post Keynesianism? *Journal of Post Keynesian Economics*, Vol 22 No 3, 343-364.

Dutt, A.K. 1992. Expectations and equilibrium: implications for Keynes, the neo-Ricardian Keynesians, and the Post Keynesians. *Journal of Post Keynesian Economics,* Vol 14 No 2, 205-231.

Dutt, A.K. 2003. New growth theory, effective demand, and post-Keynesian dynamics, in *Old and New Growth Theories: An Assessment,* edited by N. Salvadori. Cheltenham: Edward Elgar, 67-100.

Dymski, G.A. 1992. A "new view" of the role of banking firms in Keynesian monetary theory. *Journal of Post Keynesian Economics*, Vol 14 No 3, 311-320.

Dymski, G.A. 1994. Asymmetric Information, Uncertainty, and Financial Structure: "New" versus "Post Keynesian" Microfoundations, in *New perspectives in Monetary Macroeconomics,* edited by G.A. Dymski and K. Pollin. Michigan, USA: Michigan University Press, 77-104.

Dymski, G.A. 2006. Banking and financial crises, in *A Handbook of Alternative Monetary Economics,* edited by P. Arestis and M. Sawyer. Cheltenham: Edward Elgar, 385-402.

Dymski, G.A. and Pollin, R. 1994. *New perspectives in Monetary Macroeconomics.* Michigan, USA: Michigan University Press.

Eijffinger, S., Schaling, E. and Verhagen, W. 1998. The Term Structure of Interest Rates and Inflation Forecast Targeting, Discussion paper, Center for Economic Research, Tilburg University.

Falkena, H.B., Fourie, L.J. and Kok, W.J. (eds) 1995. *The South African Financial System.* Johannesburg: Southern.

Fedderke, J. 1998. *Economic growth: theory and evidence.* Unpublished manuscript, University of Witwatersrand, Johannesburg.

Fontana, G. 2002. Some notes on the monetary debate within the Post Keynesian school, in *Keynes, Uncertainty and the Global Economy,* edited by S.C. Dow and J. Hillard. Cheltenham, UK: Edward Elgar, 148-164.

Fontana, G. 2004. Hicks on monetary theory and history: money as *endogenous money*. *Cambridge Journal of Economics,* Vol 28, 73-88.

Fontana, G. 2006. The Federal Reserve and the European Central Bank: a theoretical comparison of their legislative mandates. *Journal of Post Keynesian Economics,* Vol 28 No 3, 433-449.

Fontana, G. and Palacio-Vera, A. 2002. Monetary policy rules: what are we learning? *Journal of Post Keynesian Economics,* Vol 24 No 4, 547-568.

Friedman, M. 1968. The role of monetary policy. *American Economic Review,* Vol 58 No 1, 1-17.

Friedman, M. 1971. A theoretical framework for monetary analysis. *National Bureau of Economic Research,* Occasional Paper 112.

Fry, M.J. 1988. *Money, Interest and Banking in Economic Development.* Baltimore: John Hopkins Press.

Fry, M.J. 1995. *Money, Interest and Banking in Economic Development.* 2nd edition. Baltimore: John Hopkins Press.

Galbraith, J. K. (John) 1975. *Money : Whence it came, where it went.* New York: Penguin.

Galbraith, J. K. (James) 2006. Endogenous doctrine, or, whey is monetary policy in America so much better than in Europe? *Journal of Post Keynesian Economics*, Vol 28 No 3, 423-432.

Gidlow, R.M. 1988. Workings of a managed floating exchange rate system for the Rand. *South African Journal of Economics*, Vol 56 No 2&3, 136-153.

Godley, W. 1999. Money and credit in a Keynesian model of income determination. *Cambridge Journal of Economics*, Vol 23 No 3, 393-411.

Goodhart, C.A.E. 1987. Why do banks need a central bank? *Oxford Economic Papers*, Vol 39, 75-89.

Goodhart, C. 1989. Has Moore become too horizontal? *Journal of Post Keynesian Economics*, Vol 12 No 1, 29-34.

Goodhart, C. and Illing, G. (eds) 2002. *Financial Crises, Contagion, and the Lender of Last Resort.* Oxford, UK: Oxford University Press.

Gowland, D. 1991. *Money, Inflation and Unemployment: The role of money in the economy.* 2nd edition. Hertfordshire, UK: Harvester Wheatsheaf.

Granger, C.W.J. and Newbold, P. 1986. *Forecasting Economic Time Series.* 2nd edition. Florida, USA: Academic Press.

Gujarati, D.N. 1995. *Basic Econometrics.* 3rd edition. Singapore: McGraw Hill.

Gujarati, D.N. 2003. *Basic Econometrics.* 4th edition. Singapore: McGraw Hill.

Hahn, F.H. 1982. *Money and Inflation.* Oxford: Basil Blackwell.

Hahn, F.H. and Matthews, R.C.O. 1964. The Theory of Economic Growth: A survey. *Economic Journal*, Vol 74, 779-902.

Hahn, F.H. and Solow, R. 1995. *A Critical Essay on Modern Macroeconomic Theory.* Cambridge, Massachusetts: MIT Press.

Harcourt, G.C. 1976. The Cambridge controversies: old ways and new horizons - or dead end? *Oxford Economic Papers*, Vol 28, 25-65.

Harcourt, G.C. 1997. Critiques and alternatives: reflections on some recent (and not so recent) controversies. *Journal of Post Keynesian Economics*, Vol 19 No 2, 171-180.

Harcourt, G.C. 2006. *The Structure of Post-Keynesian Economics.* Cambridge: Cambridge University Press.

Harrod, R.F. 1939. An Essay in Dynamic Theory. *Economic Journal,* No 49, 14-33.

Hart, J. 1992. *Is money real? An appraisal of Minsky's financial instability hypothesis.* Occasional Paper No 26, Economic Research Unit, University of Natal, Durban.

Hawkins, P. 2002. Banks and Small Business. *South African Journal of Economics*, Vol 70 No 3, 519-542.

Hawkins, P. 2003. *The Open Economy and its Financial Constraints.* Cheltenham: Edward Elgar.

Hayek, F.A. 1933. *Monetary Theory and the Trade Cycle*. New York: Sentry.

Hayek, F.A. (ed) 1962. *An enquiry into the nature and effects of the Paper Credit of Great Britain*. London: Frank Cass.

Helleiner, G.K. (ed) 1999. *Capital Account Regimes and the Developing Countries.* London: Macmillan.

Hicks, J.R. 1937. Mr Keynes and the classics: a suggested interpretation. *Econometrica,* Vol 5, 147-159.

Hicks, J.R. 1967. *Critical Essays in Monetary Theory.* London: Oxford University Press.

Hicks, J.R. 1989. *A market theory of money*. Oxford: Oxford University Press.

Hodge, D. 2006. Inflation and growth in South Africa. *Cambridge Journal of Economics,* Vol 30, 163-180.

Holt, R.P. and Pressman, S. 2001. (eds) *A New Guide to Post Keynesian Economics.* London: Routledge.

Howells, P.G.A. 1995. The demand for endogenous money. *Journal of Post Keynesian Economics*, Vol 18 No 1, 89-106.

Howells, P. 2003. Monetary Policy, in *The Elgar Companion to Post Keynesian Economics*, edited by J.E. King. Cheltenham: Edward Elgar.

Howells, P. 2006. The endogeneity of money: empirical evidence, in *A Handbook of Alternative Monetary Economics,* edited by P. Arestis and M. Sawyer. Cheltenham: Edward Elgar, 52-68.

Howells, P.G.A. and Bain, K. 2005. *The Economics of Money, Banking and Finance.* Harlow, England: Longman.

Intrilligator, M.D., Bodkin, R.G. and Hsiao, C. 1996. *Econometric Models, Techniques and Applications.* 2nd Edition. New Jersey: Prentice-Hall.

Iyoda, M. 2005. The determination of investment in the monetary production economy: a theory and its empirical application in the Post Keynesian tradition. *Journal of Post Keynesian Economics*, Vol 28 No 1, 115-128.

Jarsulic, M. 1989. Endogenous credit and endogenous business cycles. *Journal of Post Keynesian Economics*, Vol 12 No 1, 35-47.

Johnson, H.G. 1967. Money in a Growth Model, in *Essays in Monetary Economics.* Pennsylvania: Harvard University Press, 161-178.

Kahn, R. 1931. The Relation of Home Investment to Employment. *Economic Journal,* Vol 41, 173-198.

Kaldor, N. 1957. A Model of Economic Growth. *Economic Journal*, Vol 67, 591-624.

Kaldor, N. 1960. *Essays on economic stability and growth.* London: Duckworth.

Kaldor, N. 1978. *Further Essays on Economic Theory.* London: Duckworth.

Kaldor, N. 1985a. *Economics without Equilibrium.* New York: Sharpe.

Kaldor, N. 1985b. How monetarism failed. *Challenge*, May-June 1985, 4-13.

Kaldor, N. 1986. *The Scourge of Monetarism.* 2nd edition. Oxford: Oxford University Press.

Kaldor, N. and Mirrlees, J.A. 1962. A New Model of Economic Growth. *Review of Economic Studies*, Vol 29, 174-190.

Kaldor, N. and Trevithick, J. 1981. A Keynesian perspective on money. *Lloyds Bank Review,* No 139, 1-19.

Kapur, B. K. 1976. Alternative Stabilisation Policies for Less-developed Economies. *Journal of Political Economy,* Vol 84 No 4, 777-795.

Kennedy, P. 2003. *A Guide to Econometrics.* 5th edition. Cambridge, Massachusetts: MIT Press.

Keynes, J.M. 1930. *A Treatise on Money*. London: Macmillan.

Keynes, J.M. 1936. *The General Theory of Employment, Interest and Money*. London: Macmillan.

Keynes, J.M. 1937a. Alternative theories of the rate of interest. *Economic Journal*, 47, 241-252.

Keynes, J.M. 1937b. The 'Ex Ante' theory of the rate of interest. *Economic Journal*, 47, 663-669.

Keynes, J.M. 1937c. The General Theory of Employment. *Quarterly Journal of Economics*, Vol 51, 209-223.

Keynes, J.M. 1938. Mr Keynes on finance. *Economic Journal*, 48, 318-322.

King, J.E. 1995. *Conversations with Post Keynesians*. New York: St Martin's Press.

King, J.E. 2002. *A History of Post Keynesian Economics since 1936*. Cheltenham: Edward Elgar.

King, J.E. (ed) 2003. *The Elgar Companion to Post Keynesian Economics.* Cheltenham: Edward Elgar.

Knight, F.H. 1921. *Risk, Uncertainty and Profit* (reprinted 1971). Chicago: University of Chicago Press.

Kregel, J.A. 1976. Economic methodology in the face of uncertainty: the modelling methods of Keynes and the Post-Keynesians. *Economic Journal*, 86, 209-225.

Kregel, J.A. 1985. Constraints on the expansion of output and employment: real or monetary? *Journal of Post Keynesian Economics,* Vol 7 No 2, 139-152.

Kregel, J.A. 1986. A note on finance, liquidity, saving, and investment. *Journal of Post Keynesian Economics*, Vol 9 No 1, 91-99.

Kregel, J.A. 1997. Margins of safety and weight of the argument in generating financial fragility. *Journal of Post Keynesian Economics*, Vol 20 No 4, 543-548.

Kregel, J.A. 2004. Can we create a stable international financial environment that ensures net resourse transfers to developing countries? *Journal of Post Keynesian Economics*, Vol 26 No 4, 573-590.

Laidler, D. 1984. The 'buffer stock' notion in monetary economics. *Economic Journal*, Vol 94, 17-34.

Laidler, D. 1997. Note on Microfoundations of Monetary Economics. *Economic Journal*, Vol 107, 1213-1223.

Lavoie, M. 1984. The endogenous flow of credit and the Post Keynesian theory of money. *Journal of Economic Issues*, Vol 18 No 3, 771-797.

Lavoie, M. 1992. *Foundations of Post-Keynesian Economic Analysis*. Vermont, USA: Edward Elgar.

Lavoie, M. 1995. The Kaleckian model of growth and distribution and its neo-Ricardian and neo-Marxian critiques. *Cambridge Journal of Economics,* Vol 19 No 3, 789-818.

Lavoie, M. 1996a. Horizontalism, structuralism, liquidity preference and the principle of increasing risk. *Scottish Journal of Political Economy,* Vol 43 No 3, 275-300.

Lavoie, M. 1996b. Monetary policy in an economy with endogenous credit money, in *Money in Motion*, edited by G. Deleplace and E.J. Nell. London: Macmillan, 532-546.

Lavoie, M. 1997. Loanable Funds, Endogenous Money and Minsky's Financial Fragility Hypothesis, in *Money, Financial Institutions and Macroeconomics,* edited by A.J. Cohen, H. Hageman and J. Smithin. Massachusetts, USA: Kluwer Academic Publishers, 67-82.

Lavoie, M. 1999. The credit-led supply of deposits and the demand for money: Kaldor's reflux mechanism as previously endorsed by Joan Robinson. *Cambridge Journal of Economics*, Vol 23, 103-113.

Lavoie, M. 2005. Monetary base endogeneity and the new procedures of the asset-based Canadian and American monetary systems. *Journal of Post Keynesian Economics,* Vol 27 No 4, 689-709.

Lavoie, M. 2006. Endogenous money: accommodationist, in *A Handbook of Alternative Monetary Economics,* edited by P. Arestis and M. Sawyer. Cheltenham: Edward Elgar, 17-34.

Lerner, A.P. 1952. The Essential Properties of Money. *Quarterly Journal of Economics,* Vol 66, 172-193, reprinted in Lerner, A.P. 1953. *Essays in Economic Analysis.* London: Macmillan.

Makinen, G.E. 1977. *Money, the Price Level, and Interest Rates.* New Jersey: Prentice-Hall.

Mankiw, N.G. and Romer, D. 1991. *New Keynesian Economics, Volume 2: Coordination Failures and Real Rigidities.* Cambridge, Massachusetts: MIT Press.

Mathieson, D. J. 1980. Financial reform and stabilization policy in a developing economy. *Journal of Development Economics,* Vol 7 No 3, 359-395.

Matthews, K. and Thompson, J. 2005. *The Economics of Banking.* Chichester, West Sussex: John Wiley.

Marshall, A. 1920. *Principles of Economics*. London: Macmillan.

Marx, K. 1976. *Capital : a critique of political economy,* (Volume 1, translated by B. Fowkes). London: Penguin.

Mboweni, T.T. 2000. A new monetary policy framework. Statement issued by Mr T.T. Mboweni, Governor of the South African Reserve Bank, April 2000.

McKinnon, R.I. 1973. *Money and Capital in Economic Development*. Washington: Brookings Institution.

Meijer, J.H. 1995. Monetary Policy and the Instruments of Monetary Policy, in *The South African Financial System*, edited by H.B. Falkena, L.J. Fourie and W.J. Kok, Johannesburg: Southern, 333-433.

Meijer, J.H. 1997. *Reserve Bank Accommodation: The Money Market Shortage and Monetary Policy,* Research paper, Rand Afrikaans University.

Meijer, J.H. 2000. *The Reserve Bank at the changing of the guard: Issues and challenges,* Research paper, Rand Afrikaans University.

Meulendyke, A. 1988. Can the Federal Reserve influence whether the money supply is endogenous? A comment on Moore. *Journal of Post Keynesian Economics*, Vol 10 No 3, 390-397.

Mihailov, A. 2006. Operational independence, inflation targeting and UK monetary policy. *Journal of Post Keynesian Economics*, Vol 28 No 3, 395-421.

Milgate, M. 1982. *Capital and Employment.* London: Academic Press.

Mill, J.S. 1848. *Principles of Political Economy.* London: Longmans.

Minsky, H.P. 1982. *Can "It" Happen Again?* New York : M.E. Sharpe.

Minsky, H.P. 1986. *Stabilizing an Unstable Economy.* New Haven, USA: Yale University Press.

Minsky, H.P. 1997. Uncertainty and the institutional structure of capitalist economies. *Journal of Post Keynesian Economics*, Vol 19 No 2, 357-368.

Minsky, H.P. and Whalen, C.J. 1997. Economic insecurity and the institutional prerequisites for successful capitalism. *Journal of Post Keynesian Economics,* Vol 19 No 2, 155-180.

Mohr, P.J. 1986. The De Kock Commission and inflation. *South African Journal of Economics*, Vol 54 No 1, 22-40.

Moll, P.G. 1999. Money, Interest Rates, Income and Inflation in South Africa. *South African Journal of Economics*, Vol 67 No 1, 34-64.

Moll, P.G. 2000. The Demand for Money in South Africa: Parameter stability and predictive capacity. *South African Journal of Economics*, Vol 68 No 2, 190-211.

Moore, B.J. 1988a. *Horizontalists and Verticalists: The Macroeconomics of Credit Money.* Cambridge: Cambridge University Press.

Moore, B.J. 1988b. The endogeneity of the money supply. *Journal of Post Keynesian Economics*, Vol 10 No 3, 372-385.

Moore, B.J. 1989. A simple model of bank intermediation. *Journal of Post Keynesian Economics*, Vol 12 No 1, 10-47.

Moore, B.J. 1991. Money Supply Endogeneity: "Reserve Price Setting" or "Reserve Quantity Setting". *Journal of Post Keynesian Economics*, Vol 13 No 3, 404-413.

Moore, B.J. 1994. The demise of the Keynesian multiplier: a reply to Cottrell. *Journal of Post Keynesian Economics,* Vol 17 No 1, 121-133.

Moore, B.J. 1997. Reconciliation of the supply and demand for endogenous money. *Journal of Post Keynesian Economics*, Vol 19 No 3, 423-428.

Moore, B.J. 2004. A global currency for a global economy. *Journal of Post Keynesian Economics*, Vol 26 No 4, 631-653.

Nel, H. 1994. Monetary control and interest rates during the post-De Kock Commission period. *South African Journal of Economics*, Vol 62 No 1, 14-27.

Nel, H. 1996. The term structure of interest rates and economic activity in South Africa. *South African Journal of Economics*, Vol 64 No 3, 161-174.

Nell, K.S. 2001. The endogenous/exogenous nature of South Africa's money supply under direct and indirect monetary control measures. *Journal of Post Keynesian Economics,* Vol 23 No 2, 313-329.

Palley, T.I. 1991. The Endogenous Money Supply: Consensus and Disagreement. *Journal of Post Keynesian Economics*, Vol 13 No 3, 397-403.

Palley, T.I. 1996a. Accommodation versus structuralism: time for an accommodation. *Journal of Post Keynesian Economics*, Vol 18 No 4, 585-594.

Palley, T.I. 1996b. Beyond endogenous money: Towards endogenous finance, in *Money in Motion*, edited by G. Deleplace and E.J. Nell. London: Macmillan, 516-531.

Palley, T.I. 1996c. *Post Keynesian Economics: Debt, Distribution and the Macro Economy.* London: Macmillan.

Palley, T.I. 1996d. Growth theory in a Keynesian mode: some Keynesian foundations for new endogenous growth theory. *Journal of Post Keynesian Economics*, Vol 19 No 1, 113-135.

Palley, T.I. 1997. The Institutionalisation of Deflationary Monetary Policy, in *Money, Financial Institutions and Macroeconomics,* edited by A.J. Cohen, H. Hageman and J. Smithin. Massachusetts, USA: Kluwer Academic Publishers, 157-173.

Palley, T.I. 2006. Monetary policy in an endogenous money economy, in *A Handbook of Alternative Monetary Economics,* edited by P. Arestis and M. Sawyer. Cheltenham: Edward Elgar, 242-257.

Patinkin, D. 1965. *Money, Interest and Prices.* 2nd edition. New York: Harper and Row.

Patinkin, D. 1976. *Keynes' Monetary Thought.* Durham, North Carolina: Duke University Press.

Pesek, B.P. and Saving, T.R. 1967. *Money, Wealth, and Economic Theory*. New York: Macmillan.

Pollin, R. 1991. Two theories of money supply endogeneity: some empirical evidence. *Journal of Post Keynesian Economics*, Vol 13 No 3, 366-396.

Pollin, R. 1996. Money supply endogeneity: What are the questions and why do they matter? in *Money in Motion* edited by G. Deleplace and E.J. Nell. London: Macmillan, 490-515.

Pollin, R. and Justice, C. 1994. Saving, Finance and Interest Rates: An Empirical Consideration of Some Basic Keynesian Propositions, in *New perspectives in Monetary Macroeconomics,* edited by G.A. Dymski and K. Pollin. Michigan, USA: Michigan University Press, 279-308.

Pressman, S. 2000. A Note on Money and the Circuit Approach. *Journal of Economic Issues,* Vol 34 No 4, 969-979.

Radcliffe, Lord (Chairman) 1959. *Report of the Committee on the Workings of the Monetary System.* London: HMSO.

Ramsey, F.P. 1928. A Mathematical Theory of Saving. *Economic Journal*, Vol 38, 543-559.

Ricardo, D. 1821. *Principles of Political Economy and Taxation.* Edited by E.C.K Gonner, 1922. London: G. Bell and Sons.

Robinson, J. 1953. *The Rate of Interest and other essays.* London: Macmillan.

Robinson, J. 1960. *Collected Economic Papers: Volume Two.* Oxford: Basil Blackwell.

Robinson, J. 1979a. *The Generalisation of the General Theory and other essays.* New York: St Martin's Press.

Robinson, J. 1979b. Keynes and Ricardo. *Journal of Post Keynesian Economics.* Vol 2 No 1, 12-18.

Rochon, L-P. 1999. The Creation and Circulation of Endogenous Money: A Circuit Dynamique Approach. *Journal of Economic Issues*, Vol 33 No 1, 1-21.

Rogers, C. 1985. The monetary control system of the South African Reserve Bank: Monetarist or Post Keynesian. *South African Journal of Economics*, Vol 53 No 3, 241-247.

Rogers, C. 1986. The De Kock Report: a critical assessment of the theoretical issues. *South African Journal of Economics*, Vol 54 No 1, 66-79.

Rogers, C. 1989. *Money, Interest and Capital.* Cambridge: Cambridge University Press.

Romer, D. 2000. Keynesian Macroeconomics without the LM Curve. *Journal of Economic Perspectives*, Vol 14 No 2, 149-169.

Romer, P.M. 1986. Increasing Returns and Long-run Growth. *Journal of Political Economy*, Vol 94 No 5, 1002-1037.

Romer, P.M. 1994. The Origins of endogenous growth. *Journal of Economic Perspectives*, Vol 18 No 1, 3-22.

Rotheim, R. J. (ed) 1998. *New Keynesian Economics / Post Keynesian Alternatives.* London: Routledge.

Rotheim, R.J. 2006. Credit rationing, in *A Handbook of Alternative Monetary Economics,* edited by P. Arestis and M. Sawyer. Cheltenham: Edward Elgar, 307-327.

Rousseas, S. 1986. *Post Keynesian Monetary Economics.* New York: M.E. Sharpe.

Rousseas, S. 1989. On the endogeneity of money once more. *Journal of Post Keynesian Economics*, Vol 11 No 3, 474-478.

Rousseas, S. 1998. *Post Keynesian Monetary Economics.* Third edition. London: Macmillan.

Runde, J. 1994. Keynesian uncertainty and liquidity preference. *Cambridge Journal of Economics,* Vol 18 No 2, 129-144.

Salvadori, N. (ed) 2003. *Old and New Growth Theories: An assessment.* Cheltenham: Edward Elgar.

Sardoni, C. and Wray, L.R. 2006. Monetary policy strategies of the European Central Bank and the Federal Reserve bank of the United States. *Journal of Post Keynesian Economics*, Vol 28 No 3, 451-471.

Sawyer, M. 1996. Money, finance and interest rates: some post Keynesian reflections, in *Keynes, Money and the Open Economy,* edited by P. Arestis. Cheltenham: Edward Elgar, 50-67.

Schaling, E. and Schoeman, C. 2000. *Foreign exchange market intervention in South Africa during the Asian contagion: Leaning against the wind or causing a hurricane?* Research paper, Rand Afrikaans University.

Schoombee, G.A. 1996. Recent developments in monetary control procedures in South Africa. *South African Journal of Economics*, Vol 64 No 1, 83-96.

Sculmeister, S. 2000. Globalisation without global money: the double role of the dollar as a national currency and world currency. *Journal of Post Keynesian Economics*, Vol 22 No 3, 365-395.

Schumpeter, J.H. 1954. *History of Economic Analysis.* New York: Oxford University Press.

Sen, A.K. 1965. The money rate of interest in the pure theory of growth, in *The Theory of Interest Rates*, edited by F.H. Hahn and F.P.R. Brechling. London: Macmillan, 267-280.

Sen, A.K. (ed) 1970. *Growth Economics.* Middlesex, England: Penguin.

Setterfield, M. 2000. Expectations, endogenous money, and the business cycle: an exercise in open systems modeling. *Journal of Post Keynesian Economics,* Vol 23 No 1, 77-105.

Setterfield, M. 2006. Is inflation targeting compatible with Post Keynesian economics? *Journal of Post Keynesian Economics,* Vol 28 No 4, 653-671.

Shackle, G.L.S. 1974. *Keynesian Kaleidics.* Edinburgh: Edinburgh University Press.

Shackle, G.L.S. 1983. Levels of simplicity in Keynes' theory of money and employment. *South African Journal of Economics*, Vol 51 No 3, 357-367.

Shaw, E.S. 1973. *Financial Deepening in Economic Development.* New York: Oxford University Press.

Solow, R.M. 1956. A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics,* Vol 70 No 1, 65-94.

Solow, R.M. and Taylor, J.B. 1999. *Inflation, Unemployment, and Monetary Policy.* Cambridge, Massachusetts: MIT Press.

South African Reserve Bank. 2005a. *An implementation paper on the Modifications to the Money Market Operations of the South Africa Reserve Bank.* Financial Markets Department, May 2005.

South African Reserve Bank. 2005b. *The Reserve Bank's system of accommodation.* Fact sheet No 9.

South African Reserve Bank. 2005c. *National government debt.* Fact sheet No 7.

Sowell, T. 1972. *Say's Law: An Historical Analysis.* Princeton: Princeton University Press.

Sraffa, P. 1960. *Production of Commodities by Means of Commodities.* Cambridge: Cambridge University Press.

Stiglitz, J.E. and Weiss, A. 1981. Credit rationing in markets with imperfect information. *American Economic Review*, Vol 71 No 3, 393-410.

Swan, T.W. 1956. Economic Growth and Capital Accumulation. *Economic Record,* Vol 32, 334-361.

Tastan, H. 2005. Do real exchange rates contain a unit root? Evidence from Turkish data. *Applied Economics,* Vol 37, 2037-2053.

Taylor, J.B. 1995. The Monetary Transmission Mechanism: An empirical framework. *Journal of Economic Perspectives*, Vol 9 No 4, 529-545.

Taylor, L. 2004. *Reconstructing Macroeconomics: Structuralist Proposals and Critiques of the Mainstream.* Massachusetts: Harvard University Press.

Thirlwall, A.P. 1978. *Growth and Development.* 2nd edition. London: Macmillan.

Thirlwall, A.P. 1993. The renaissance of Keynesian economics. *Banca Nazionale del Lavoro Quarterly Review*, Vol 46 No 186, 327-337.

Thirlwall, A.P. 1997. Reflections on the concept of balance-of-payments-constrained growth. *Journal of Post Keynesian Economics*, Vol 19 No 3, 377-386.

Thirlwall, A.P. 2006. *Growth and Development.* 8th edition. Basingstoke, Hampshire: Macmillan.

Thornton, H. 1802. *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain.* London: J. Hatchard.

Tily, G. 2007. *Keynes's General Theory, the Rate of Interest and 'Keynesian' Economics: Keynes Betrayed.* Basingstoke, Hampshire: Palgrave Macmillan.

Tobin, J. 1955. A Dynamic Aggregative Model. *Journal of Political Economy*, Vol 63, 103-115.

Tobin, J. 1965a. Money in economic growth. *Econometrica,* Vol 33, 671-684.

Tobin, J. 1965b. The theory of portfolio selection, in *The Theory of Interest Rates,* edited by F.H. Hahn and F.P.R. Brechling. London: Macmillan, 3-51.

Tobin, J. 1980. *Asset Accumulation and Economic Activity*. Oxford: Basil Blackwell.

Torr, C.S.W. 1988. *Equilibrium, Expectations and Information*. Cambridge: Polity Press.

Tsiang, S. C. 1980. Keynes's "Finance" demand for liquidity, Robertson's loanable funds theory, and Friedman's monetarism. *Quarterly Journal of Economics*, Vol 94 No 3, 467-492.

Turvey, R. 1965. Does the interest rate rule the roost? in *The Theory of Interest Rates,* edited by F.H. Hahn and F.P.R. Brechling. London: Macmillan, 164-172.

Van den Heever, J.P. 2001. A note on inflation targeting in South Africa. *South African Journal of Economics*, Vol 69 No 1, 168-177.

Van der Merwe, E.J. 2004. *Inflation targeting in South Africa.* Occasional Paper No 19, July 2004, South African Reserve Bank.

Van der Walt, S.J. 1995. Public debt management, in *The South African Financial System*, edited by H.B. Falkena, L.J. Fourie and W.J. Kok, Johannesburg: Southern, 462-483.

Van Eeghen, P.H. 1999. *Macroeconomics without laws: methodological and theoretical aspects.* Unpublished doctoral thesis, Unisa, South Africa.

Vickers, D. 1985. *Money, Banking, and the Macroeconomy.* New Jersey: Prentice-Hall.

Walker, D.A. (ed) 1984. *Money and Markets : Essays by Robert W. Clower*. Cambridge: Cambridge University Press.

Weintraub, S. 1977. Hicksian Keynesianism: dominance and decline, in *Modern Economic Thought,* edited by S. Weintraub. Oxford: Basil Blackwell.

Weintraub, S. 1982. Hicks on IS/LM : more explanation? *Journal of Post Keynesian Economics,* Vol 4 No 3, 445-452.

Wesso, G.R. 2002. *Broad money demand and financial liberalisation in South Africa.* Occasional Paper No 18, November 2002, South African Reserve Bank.

Whittaker, J. and Theunissen, A.J. 1987. Why does the Reserve Bank set the interest rate? *South African Journal of Economics,* Vol 55 No 1, 16-33.

Wicksell, K. 1898a. *Interest and Prices* (translated by R.F. Kahn, 1936). London: Macmillan.

Wicksell, K. 1898b. The Influence of the Rate of Interest on Commodity Prices, in *Selected Papers on Economic Theory,* edited by E. Lindahl. London: George Allen & Unwin.

Wicksell, K. 1901. *Lectures in Political Economy,* vols I and II, (translated by E. Classen and L. Robbins, 1935), London: Routledge.

Wolfson, M.H. 1996. A Post Keynesian theory of credit rationing. *Journal of Post Keynesian Economics*, Vol 18 No 3, 443-470.

Wray, L.R. 1990. *Money and credit in capitalist economies: the endogenous money approach.* Aldershot, Hants: Edward Elgar.

Wray, L.R. 1992. Commercial banks, the central bank, and endogenous money. *Journal of Post Keynesian Economics*, Vol 14 No 3, 297-310.

Wray, L.R. 1996. Money in the Circular Flow, in *Money in Motion,* edited by G. Deleplace and E.J. Nell. London: Macmillan, 440-464.

Wray, L.R. 1997. Flying Blind: Recent Federal Reserve Policy, in *Money, Financial Institutions and Macroeconomics,* edited by A.J. Cohen, H. Hageman and J. Smithin. Massachusetts, USA: Kluwer Academic Publishers, 203-217.

Wray, L.R. 2004. Loanable funds, liquidity preference, and endogenous money: do credit cards make a difference? *Journal of Post Keynesian Economics*, Vol 26 No 2, 309-323.

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