

**THE
SUPPLY
AND DEMAND
FOR
MONEY**

**Keith
Cuthbertson**

The Supply and Demand for Money

KEITH CUTHBERTSON

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The Supply and Demand for Money

To Dot and Stan

Preface

This book is intended primarily for economists who have an interest in understanding the theory and empirics of the supply and demand for money although the role of the latter in the wider macroeconomic debate is also discussed. We hope to bridge the considerable gap between intermediate undergraduate texts and the material found in journal articles. It follows that the book is aimed at final year undergraduate and graduate students in economics and finance, as well as professional economists dealing with the financial sector.

The range of topics that come under the heading of 'monetary economics' is now so vast that one cannot hope to cover all aspects in reasonable depth, in one text. The material covered here is less than that found in a conventional text on monetary economics, as the title suggests. Some topics in monetary economics although ingenious and aesthetically pleasing are nevertheless about as much use as a chocolate teapot. I have therefore tried to concentrate on issues that yield practical insights and I think the book could provide a core text for a number of undergraduate and postgraduate courses in monetary economics that concentrate on analytic rather than institutional matters. However, I should welcome correspondence on how useful the book is for such courses: constructive criticism is always useful.

I am a great believer in the view that progress in economics requires an understanding of theoretical models and the empirical results from such models: naturally the content of the book reflects this. My first degree is not in economics and my postgraduate course in economics dealt only in theory: both econometric and economic theory. I remember leaving my MA course believing that the money supply could be (and ought to be) closely controlled and that the demand for money was a stable function of a few key variables. A few 'high-powered' regressions of my own would no doubt soon confirm these facts. This was in 1971 in the UK. It did not take me long to realize that academics do not have a monopoly of wisdom and truth in these matters and indeed that controversy abounds. Ever since, I have been sceptical of the pronouncements of economists. As a sceptic is what an idealist calls a realist, I accept the label with equanimity. However, I hope the book reflects problems that remain, as well as the intellectual advances in our understanding of particular areas of monetary economics.

Although the theory and empirics of the determination of the demand and supply of money provide the core elements in the book, I felt that I could not

just present these issues in a vacuum. After all, monetary targets and 'monetarist policies' have been widely adopted by industrialized nations and the controversy surrounding alternative policies options continues apace. The supply and demand for money are central to an understanding of the impact of monetary and fiscal policy on the macroeconomy. I have tried, therefore, to place the detailed discussion on the supply and demand for money in the context of this general debate on macroeconomic policy. This has an advantage in that the reader can see how the detailed analysis of asset demands and supply may be used to build up alternative models of the financial sector and how the latter then react with the real sector in 'complete models'. Space constraints imply that this overview is somewhat sketchy but I hope it focuses on the main issues and above all is not misleading.

The overall framework of the book is as follows. In chapter 1 we provide an overview of alternative analytic models of the macroeconomy. In ensuing chapters we discuss the supply and demand for assets, particularly money, in detail. In the penultimate chapter we begin to bring the supply and demand sides of financial markets together when we discuss the term structure and this theme is reinforced in the final chapter where we provide practical illustrations of 'real world' financial and 'complete' models.

The variety of models discussed both for asset demand functions, and 'complete' models are numerous but the interconnections between issues discussed in individual chapters are continually stressed. The mathematical ability assumed is not high, elementary calculus being the main technique used and the emphasis is on the economics behind the results. Econometrics is a stumbling block for many students but an analysis of applied work is a necessary requirement for evaluating different theories. We have included an appendix where we discuss some recent issues in applied econometrics. This should enable the reader who has taken an introductory econometrics course to understand the empirical sections in the book and also to tackle some of the source material. Thus we hope to go some way towards dispelling the myth that an econometrician is the sort of person who goes into a revolving door behind you and comes out in front. Inevitably the level of difficulty and depth of coverage of topics varies somewhat but there is nothing in the text that goes beyond the abilities of a good final year student with reasonable mathematical ability. References are representative not exhaustive but enough are provided to enable the average 'economic sleuth' to pursue each 'case' in greater depth.

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Steven Hall, Brian Henry, Gerry Kennally, David Mayes, Simon Wren-Lewis and Chris Johns. An anonymous referee provided numerous helpful points. Any remaining errors and omissions lie solely with the author. Unfortunately the 'literary slog' involved in producing the second draft of the book had to be done in my spare time - miraculously the family appears to have survived although I have the feeling that I have clocked up numerous 'penalty points' for which I hope to make amends in the future. Janet Sheppard and Anna Roberts helped with the typing although for typing most of the first draft my thanks go to the numerous typists in the department of economics at Manchester University and for the second draft, my home computer and my fingers - all ten (or is it eight?) of them.

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An Overview

1.1 INTRODUCTION

There has been a great deal of controversy in macroeconomics over the past ten years or so. In retrospect the 1950s and the early 1960s appear to have been a period of consensus. The policy of 'fine tuning' using fiscal instruments to achieve full employment, was widely accepted over this period. The latter part of the 1960s and early 1970s saw the rise of monetarism and the view that 'money matters': control of inflation required control of the money supply. This approach was coupled with the view that uncertainties about the short-run impact of policy variables on the economy (but not their long-run impact) tilted the argument against the use of 'fine tuning' and in favour of setting policy instruments according to 'rules'. Those who favoured rules rather than discretion also accepted that the economy was self-correcting and that, in the long run, automatic full employment would ensue. In the early 1970s a number of countries abandoned the Bretton Woods 'fixed' exchange rate regime and allowed their currencies to float. It is probably true to say that subsequent movements in nominal and real exchange rates were more volatile than advocates of floating rates had anticipated. Large changes in real exchange rates caused fluctuations in real net trade and real output, and 'sound' monetary policies did not always appear to reduce inflation without also causing a substantial fall in real output. Just as the monetarist approach appeared to be losing credibility in practical terms, it received an academic boost from the so-called rational expectations-new classical (RE-NC) approach. Early versions of the new classical approach suggested that systematic attempts by the authorities to influence real output are futile. In particular, systematic monetary policy has no effect on output *even in the short run*, while unanticipated changes in the money approach supply exacerbate the economic cycle. Another powerful implication of the RE-NC approach is that it is impossible to assess alternative policy options using 'conventional' macroeconometric models. These NC propositions seemed to imply the demise of discretionary policy: at best it altered nothing, and at its worst it was likely to exacerbate the cycle.

Today, controversy still surrounds the relative impact of monetary and fiscal policy on the economy, the determinants of the exchange rate, the use of rules or discretion in the setting of policy instruments and whether the economy automatically moves to a full employment level of output. In a book which

concentrates on the supply and demand for money, one could legitimately ignore these general issues. However, to put the detailed material of the rest of the book into perspective we present a brief overview of the main schools of thought, emphasizing the importance of the demand for money (and other assets) in the transmission mechanism of monetary and fiscal policy. In the final chapter we draw on this material and our detailed analysis of the supply and demand for money and present illustrative examples of 'complete real world' macromodels. Hence by the end of the book we hope the reader has a detailed knowledge of the building blocks of alternative 'financial models', together with some ideas on how these interact with the real sector.

1.2 ALTERNATIVE VIEWS ON THE MACROECONOMY

1.2.1 Closed economy 'fix-price' models: monetarists and neo-Keynesians

Much of the debate in the 1960s and early 1970s between monetarists and Keynesians about the determinants of aggregate demand was conducted in terms of the closed economy 'fix-price' IS-LM model which could be extended to include 'wealth effects' and a wider portfolio of assets (Levacic and Rebmman, 1982). In the simple IS-LM model the efficacy of monetary and fiscal policy ('financial crowding out') depends crucially on the size of the interest elasticity of the demand for money relative to that on expenditure (table 1.1). With the addition of 'wealth effects' working via the government budget constraint (Blinder and Solow, 1973) the time path to equilibrium is influenced by the size of the wealth elasticity of the demand for money (relative to that on real expenditure). Also, the 'wealth effects' literature indicates that it is possible for bond financed¹ or mixed money-bond financed fiscal deficits to be destabilizing. In this type of model the interdependence of monetary and fiscal policy is made explicit and this is examined in detail in chapters 7 and 8.

TABLE 1.1 Closed economy fix-price IS-LM model

Policy	Elasticities				Normal elasticities
	$E_r^I = 0$	$E_r^m = \infty$	$E_r^I = \infty$	$E_r^m = 0$	
Fiscal: $\Delta G > 0$	'full' Keynesian multiplier	'full' Keynesian multiplier	0	0	some crowding out, but $\Delta Y > 0$
Monetary: $\Delta M^s > 0$	0	0	'full' money multiplier	'full' money multiplier	$\Delta Y > 0$

E_r^I = interest elasticity of investment (absolute value).

E_r^m = interest elasticity of the demand for money (absolute value).

The temporal stability of the demand for money function is crucial in determining the predictability of monetary and fiscal policy. Also, the importance of lags in the demand for money function, whether these are due to adjustment or expectations formation is clearly demonstrated in 'dynamic' IS-LM models (Tucker, 1966; Laidler, 1966, 1973). These analytic 'fix-price' models therefore highlight the importance of the determinants of the demand for money in the transmission mechanism of monetary and fiscal policy. We discuss theoretical models of the demand for assets in chapters 2 and 3, the importance of lags and expectations are dealt with in chapter 4 and the size and stability of the parameters of the demand for money function are examined in chapters 5 and 6.

The portfolio adjustment process in the IS-LM model is very restrictive as substitution between only two assets, money and 'bonds', is allowed. In reality a whole range of assets, with varying degrees of substitutability, may provide substitutes for money. If so then a change in the money supply may involve a change in the yield on a wide range of financial and real assets, ranging from liquid assets to long term bonds, equity and capital goods. For example, Tobin (1980) stresses the possibility that the transmission mechanism of monetary policy may involve equities. After an increase in the money supply, interest rates fall and bond prices rise. The latter will lead to a rise in equity prices as agents switch out of low yielding bonds into equities. The market valuation of firms' real assets (the price of equities) now exceeds their costs of production and this provides an incentive for increased production of capital goods. Brunner and Meltzer (1972) extend the range of assets that may be substitutes for money and include real capital goods such as housing and consumer durables as well as 'fixed capital' (that is plant and machinery). An increase in the money supply yields diminishing utility at the margin, hence the higher (implicit) service yield of, say, durables encourages purchases of the latter, a rise in their demand price and an incentive to increase their supply.

Two important observations follow from this portfolio approach which are taken up in future chapters. First, the demand for money may depend on a *set* of interest rates (yields). Second, it may be necessary to model the demand for a whole range of financial assets if we are to understand fully the transmission mechanism of monetary policy. If the latter course is followed the resulting equations may be solved under the assumption of market clearing for the various 'short-term' and long-term interest rates. The relationship between long rates and short rates derived in this manner yield 'structural' term structure equations. An alternative to the above is to look at the relationship between short rates and long-term interest rates directly and apply a 'reduced form' (or 'unrestricted') term structure relationship. Both of these approaches are discussed in chapter 9 and provide the basis for our discussion of 'complete' models of the financial sector in chapter 10.

1.2.2 *The supply side and the neutrality debate*

Towards the end of the 1960s, in a number of industrialized nations, there was a simultaneous rise in both inflation and unemployment: stagflation had arrived and was to remain a major problem. It became increasingly recognized that

changes in the money supply might have a powerful influence on inflation: a hypothesis which in its extreme version is summed up in Milton Friedman's assertion that 'inflation is always and everywhere a monetary phenomenon'. The Monetarist view relied on a *stable* demand function for money (with a unit price level elasticity) and a neo-classical view of the labour market and the 'supply side'.

The division of an increase in the money supply between a rise in the price level and a change in real output depends on the slope of the aggregate supply curve. In the neo-classical model of the labour market (which is consistent with the long-run vertical price expectations augmented Phillips curve, PEAPC) the long-run supply curve is vertical and unaffected by changes in the money supply or fiscal policy.² Money is 'neutral' in the long run, real output remains unchanged and the price level rises in proportion to the money supply. In the short run the aggregate supply curve is upward sloping because misperceptions about real wages on the part of workers (Friedman, 1968) lead to *temporary* changes in labour supply and output at a higher price level. (This provides an argument for the 'short-run' Phillips curve.) Monetarists tend to accept the neo-classical view of aggregate supply. On the other hand some neo-Keynesians would argue that the aggregate supply curve is upward sloping, even in the long run, because of rigidities in the labour market which prevent market clearing.³ Monetary policy is therefore *non-neutral* in the long run as well as the short run.

With a neo-classical supply curve there is complete 'crowding out' of fiscal policy: we refer to this as 'physical' crowding out in contrast to 'financial' crowding out, discussed earlier, which operates on the demand side.

1.2.3 *Open economy aspects*

In the early part of the 1970s a number of industrialized nations abandoned the Bretton Woods 'fixed' exchange rate system, allowed their currencies to float and their exchange rates to be determined (largely) by market forces. It was widely thought at the time that nominal and real exchange rates would alter only slowly and that floating rates would allow 'small open economies' to have an independent monetary policy and hence to choose a rate of inflation independent of that in the rest of the world (Brooks et al., 1985).

International monetary models (IMM) came to prominence in academic and policy debates of the 1970s. However, an important precursor of these models is the so-called Mundell-Fleming (Mundell, 1960, 1963; Fleming, 1962) approach. The latter is a natural extension of the fix-price closed economy IS-LM model. Under floating exchange rates an additional transmission mechanism of monetary (and fiscal) policy is provided by the link between the interest rate, capital flows, the exchange rate and real net trade. In this model, monetary policy has an unambiguous effect on output but the efficacy of fiscal policy depends on the degree of capital mobility. With a high degree of capital mobility (that is horizontal BB curve (Artis, 1980)) fiscal policy is completely 'crowded out' by an induced fall in net trade whilst with a low degree of capital mobility (that is near vertical BB curve) there is 'crowding in' in the sense that the fiscal multiplier is higher than in the closed economy IS-LM model. In the model the efficacy of fiscal policy therefore depends on the substitutability between

domestic and foreign assets. The latter is examined in chapter 5 for domestic and foreign money (that is currency substitution). Although space constraints prevent an empirical analysis of substitution between domestic and foreign non-money assets, nevertheless, some theories of the demand for assets discussed in chapters 2 and 3 may be usefully applied to this question.

In the 'current account monetary model' (CAM) under flexible exchange rates (Bilson, 1978), the rate of domestic monetary growth determines the domestic rate of inflation, and the rate of growth in the domestic relative to the foreign money supply determines the exchange rate. The basic assumptions of the model are stable domestic and 'foreign' demand for money functions with the exchange rate determined by purchasing power parity.

The CAM model was unable to account adequately for the volatile swings in real exchange rates that occurred in the floating rate period, and unless the model is extended it does not explain changes in real net trade and output consequent on these real exchange rate changes. The seminal article by Dornbusch (1976) provides a capital account monetary model (KAM) in which exchange rate 'overshooting' and changes in real output occur in the short run. The model is one of 'sticky' goods prices in the short run but the money and foreign exchange markets 'clear' in all periods. In addition, agents are assumed to form their expectations according to the rational expectations hypothesis, an issue we take up below. In the Dornbusch model, money is neutral in the long run (that is vertical long-run Phillips curve) and hence control of inflation requires control of the money supply and a stable demand for money function. However, it is explicitly recognized that a tight monetary policy may involve short-run costs in terms of lower output. The parameters of the demand for money function influence the path of output in the short run and, in particular, the size of the interest elasticity of the demand for money influences the degree of overshooting in the exchange rate (see also Frenkel and Rodriguez, 1982).

We may conclude this section by noting that in models of small open economies under flexible exchange rates the demand for money continues to play a key role in the transmission mechanism of monetary and fiscal policy and the money supply remains a key policy instrument.

1.2.4 *Rational expectations and the new classical school*

The rational expectations hypothesis (REH) has permeated all areas of macroeconomics and may perhaps be considered as *the* major development in economics over the past fifteen years. It has influenced our views about individual behavioural functions and the scope and role for government policy (Begg, 1982; Minford and Peel, 1982; Sheffrin, 1983).

As we shall see in chapters 2 and 3, some theories imply that expectations variables, for example the expected capital gains on bonds, expected income, inflation and prices, influence the demand for assets and RE provides methods of modelling these (unobservable) expectations variables. We discuss this in chapters 4 and 5.

Throughout the 1970s the so-called new classical (NC) view was being developed, initially in the US but later by other economists. We may characterize the NC view as embodying two basic propositions: first, that all markets clear

continuously and second, that agents form their expectations of economic variables (for example the rate of inflation) 'rationally': agents do not make systematic errors over a period of time, in their forecasts of the future course of economic variables. These two hypotheses are logically distinct and it is only when both are accepted that one may obtain the distinctive NC results. The major themes within the NC paradigm we discuss below include the policy ineffectiveness and policy evaluation propositions and the insights gained from partially rational models.

Policy ineffectiveness. In a wide variety of RE models it is possible to demonstrate that counter-cyclical monetary and fiscal policy is futile: the authorities cannot have a *systematic* effect on the mean level of output around its trend or natural rate. Indeed attempts at counter-cyclical policy may increase the variance of fluctuations in output, as compared with a policy whereby the money supply, for example, is fixed by a simple (non-contingent) rule. Thus the policy ineffectiveness debate also has implications for the rules versus discretion debate. It is the predictable part of the money supply that has no effect on output whereas unanticipated money supply changes do (temporarily) affect output. Clearly in such a model there is little or no rationale for any kind of monetary policy directed towards controlling output – announced targets for the money supply are used solely to achieve an inflation target (McCallum, 1980).

However, it is now clear that the policy ineffectiveness proposition and the claimed superiority of (non-contingent) rules in setting the money supply do not hold when some of the more restrictive assumptions of NC models are relaxed. Buiter (1980, 1981) provides a lucid account of the rules versus discretion debate in RE-NC models. The policy ineffectiveness proposition ceases to hold when, for example, (a) the authorities have access to information unknown to the private sector, (b) a subset of the private sector has an informational advantage (Weiss, 1980; King, 1981), (c) agents have access to some global information such as an economy-wide interest rate, (d) the authorities have a 'timing advantage' as in overlapping contract models (Taylor, 1979, 1980). In all of the above market clearing RE models the authorities can influence the variance of output around the natural rate but not the mean level of output. However, in non-market clearing RE models (Begg, 1982) the authorities can also influence the mean level of output.

Policy evaluation: Lucas critique. Lucas (1976) asserts that it is probably impossible to use existing econometric models to evaluate the consequences of alternative policy scenarios. This arises because the parameters of the model are likely to change under alternative policy regimes and it may not be possible to ascertain the new 'correct' values of the parameters at the time of the policy change. It also follows that the Lucas critique provides an explanation for the observed instability in coefficients of econometric models: different policy regimes give rise to 'shifts' in parameters.

The Lucas critique, if empirically important, is rather devastating. To see this, consider the way in which existing econometric models are used. After the model has been constructed on a particular data set, the model builder may use