PART ONE
The principles of the new paradigm

Money has long played a central role in popular conceptions of economics – and life more generally. "Money makes the world go around" and "money is the root of all evil" are but two aphorisms that come to mind.

Professional economists give money an equally mixed review. The monetarists – whose enormous popularity in the early 1980s seems subsequently to have waned – place money as a central determinant of economic activity. By contrast, in the classical dichotomy, money has no *real* effects, a view which has been revived in real business cycle theory.[1] Monetary economics has thus been a curious branch of economics: At times, its central

These lectures are based on our joint research over the past decade, parts of which are reported in Greenwald (1998), Greenwald and Stiglitz (1987a, 1987b, 1987c, 1988a, 1988b, 1988c, 1988d, 1989a, 1989b, 1990a, 1990b, 1991a, 1991b, 1991c, 1991d, 1992, 1993a, 1993b, 1993c, 1995); Greenwald, Kohn and Stiglitz (1990); Greenwald, Levinson and Stiglitz (1993); Greenwald, Salinger and Stiglitz (1991); Greenwald, Stiglitz and Weiss (1984) and Clay, Greenwald and Stiglitz (1990). In parts of these lectures, we have also drawn upon joint work with Thomas Hellmann and Kevin Murdoch (especially in the discussions concerning bank regulation) reported in Hellmann, Murdoch and Stiglitz (2000) and in Hellmann and Stiglitz (2000). The analysis of the East Asia crisis in part II draws heavily upon joint work with Jason Furman, published in Furman and Stiglitz (1998). The views expressed here are solely those of the authors and do not necessarily represent those of any organization with which they are or have been affiliated.

[1] See Kydland and Prescott (1990) and Kydland and Cooley (1995).

tenet seems to be that it is a subject of no interest to anyone interested in real economics; at other times, it moves front and center.

While for long periods of time the view that money does not matter has held sway in monetary theory, this does not appear to be the view of the world, which hangs on anxiously, wondering whether the Federal Reserve will raise or lower interest rates by as little as twenty-five basis points. As our starting point for this book, we recognize there is some validity in the view that money matters, at least in the short run. We take it that the task of monetary economics is to explain why, and in doing so, provide better guidance to policymakers attempting to use monetary policy to enhance the overall economic performance – allowing expansion of the economy, at least to the point where such expansion does not lead to an increase in the rate of inflation.

The central thesis of this chapter is that the traditional approach to monetary economics, based on the transactions demand for money, is seriously flawed; it does not provide a persuasive explanation for why – or how – money matters. Rather, we argue that the key to understanding monetary economics is the demand and supply of loanable funds, which in turn is contingent on understanding the importance, and consequences, of imperfections of information and the role of banks. We argue, in particular, that one should not think of the market for loans as identical to the market for ordinary commodities, an auction market in which the interest rate[2] is set simply to equate the demand and supply of funds. T-bill rates do matter, but they affect economic activity largely indirectly, through their effect on banks. Banks provide vital certification, monitoring, and enforcement services, ascertaining who is likely to fulfill their promises to repay, ensuring that money lent is spent in the way promised, and collecting money at the due date.

[2] For most of part I, we assume that the inflation rate is fixed, so that the interest rates can be viewed as either nominal or real (since changes in nominal translate immediately into changes in real). Since traditional economic analysis has stressed that what matters is real variables, including real interest rates, it will be convenient to think of the interest rates as inflation adjusted real interest rates. In those chapters of the book where we focus on the effects of nominal interest rates as well as real ones, we will use subscripts to denote nominals.

That some loans are not repaid is central. A theory of monetary policy which pays no attention to bankruptcy and default is like *Hamlet* without the Prince of Denmark, and is likely to – and in the East Asia crisis, did – lead to drastically erroneous policies. Thus, a central function of banks is to determine who is likely to default, and in doing so, banks determine the supply of loans. Providing these certification, monitoring, and enforcement services is in some ways like any other business; there is risk, and thus the key to understanding the behavior of banks is understanding limitations on their ability to absorb these risks, and how their ability and willingness to do so can change with changes in economic circumstances and in government regulations. A closer look at these determinants of bank behavior reveals why it is that economic activity may depend on the nominal interest rate as well as the real interest rate, thus providing an explanation of one of the more disturbing anomalies in economics.[3]

While banks are at the center of the credit system, they are also part of a broader credit "general equilibrium" – a general equilibrium whose interdependencies are as important as those that have traditionally been discussed in goods and services markets. However, their interdependencies, until now largely unexplored, are markedly different – and are affected differently both by economic events and policies.

This book can be viewed as a contribution to the new institutional economics, which has emphasized the importance of institutions in any economy. In Walrasian economics, attention focused on equilibrium outcomes, determined by the underlying "fundamentals" of the economy – preferences and technology, which determined the demand and supply curves. Neo-classical economists argued that one should see through the superficial institutions to the underlying fundamentals. Monetary economics was easily incorporated into this framework, simply by postulating a demand function for money – and a supply determined by the government. The new institutional economics argues that there is much more to economic analysis – institutions

[3] As we shall comment below, standard economic theory argues that investment should depend just on real interest rates, not nominal interest rates. Yet empirical studies seem to suggest the contrary.

matter. Furthermore, they also argue that one can *explain* many aspects of institutions, for instance by looking at transactions-cost technology[4] or the imperfections and costs of information.[5] This book argues that financial institutions – banks – are critical in determining the behavior of the economy, and that the central features of banks and bank behavior can be understood in terms of (or derived from) an analysis of information imperfections.

The argument for looking at the banking system's institutional structure in detail as an intrinsic part of monetary economics has strong empirical support beyond that implicit in practical monetary policy discussions (which takes the importance of institutional factors as given). Over time, in closely observed systems like that in the United States, traditional monetary relationships have varied significantly, while in the same periods there have been equally important changes in the institutional structure of the banking system, or at least in the institutions within the banking system. Similarly, there are marked differences in the effectiveness of monetary policy in different countries, and similarly marked differences in their institutional structures. We argue that the changes in the monetary relations over time and differences across countries can be linked to institutional variations in the banking system. Frequently such changes become especially marked as the economy goes into a recession or faces a financial crisis. It is precisely when monetary policy becomes of crucial importance that the traditional models fail most dramatically. Later, we will argue that the failure to understand key aspects of financial institutions and their changes lies behind some of the recent failures in macro-economic policies, including the 1991 US recession and the severe recessions and depressions in East Asia that began in 1997.

An important reason for focusing on the impact of banking institutions is the rapid pace at which these institutions are changing. Existing theoretical models, largely institutionally independent, provide little or no guidance for assessing the effect of these changes on monetary policy. For example, transactions-

[4] See Williamson (1979, 1985, 1999).
[5] See, for example, Stiglitz (1974b, 1987b); Newberry and Stiglitz (1976); Braverman and Stiglitz (1982, 1986); and Braverman, Hoff and Stiglitz (1993).

based monetary theories that concentrate on money as a medium of exchange would tend to count money market accounts (which effectively monetize investments in short-term government securities) simply as an exogenous increase in the money supply and hence, of no particular significance for the incremental impact of central bank monetary expansions or contractions. Yet, in the context of an institutional banking system that competes with money market accounts for deposits, their long-run impact on the efficacy of monetary policy may be a far more difficult matter to assess. For policy purposes, it is important to understand the forces involved.

Still another reason for looking in detail at the structure of banking institutions arises from a series of questions concerning policies that directly or indirectly affect those institutions – and therefore the efficacy of monetary policy and the flow of funds towards investment in different kinds of enterprises. For instance, recent years have seen rapid globalization, and within Europe, monetary integration. With open capital markets, market rates of interest will equalize across countries in a monetary union. Similarly, as national economies become integrated, market rates will equalize across regions of a national economy. This means, for instance, that individual national monetary authorities or regional authorities (if they are small) cannot influence interest rates and hence, according to traditional monetary theory, cannot affect local economic activity (through monetary policy). Yet, such a conclusion may be unwarranted: local monetary authorities may be able to subsidize local banks (even though those banks face fixed interest rates) and in doing so, may stimulate local lending and local economic activity. The circumstances under which this may be the case require understanding the institutional structure of the banking system.

Similarly, many developing countries have been placed under strong pressures to open up their financial systems – a marked change in their institutional structure. Most of the arguments for this make standard appeals to an institution-free analysis – more competition increases economic efficiency. A closer look at the impact of such reforms on the domestic banking system, and on the flow of credit to small and medium-size enterprises (SMEs),

suggests that there may be many circumstances in which these policy reforms have adverse consequences.

Part I of the book is divided into seven chapters. Chapter 1 sets out the problems with the current set of theories. Chapter 2 explains how financial markets (including the market for "loans") differ markedly from those for ordinary commodities. Chapter 3 develops the equity-based theory of banking, and uses it to derive the supply of loanable funds in an idealized competitive banking system toward which the world seems to be moving. Chapter 4 outlines the differences and similarities between the model banking system and the current system. Chapter 5 steps back and analyzes equilibrium in a simplified corn economy. Chapter 6 explains the important differences in the role of monetary policy in the corn economy and in a modern credit economy. Chapter 7 broadens the discussion towards a general equilibrium theory of credit. In part II of this book, the new paradigm is used to analyze a variety of aspects of monetary policy and to interpret several recent historical episodes.

ONE

Reflections on the current state of monetary economics

To theorists, monetary economics has long presented a challenge: finding the assumptions under which it does or does not matter. The challenge is all the greater because, while it is easy to construct models in which money matters, it is hard to believe that the quantitative effects in at least many of these are significant enough to account for observed behavior. For instance, macro-economists have often relied on the real balance effect, the fact that as prices fall, the real value of money increases, making individuals feel better off. However, for moderate rates of decline in prices, the magnitude of the real balance effect is too small to account, for instance, for an economic recovery.[1]

A second example concerns the refutation of the monetarist doctrine that prices move proportionally to increases in the money supply, for any monetary regime, so that there are no *real* effects of the increase in the money supply. Assume that were the case. Define a monetary regime as a rule of monetary expansion,

[1] Consider a dramatic fall in the price level by 50 percent. Assume that the ratio of money and dollar denominated government liabilities to GDP is 1, and that the coefficient on wealth in the consumption equation is 0.06. Then the increase in "autonomous" consumption from this fall in price – assuming that there is no Barro–Ricardo effect, so that consumers completely ignore the real value of their liabilities – would be 3 percent; even with a multiplier of 2, this would hardly offset a depression where GDP is down by 20 percent. To do that would require a fall in the price level three times greater.

depending on the state of nature, such that the expected rate of change of the money supply $E[d\ln M/dt]$ is a constant; the expected return to holding money is the same among monetary regimes given that prices move proportionally to M. However, if individuals are risk averse, then changes in the monetary regime will affect the probability distribution of returns, and hence, in general, the relative demand for money and capital, and therefore will have real effects, counter to the assumption. However, the issue is whether, given the degree of risk aversion in the market, the effects are significant for relevant changes in the monetary regime.

Rigor, ad hocery, and relevance

Current dicta require that macroeconomics (treating here monetary economics as a branch of macroeconomics) be based on microeconomic principles. Some economists, who, in other respects, seem to insist that models should not be ad hoc, that they should be based on principles of maximization, took the low road around the difficulties posed by these strictures, putting money into the utility function or the production function – a trick, which repeated often enough, took on a semblance of respectability! Others took the high road, creating a demand for money by assuming that it is required for transactions, modeling it as an old fashioned cash in advance constraint – criticisms that it was an ad hoc assumption that was blatantly false being brushed aside with the remark that these were topics for future research.[2]

The wavering case for the irrelevance of money

Research since 1970 has managed to both strengthen – and weaken – the argument that money does not matter. Extending

[2] On one occasion, when this objection was raised at a seminar at Princeton, a visiting professor from Chicago, while acknowledging that money was no longer required *in general*, pointed out that cash was still required for taxicabs. Surely, one does not want to construct a monetary theory on the basis that money is required for taxicabs and to purchase soft drinks in vending machines! Interestingly, when he submitted his bill for expenses, it showed that he had paid his taxicab fare on a credit card. And do we think that the new technologies which allow using cellular phones to purchase cokes in vending machines will lead to further changes in monetary theory?

the general equilibrium approach (Stiglitz 1969, 1974a) to show the irrelevance of corporate financial policy,[3] public financial policy was shown to have no effect.[4] Establishing a form of Say's law for government debt, Stiglitz (1988a) showed that if the government reduced taxes and increased its debt, the demand for government bonds increased by an amount exactly equal to the increase in supply. Furthermore, a change in the term structure of government debt has no effects. Of course, like any theorem, there were assumptions that went into the analysis. These seemed to be of two sorts: some, like the absence of distortionary tax effects, while they would alter the *qualitative* result that taxes had *no* effect, seemed an implausible basis for an argument about why monetary policy should be important: surely its effectiveness did not hinge on the real effects produced by the *difference* in the *change* in the dead weight losses arising from an increase in taxes in one year compensated by a decrease in taxes in some later years! Another assumption in the analysis was the absence of intergenerational redistributive effects. While one might agree or disagree with Barro (1974) that the economy is best modeled as a set of dynastic families, with no intergenerational effects, surely *short*-run monetary policy does not hinge on these intergenerational effects.

The other set of assumptions – concerning perfect capital markets (though the analysis does not require there be a complete set of risk and futures markets) – was no different from that assumed in conventional economic models. If that assumption were struck down, with it would fall much of the standard theory. Of course, practical people have long claimed that economists' models of capital markets are unrealistic, and a host of institutional economists (and theoretical economists, when they found it convenient) have made use of the imperfect capital markets assumption. However, higher-minded economists have looked derisively at those who made reference to imperfect capital markets, accusing them of, among other sins, ad hocery.

[3] A general equilibrium proof of Modigliani and Miller's classic (1958) analysis showing the irrelevance of debt–equity ratios.

[4] This result can also be viewed as a generalization of the Barro–Ricardo theorem (Barro 1974).

The critical assumption: perfect capital markets

One of the most important developments in economic theory of the past fifteen years has been the exploration of the consequences of imperfect and costly information for the functioning of the capital market. It has been shown that models that assumed imperfect capital markets may have been much closer to the mark than those that assumed perfect capital markets.[5] These studies have shown that capital markets that are competitive – in the sense that that word is commonly used – may be characterized by credit and equity rationing. The models based on imperfect and costly information provide explanations of institutional details of the capital market, details which are either inconsistent with perfect capital market models or about which perfect capital market models have nothing to say; but they also provide a basis of explanation of the many aspects of macroeconomic (aggregate) behavior that seem inconsistent with the conventional neoclassical model.

In part I of the book, we argue that monetary institutions and policy do have important real effects, but for reasons quite different from those of the standard theory. Our objective is to explain both why it is that monetary policy is – sometimes – effective, and why the conventional explanation of the mechanism by which it works – particularly those versions based on the transactions demand for money – is inadequate.

We should say at the outset that we are not denying that there might be *some* grain of truth in these conventional explanations, only that they miss the *central* aspects of the mechanisms by which monetary policy works, and therefore are an unreliable basis for the analysis of monetary policy.

[5] Stigler (1967) tried to argue against capital market imperfections, suggesting that they were simply related to transactions costs, and that such costs were no less real than any other costs. But he failed to understand how imperfect information changed the nature of capital markets in far more fundamental ways, e.g. leading to credit rationing. For a more extensive critique of Stigler's position, see Stiglitz (2000c).