IV. MONEY IN AN INFLATION-TARGETING FRAMEWORK

by Paul Mizen[1]

A. Introduction

What role is there for money to play in the transition economies? In many transition economies, the initial reforms to the financial sector required the creation of a two-tier banking system for which the challenge was to control the growth of credit to industry; for many countries the control of public sector financing of private sector activity involved a significant uphill struggle. Having restrained credit to some degree, most countries adopted monetary targets as a means of providing a nominal anchor to tie down inflation expectations and to limit the extent to which the public finances can be monetized. In these countries money occupies the principal position for monetary policy making, since the target is specified in terms of the growth rate in a chosen monetary aggregate. Some countries, most notably the Czech Republic, have abandoned monetary targeting in favor of inflation targeting so that money has a subordinate role to the future expected path of inflation, which is the target. Given the proven record of inflation targeting in the OECD countries, which contrasts favorably with the experience of the major monetary targeters, this is a welcome step. Alternatives do exist, such as the exchange rate targeting proposal of McKinnon (1998), but in the medium to long term they deliver the same policy objective of price stability. When money is not the target, the question posed at the beginning must then be amended to read "what role *remains* for money to play in the transition economies?"

In this chapter, we argue that money can still play a role as an important indicator variable through the corroborative and incremental information it contains on inflationary conditions. But before we reach that conclusion we show that monetary targeting is inherently difficult to master due to domestic and international sources of instability. The literature on money demand instability teaches clear lessons for transition economies that attempt to use monetary targets as anything more than a constraint on public finances and inflationary expectations. Money demand functions are too unstable to be relied upon for targeting purposes. International pressures from the use of the euro will also undermine the stability of the demand for money function in transition economies, making monetary targeting extremely difficult. The pressure in this dimension comes from the network advantages of a large currency domain and the incentives towards currency substitution.

B. Instability in the Demand for Money

Domestic instability

Consider the broader picture in the industrialized countries in the late 1970s and early 1980s. Up to the mid-1970s there was a consensus that the demand for money could be accurately represented by a long-run equation denoting equilibrium and a process of

[1] The author is a Reader in Monetary Economics in the School of Economics at the University of Nottingham, U.K.

partial adjustment to describe the dynamics. The model was estimated using both annual and quarterly data for both the United Kingdom and the United States from the beginning of 1970s and it performed well, fitting the data within the sample and predicting accurately out of the sample. Laidler and Parkin (1970) and Goodhart and Crockett (1970) were the first to use the partial adjustment model in the United Kingdom, followed by Goldfeld (1973) in the United States, and initially these models appeared to perform well. Other studies for both countries showed the negatively signed interest rate coefficient was again confirmed although there was much more disagreement over its magnitude. The short-run model provided the necessary information required for monetary policy, and so stable was the relationship that the "Goldfeld equation" became the standard framework. This was the position up to the early to mid-1970s.

The United States and the United Kingdom were then both about to experience two periods of change that would profoundly affect the demand for money function. The source of the first change was the higher and more volatile inflationary environment as a result of the Vietnam war in the United States, demand management policies of the Heath Government in the United Kingdom and the worldwide oil shocks in the mid-1970s and early 1980s. At the same time many credit controls on banks and individuals began to be circumvented and new institutional arrangements were introduced to attempt, unsuccessfully as it turned out, to create offsetting distortions. Later, in the 1980s deregulation and innovation in the financial sector would create another change as interest bearing accounts, new financial products, new technological development and increased competition between traditional banks and thrifts would lead to a changing velocity of circulation. It was unknowable at the time that these would prove to be so unsettling for monetary policy.

With the benefit of hindsight, we can see that two features did point to later difficulties in the mid-1970s when the model appeared to falter and ultimately broke down. In the first place, there was an inconsistency between the quarterly and the annual demand for money results. The annual studies assumed that there was full adjustment within a single year (one observation), and when quarterly data were introduced it became possible to put this assumption to the test by examining the speed of adjustment parameter, which quantifies the amount of adjustment taking place in each of the four quarters. The results suggested that the actual speed of adjustment was less than fifty percent, and occasionally as low as fifteen percent, of the difference between the actual and the desired level of money balances in one year. The adjustment to equilibrium took much more than one year. Lags of this length surprised many economists since they implied that the money market was more sluggish than initially had been thought.

The second inconsistency appeared in the estimated interest rate elasticities. Theory suggested that it was reasonable to expect close substitutes to have high interest elasticities since only a slight change in interest rates ought to provoke a redistribution of portfolios. Evidence from the short-run money demand studies indicated that the reverse was the case. Longer-term securities appeared to have higher interest rate elasticities with money despite the fact that they might be considered to be poorer substitutes. The statistical reason for this result was the lower amplitude of the cyclical fluctuations in

interest rates on longer-term assets compared with short rates. Expectations of future short-term rates are generally considered the dominant influence on the yield curve but the authorities tend to conduct transactions at the shorter end of the market. Therefore, the functional form that implies interest rates determine money balances exogenously and with a long lag will be called into question.

In Britain, it was the work of Haache (1974) that showed conclusively that the partial adjustment model was unable to predict accurately outside of sample for the period after 1971, recording significant negative forecasting errors for broad, narrow and sectoral aggregates. In the United States, Goldfeld (1976) came to the same conclusion showing that his model broke down from 1974, overpredicting money balances and implying that there was some "missing money" the existence of which had yet to be explained. Despite considerable effort on both sides of the Atlantic the model was not easily corrected to account for the inexplicable events of the period.

Initial attempts to understand the episode focused on the unusual monetary conditions that had led to greater financial innovation. Haache experimented with the yield on certificates of deposit as an additional explanatory variable in an otherwise unchanged partial adjustment model, restoring some of the predictive performance of the money demand function. Investigation by Artis and Lewis (1976), however, concluded that in experiments with different aggregates in real, nominal and per capita terms, even excluding CDs altogether, it was not possible to reverse the conclusion that the partial adjustment model suffered from serious prediction errors. Goldfeld, in the United States, added the interest on NOW and thrift accounts to the otherwise standard money demand function, and, while he did remove the over-stated predictions to some degree, he remained unconvinced that this was the root cause of the problem. These unexplained patterns of behavior in the 1970s introduced a new agenda for empirical studies of the demand for money, which had ceased to be much more than routine applications of the accepted Goldfeld model. Both Goldfeld (1976) and Artis and Lewis (1976) concluded that the theory behind money demand estimation needed overhauling and in many respects the research agenda of the next 25 years was set by the breakdown of the partial adjustment theory.

Two research programs began to correct for the effects of expectational errors arising from volatile economic conditions and the process of financial innovation. The first attempted to capture the effect of volatility and shocks on money demand functions through the concept of money as a buffer stock. Money should then be thought of as an inventory that could temporarily depart from its desired level. The second examined the effects of higher inflation and financial innovation on the construction of monetary aggregates. The simple-sum aggregates used up to this point could be the cause of inferior performance in the money demand function, requiring reforms to the aggregation procedure. The outcomes of these research processes were synthesized into two main classes of models: the Buffer Stock models and the Divisia models.

Buffer stock models

In a far-sighted comment on Goldfeld's paper which exposed the breakdown in the United States, Brainard (1976) suggested an explanation for the "missing money" episode where "money balances serve as a buffer stock, or a temporary abode of purchasing power, and one would expect the transitory income to be absorbed passively in money holdings in the short run." (See Brainard, 1976, p. 735.) If we were to recognize that there could be departures from equilibrium in the money market based on commonly accepted microeconomic principles then money would act as a buffer stock. The idea that all individuals hold their long-run desired money balances at all times and are continuously on the LM curve would be replaced by the more realistic view that temporary departures can be rational and optimal.

Four groups of models emerged from this reasoning. First, *flow disequilibrium models* questioned the direction of causality between money and other variables reversing the money demand relationship to make money balances exogenous and some other variables, such as prices, income or interest rates endogenous (Artis and Lewis, 1976; Coats, 1982a and1982b; Laidler, 1982). Second, *shock absorber models* introduced expectations into the analysis and allowed unexpected and anticipated events to affect the money demand function in different ways (Carr and Darby, 1981; and Carr, Darby, and Thornton, 1985). The third group of models extended the shock absorber principle to an infinite horizon of future events creating *forward-looking buffer stock models* (Cuthbertson ,1988 and 1991; Cuthbertson and Taylor, 1987 and 1992; and Mizen, 1994). Lastly, a separate group of models based on different microeconomic foundations gave a type of model based on inventory management (Miller and Orr, 1966; Akerlof, 1979; Akerlof and Milbourne, 1980).

In various ways, these models all treat money as an inventory for purchasing power, and by doing so recognize that departures from long-run equilibrium are both possible and optimal from the individual point of view. Money departs from equilibrium in the short run to ensure optimal intertemporal adjustment. For each individual agent it is optimal to hold balances that deviate from the long-term desired level over the short-term rather than allow adjustments in other assets and real expenditure of goods and services at greater cost. The argument states that because money is by definition the most liquid asset, and therefore the least costly to adjust, portfolio reallocation and expenditure patterns should be more sluggish than changes to money balances. Smoothing of adjustments is used to overcome the costs that would otherwise be incurred when alterations are required to less liquid balances and expenditures. The important point to note is that adjustment of money balances is determined according to an optimal rule derived from a cost-minimization exercise and any departure from desired balances, m*, is not a mistake or an error but a sanctioned and rational cost-minimizing option chosen by the individual.

The interpretation as a buffer stock has some very useful features. Two empirical puzzles are cleared up by this approach since a) it reconciles the slow adjustment speed detected empirically by treating money balances as a the least-cost repository for expected and unexpected changes to liquid assets, and b) it allows money to overshoot its long-run value by a practical mechanism that can be supported by empirical evidence. Success

comes from the ability to “mop up” the excesses and deficiencies in liquidity observed over short periods in a more flexible way than other models, most notably the Goldfeld model, were able to do. They have worked particularly well in the countries that experienced significant instability in the money demand function due to unexpected shocks. Carr and Darby (1981), Coats (1982a and 1982b), Cuthbertson (1988, 1991), Cuthbertson and Taylor (1987, 1992) and Mizen (1994) all document improvements in the dynamic money demand function for the United Kingdom and the United States.

Divisia models

Divisia aggregates are based on the construction of optimal weights based on index numbers, and ultimately microeconomic consumer theory. Before Divisia approaches were widely known, conventional demand for money functions had been augmented by a set of dummy and other variables to allow for financial innovations (see Taylor, 1987; Hall, Henry and Wilcox, 1989), but this approach was always regarded as ad hoc. It simply assumed that all the components within the monetary aggregate should have the same weights in the aggregation process, and by implication would all be affected in the same way by financial innovation.

William Barnett (1980) has taken issue with this and a number of other assumptions in the models of the demand for money based on simple-sum aggregates, on three counts:

- The conventional approach assumes all assets are perfect substitutes with each other. Regarding the components as equally liquid, yet at the same time quite different from the excluded items, which flies in the face of the evidence on the substitutability between components (Belongia and Chalfant, 1989; Belongia and Chrystal, 1991).

- The conventional aggregates ignore shifts between the components, so that components can vary over time without changing the total value of the aggregate. The equal weighting on each component gives each part an equal “price.”

- If the assets are not perfect substitutes, contrary to the implicit assumptions, then there is no way of distinguishing between income and substitution effects on monetary asset components. A “good” aggregate should measure income effects but be unresponsive to pure substitution effects, yet a simple sum aggregate does not allow this.

The assumptions underlying simple-sum models may have been innocuous at first, but once the process of financial innovation and deregulation began, this undermined the reliability of the assumptions. Barnett's contribution to monetary economics has been to consider a class of aggregates that might overcome these problems and satisfy ideal or “superlative” properties for the aggregation function. When a Divisia approach is used, the demand for money function should be more stable than its simple-sum equivalent and suffer less from the problems that plagued the Goldfeld equation. Through its ability to account for the gradual shift out of certain asset components into others, the Divisia is

well placed to deal with financial innovation (see Mullineux, 1996). The variation in the weights is able to deal with changes to the monetary environment and the additional information, on the direction of flow of assets out of one component into another, is valuable.

The evidence for a more stable demand function when Divisia aggregates are used is compelling, suggesting that inappropriate methods were responsible for a lot of the instability in the Goldfeld equation. Chrystal and MacDonald (1994) and Belongia and Chrystal (1991) report results to show that the Divisia model out-performed conventional aggregates in the United States, Australia, Canada, Germany, Switzerland, Japan and the United Kingdom using standard diagnostic tools. The Divisia aggregate is shown to have desirable properties as a leading indicator to predict nominal output and inflation in a test against a St. Louis equation for the United Kingdom, Australia, Germany, Switzerland, Canada, Japan and the United States. The superior performance derives from the elimination of distortions due to financial innovations in the late 1970s and early 1980s and the extra information on substitution and income effects, gained by weighting components differently (see Barnett, 1980; Barnett, Offenbacker and Spindt, 1984: Belongia and Chalfont, 1989).

Transition economies

It is clear that over a period of two decades the United Kingdom and the United States experienced significant financial market changes. These greatly altered the relations between the money supply and the determinants of the demand for money, unsettling the relations that had been presumed to be stable. Although these two countries did not move from centrally planned economies to a free market, there are many similarities to be drawn between their experiences and those of the transition economies. The most striking difference, however, is the sheer speed with which these events have taken place in the transition economies.

It is no surprise to find that money demand functions in transition economies estimated by time series methods do not exhibit stable properties given the short sample of data due to the change in regime. We would expect them to face the same kind of instabilities that the industrialized countries experienced in the 1970s and 1980s, but an order of magnitude larger given the speed and scope of transition. Reforms have been large and rapid, and it would be odd if they did not have an effect on the demand for money and the relations underlying monetary control. The scale of transformation required to take an economy from a centrally planned organization based on the Soviet model to a free market economy with an orientation towards the West is colossal and the accompanying reforms to the financial sector are bound to be equally dramatic.

For transition economies the problem of instability is a pressing problem. The question is what can be done to ameliorate its effects. Papers that include sample data from pre- and post transition are more readily available (see Charemza and Ghatak, 1990; Chawluk and Cross, 1994; and Nijsee and Sterken, 1996; for examples), but these cannot necessarily tell us a great deal about the short period since transition began. Yet there is insufficient

time series data to estimate highly sophisticated empirical models in place of the relatively simple short-run equations for the period since transitions. So the solutions worked out over the last two decades may be applicable and useful for industrialized countries, but, without sufficient data, the functional forms cannot be estimated for transition economies, because they are more data intensive than other methods. This leaves little option but to attempt to estimate money demand functions with the time series data that is available, but to be wary of attaching too much precision to the results until such time as the estimated elasticities settle down and the forecast performance improves. Simple error feedback models can be estimated, but these stretch the cointegration methodology to the limit as they typically work with small samples of monthly data of at best seven or eight years and often much less than that. It seems that until a longer time series is collected we will be unable to make corrections to the short-run money demand function to account for the effects of unexpected shocks and financial innovations in this way. This does not bode well for monetary targeting, as we will discuss later.

One option that is available is to use pooled or panel data from a range of transition economies. This ensures that there are a sufficient number of observations to estimate a demand for money function, but when the transition economies borrow information from each other there are a number of qualifications that must be borne in mind. First, the domestic reform programs and experiences of transition economies have all been different and therefore the properties of the demand for money in one country are not strictly comparable with the properties of the demand for money in another. Second, some economies have made more progress in reforming the centrally planned structures, which had formerly existed, than others. This means that the extent to which there have been reforms to soft budget constraints and credit control, financial markets, and industrial organization all differs between countries. Nevertheless, group effects can be used in order to isolate country specific effects in the intercepts to provide a means of dealing with these differences. Begg et al (1996) report “tolerably good” demand for money functions estimated using M2 data from 13 transition economies. Although there is evidence that velocity was changing over the sample within countries, the estimated equations were able to capture a stable relationship. While these provide a starting point for monetary targeting, Begg (1997) notes that there is still a requirement to forecast real output and prices before a sensible target for money can be determined. Determining the level of production relative to capacity and the evolution of prices makes this a formidable task.

It appears that the empirical problems at the domestic level stack up when we attempt to estimate money demand functions for the purposes of monetary targeting. The next section explains that there are just as many reasons to believe that international environment is equally unpredictable.

International instability

The reasons given above relate to the unpredictability of the demand for money due to domestic developments. This section considers external events that could further

exacerbate the instability in the demand for money. The argument is based upon the observation that some currencies emerge as international currencies with significant use by third parties in transactions that do not involve residents of the issuing country on either side of the transaction. These vehicle currencies can greatly undermine the stability of demand for money of near neighbors. The use of the vehicle rather than the domestic currency unit may be more desirable as the network of users increases. With the euro on their doorstep it is likely that the transition economies will be affected by this phenomenon, and the result will be further instability in the demand for money.

The euro as an international currency

The euro is likely to emerge as an international currency, and this will create instability in the demand for money in transition economies. Crucial to the analysis is the effect of the scale of the markets and the low inflation environment expected to prevail in the EU-11 area, (Mundell, 1998). In terms of Mundell's four features, the euro appears to have the necessary characteristics of an international currency. It has a sizable network (or domain) defined by the combined GDP of the EU-11 countries—this is close to the U.S. GDP of $6.8 trillion and encompasses a larger population of 289 million residents. If we consider the possibility of enlargement or the scope of the markets with which the EU trades imported or exported goods the network could extend to a much larger market.

Likewise on stability the EU looks set to fulfill the criteria for an international currency. The European Central Bank (ECB) has shown that it intends to use monetary and inflation targeting to achieve low inflation and low price variability to match the performance of the deutsche mark, making the euro a suitable currency for pricing contracts. Mundell concurs with these views, although he is less than convinced that the euro has the political stability and fall-back value to attain a true international currency status. There are reasons to disagree with his conclusions however. The euro has the political backing of its member states and that is likely to be sufficient to support it in the absence of a central state. The economic incentives for countries to "make it work" would seem to be sufficient: one cannot otherwise explain the continuation of the European Monetary System after the disastrous experience of exchange rate targeting in the Exchange Rate Mechanism (ERM) during 1992–93. On the question of the fall back value, it can be pointed out that none of the international currencies of the post-war period has a fall back guarantee since they are all fiat moneys built on trust. In the absence of this characteristic, a constitutional commitment to inflation control appears to have reassured wary investors that the purchasing power is not likely to be jeopardized.

If the euro does become an international currency, then what will encourage its use beyond the borders of the EU-11? We advance some reasons why the transaction costs and network externalities central to the emergence of international currencies will encourage the use of the euro by residents outside the EU area and particularly in transition economies. On January 1, 1999, residents of the EU-11 countries found their diversified deposits redenominated into euros. Swoboda (1969) has shown, by an application of the Baumol-Tobin square root rule, that it is more efficient to hold deposits in one currency than in many, in proportion to the needs of trade and inversely with the

relevant opportunity cost. The existence of a single currency would increase efficiency by reducing the total level of balances required. The reduction in the optimal balance required overall will cause an excess stock of euros in the initial stages to be offloaded in other assets or goods.

Ultimately, to offload the deposits the euros will need to be exchanged for assets and goods priced in other currencies, so the euro may depreciate. The economization of liquid balances, the reduction in the costs of currency management, and lower staffing levels associated with foreign exchange management for the members of the EU-11 will put them at an advantage compared to those outside the euro area. The excess (the difference between the original diversified deposits and the new, lower, optimal level of deposits in euros) and savings from economization could be reallocated into less liquid interest bearing assets, earning a higher rate of return, or simply be spent on goods and services. These advantages may persuade those outside the EU-11 to hold deposits in euros rather than in domestic currency, so that they also gain from the reduction in total liquidity.

In the first instance, multinational firms will reap the benefits of many economies through more efficient foreign exchange management. Anecdotal evidence suggests that changes are already under way to ensure that they are exploited. The toolmaker Trumpf (Germany), cited in the *Financial Times*, December 17, 1998, suggests that although conversion will involve costs of installing new software and currency management systems amounting to a one-off payment of DM 2 million, they will save DM 1 million annually from the reduction in staff costs and payments made to banks for currency conversion. If these figures are representative, a payback period of two years provides a good incentive for companies to make the conversion to handle euro deposits and price in euros rather than in national currency.

Trade patterns, externalities, and currency usage

If the introduction of the euro is to have a major effect on the holdings of currency and deposits, then it is likely to operate through trade patterns and invoicing behavior. Firms that have substantial bi-directional trade with EU-11 countries may prefer to invoice in euros: survey evidence suggests that up to half of sales to the EU will be invoiced in euros, and many sales outside the EU will be invoiced in euros to make pricing more transparent. The dividing line is likely to be between large companies, which will probably handle receivables in euros, and small or medium-sized enterprises, which will continue to pay for goods and services in domestic currency. On the basis of the 1997 direction of trade statistics, if half of exports to the rest of the EU from euroland countries are invoiced in euros, then this would amount to $540 billion in trade, while if importers from the rest of the EU insist on paying in euros this would amount to another $417 billion. By holding the proceeds in euro (transaction) accounts rather than in other currencies (that will later need to be transferred back to euros at a future, uncertain exchange rate), firms will reduce their transaction costs in the foreign exchange market and their exposure to currency risk.

In an interview with the *Financial Times*, deputy head of Imperial Chemical Industries (ICI) Peter Everett indicated that the euro is likely to be the normal transactions vehicle for trade between ICI and its customers and suppliers in the United Kingdom, Denmark, Sweden, and Greece as well as the EU-11. There is no reason why this could not also be true for transition economies. While the customers may not always be invoiced in euros, suppliers are likely to be paid in euros under the "no compulsion, no prohibition" ruling companies can usefully use to make payments of invoices in euros to facilitate a hedging operation against the large euro takings from elsewhere in Europe. The network externalities to customers and suppliers in these countries will be large, and even for countries outside of the EU such as Switzerland, which imports $58.3 billion of goods from the EU and exports $45.3 billion to the EU, the rewards for using the euro could be considerable. The export/import trade of the transition economies is also large.

Financial markets

The size of the European capital market is about as large as the U.S. market was. At the end of 1995, the EU-11 area had total trade in bonds, equities and bank assets of $21 trillion versus the United States at $23 trillion. The market for futures and forwards is more skewed toward the United States, since the derivatives trade in Europe represented only 36 percent of the U.S. level according to 1995 figures (Thom et al, 1998). Accounting for the total trade within Europe, the capital market will be very large, but much of this trade will fall off now that intra-EU trade has been eliminated by the single currency. However, the deeper capital market (with lower transaction costs of operating through euros versus the dollar or the yen) may gain trade for the euro, which may offset the reduction due to monetary union (Hartmann, 1996). Financial institutions that do not deal in the euro will lose credibility and therefore business. Recent estimates by Morgan Stanley Dean Witter suggested that up to $1300 billion of new money would flow into new equities in euros from fund managers alone in the next ten years. Many investors have begun to treat financial markets as if they were pan-European, even though this is some way off, by no longer conducting operations on a national level but adopting a new sectoral basis for investment. Companies now work to raise finance on a continental level in larger markets and bid-ask spreads are likely to fall in Europe as a result. Restructuring of financial arrangements will help remove segmentation in the market and improve competition through transparency, first of all at the corporate level, but subsequently for the retail sector. The outlook for some small traders with specializations in niche markets is therefore bleak. The markets for debt are likely to experience some redenomination into euros as banks issue debt in euro to buy back current debt in dollars, McCauley (1997).

It will take some time for the euro to establish its own credentials as a suitable international currency but it will certainly assume a second place position to the dollar for two reasons. First, the euro is a direct replacement for the second placed international currency, the deutsche mark. This means that the domestic markets of Germany and the other EU-11 countries will all adopt the euro as their domestic currency. The euro will have considerable network externalities in their wider export and import markets and this will create incentives for residents of those countries to use the euro as a transaction

vehicle for the reasons outlined above. We agree with Gebhard (1998) that the euro will take on the transaction vehicle role of the deutsche mark but the euro will also have a significantly wider market, comprising a share of world trade at least as large as that of the United States (a share equal to a quarter of world trade) according to estimates by Hartmann (1996). Second, the ECB has shown that it has no intention of abandoning the low inflation reputation of the Bundesbank but rather, as an institution without a history, intends to reap as much credibility as possible by emulating the Bundesbank's monetary policy stance. This ought to provide a sound footing for the euro as a currency in which to conduct trade. Together these features will create a large demand for the euro as a transaction vehicle outside, as well as inside, the EU-11.

These reasons suggest that the nonbank private sector of transition economies has good reason to consider using the euro, and these will induce changes in the level of demand for domestic currency that will be sure to lead to further volatility in the demand for money. The extent to which transition economies are dollarized gives an indication of the readiness with which a stable international currency is already used as a vehicle in place of the domestic currency unit. The result is that any policy regime that relies on the stable relationship between money and a small number of explanatory variables is liable to experience a considerable upset. Much of the money supply is unrecorded and beyond the control of the national central banks; with the euro on the doorstep it is likely that this component will continue to grow. We conclude that international financial developments make monetary targeting unworkable just as much as the domestic reasons discussed above.

C. Monetary Targeting

The experience of monetary targeting in industrialized countries is mixed. The United States and the United Kingdom both experimented with different forms of monetary targeting and abandoned the attempt after they experienced a lack of control over the key aggregates. In the United States under Chairman Paul Volcker, the Federal Reserve attempted to target nonborrowed reserves during the period 1979–82. The annual growth of the money supply showed some reduction as a result but the short-term (quarter to quarter) growth rate of money increased dramatically. In part, this was due to events beyond the control of the Fed, such as credit controls and financial innovations implemented by government and banking sectors. It also reflected the instability in the money demand function and in particular the increase in the incidence of unexpected changes to money supply. In the United Kingdom, the new Conservative government under Prime Minister Thatcher introduced a medium-term financial strategy (MTFS) in 1979 with targets assigned for sterling M3 for the next four years. A number of unexpected events such as the oil price shock, the increase in indirect taxes and misaligned exchange rates undermined monetary control. In 1985, after a period in which the MTFS was effectively ignored, the United Kingdom adopted an exchange rate target.

German policy operated by the Bundesbank, by contrast, has always been regarded as the paragon of monetary targeting experience by outside observers. It has been argued that the demand for money is more stable in Germany than elsewhere, possibly due to the lack

of significant bursts of financial innovation. The benign environment might explain the better relative performance but there has not been unqualified success. A review of the annual performance of the Bundesbank by Schmid (1998), reveals that in 22 years of monetary targeting there were as many years of failure as there were of success. It has been argued by Artis et al (1998) that the Bundesbank was able to excuse itself for missing the monetary targets on the grounds of its low-inflation performance. The Bundesbank may have been inflation targeting all along, adopting monetary reference values for cosmetic reasons.

Table 1. Monetary Targets and Their Implementation

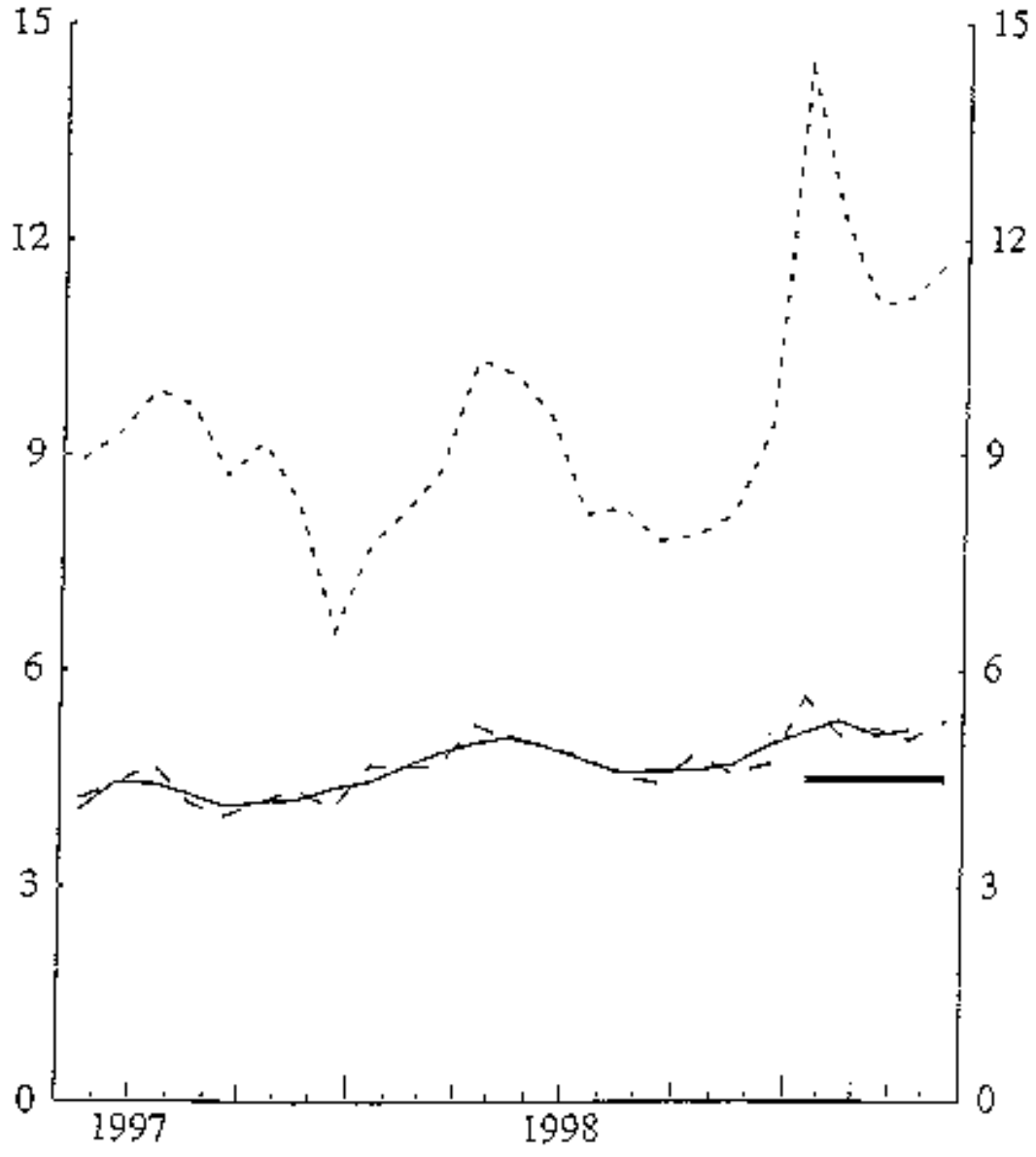
	Target Growth of the Central bank Money stock or M3* (percent)			Actual Growth (rounded figures) (percent)		
Year	In the course of the year†	On an annual average	Concretizing of target in the course of the year	In the course of the year†	On an annual average	Target met
1975	8	-	-	10	-	No
1976	-	8	-	-	9	No
1977	-	8	-	-	9	No
1978	-	8	-	-	11	No
1979	6 to 9	-	Lower Limit	6	-	Yes
1980	5 to 8	-	Lower Limit	5	-	Yes
1981	4 to 7	-	Lower half	4	-	Yes
1982	4 to 7	-	Upper half	6	-	Yes
1983	4 to 7	-	Upper half	7	-	Yes
1984	4 to 6	-	-	5	-	Yes
1985	3 to 5	-	-	5	-	Yes
1986	3 ½–5 ½	-	-	8	-	No
1987	3 to 6	-	-	8	-	No
1988	3 to 6	-	-	7	-	No
1989	5	-	-	5	-	Yes
1990	4 to 6	-	-	6	-	Yes
1991	3 to 5	-	-	5	-	Yes
1992	3 ½–5 ½	-	-	9	-	No
1993	4 ½–6 ½	-	-	7	-	No
1994	4 to 6	-	-	6	-	Yes
1995	4 to 6	-	-	2	-	No
1996	4 to 7	-	-	8	-	No
1997§	3 ½–6 ½	-	-			

Source: Schmid (1998).
* Since 1988: M3.
† Between the fourth quarter of the preceding year and the fourth quarter of the current year: 1975: Dec. 1974 to Dec. 1975.
‡ According to the adjustment of the monetary target in July 1991.
§ Embedded in a two-year orientation for 1997/98 of about 5% per year.

In recent months the ECB has attempted to reap the benefits of the Bundesbank's history by establishing a monetary reference value of 4.5 percent alongside a target for inflation. The experience of monetary policymaking to date shows that since January 1, 1999 the growth of the broad money measure has exceeded the reference value, Figure 1. In fact, it

would be necessary to go back to 1997 to find a rate of growth that was near to the reference value of 4.5 percent. In reality, it seems that other measures of the monetary stance offer a more pressing concern than the monetary reference value (despite protestations to the contrary).

Figure 1. Monetary Aggregates in the Euro Area
(annual percentage changes)



Source: ECB.
1/ Three-month centred moving average.

Both the Bundesbank and the ECB refer to the monetary indicator as a “reference value,” not a target; it is reasonable to assume that a reference value is a guide to policy setting that can be missed by over- or under-shooting of the ranges. Rather than interpret these deviations as indications that the monetary references were failing, perhaps they should be thought of as short-term variations in relation to a desirable long-term value for money growth consistent with velocity. Bennett McCallum has continued to discuss the view that money growth should have a monitoring range for this purpose—not necessarily as a target but as a means of determining the growth of money against a desirable range—defined by the McCallum rule, McCallum (1988). The McCallum rule defines the instrument of monetary policy as the narrow money base, (*m0*). The rule is written as

$$m0, = k_{t-1} - v_{t-1} + 0\,(z^* - z)_{t-1}$$

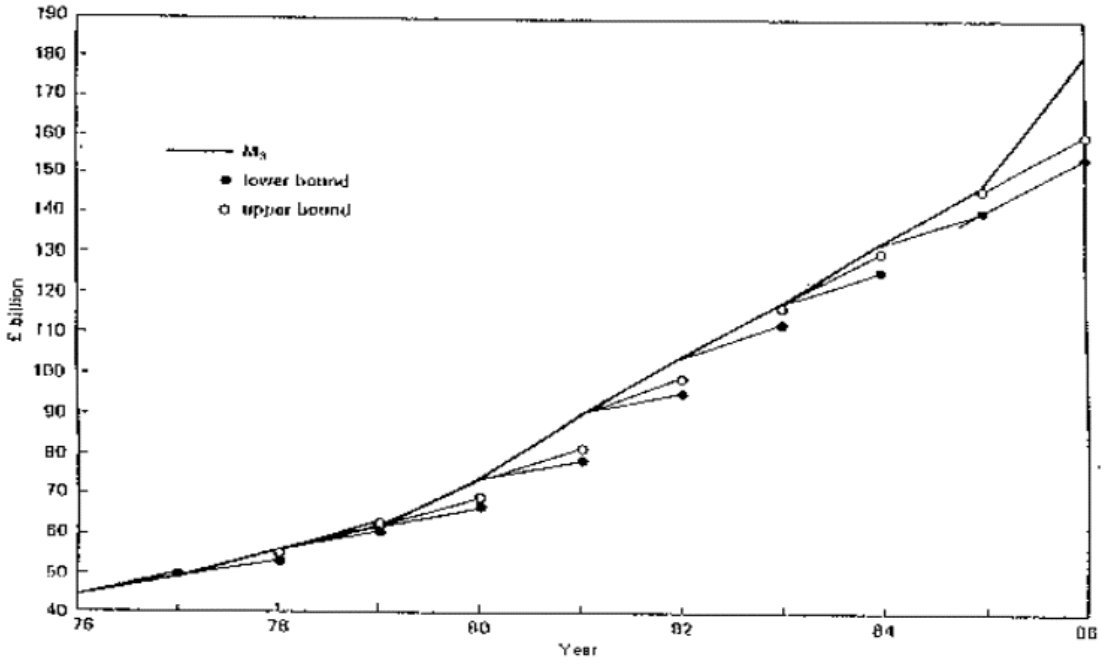
where $m0_t$ is the growth rate of nominal narrow money supply, k_{t-1} is a target level of money growth, v_{t-1} is a lagged 16-month moving average of velocity growth, and (z^*-z_{t-1}) is the deviation of a nominal income growth from the target rate, z^*. The parameter weight is 0, and t is a time subscript; all variables are in natural logarithms. Strictly speaking, this is a form of nominal income target rather than a monetary target, but it does prescribe a reference value for the narrow money measure that, if adhered to strictly would be a monetary target. If the economy is at target growth rate for output and money demand equals its desired level (i.e., $v_{t-1}=0$ and $(z^*-z)_{t-1}=0$), then $m0_t - k_{t-1.}$

Thus, in a dynamic sense, McCallum’s rule approximates a Friedman money-growth rule, where k_{t-1} is the growth rate. This interpretation has led many economists to consider the McCallum rule as a dynamic monitoring range for narrow money, which is endogenously supplied by the central bank. Even under an inflation-targeting regime, this could be used as a reference value to determine whether monetary growth is excessive in relation to the optimal rule. We will consider the informational role of money in the next section.

Together, these observations on the conduct of policy from the United States, the United Kingdom, Germany and Europe offer mixed advice on the usefulness of a reference value. We should add that whenever monetary targeting has been attempted historically, Charles Goodhart has observed that no matter how regular a relationship may appear at first, “any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes” (Goodhart's Law, Goodhart, 1984). Clearly, even if a stable and reliable relation between money and real output did exist in transition economies, it would be liable to break down once the authorities relied upon it for policy making. This has been the experience of both the United Kingdom and the United States, although the instability of the basic function and the exposure of their economies to significant shocks could hardly have been a good starting point for their monetary targeting experience. Perhaps Goodhart was right to describe his law as a mixture of the Lucas critique and Murphy's law!

Monetary targeting is a strict framework for monetary policy because it requires two conditions to be met. First, the central bank should be able to exert close control over a monetary aggregate of its choice, whether this be a narrow or a broad measure, and second, there should be a reasonable connection between the chosen aggregate and nominal income. The first condition was plainly violated in all cases, but most blatantly in the United States and the United Kingdom as Figures 2 and 3 demonstrate.

Figure 2

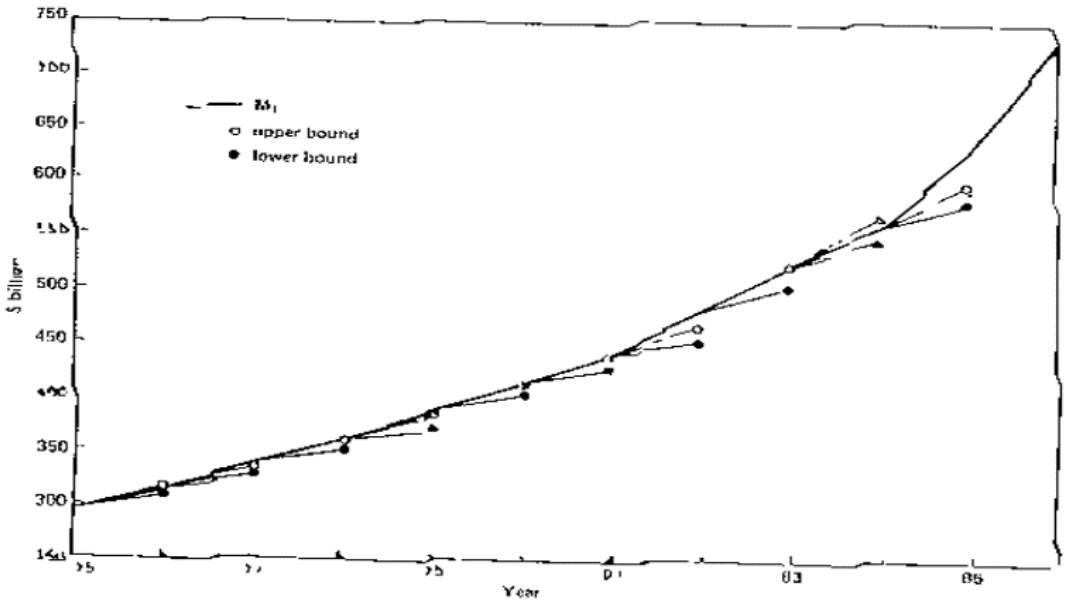


The method of targeting M3 changed in 1985 from the use of cones to the use of tram lines, as shown above.

Source: Bank of England Quarterly Bulletin (1986) p. 500.
Goodhart 1989

For the latter to hold, a stable and predictable money demand function is required. Judd and Scadding (1982) argued that a money demand function useful for policy should be a) statistically predictable, b) a simple relation between explained and explanatory variables, and c) clearly influential over real variables. In the period of the late 1970s and early 1980s, this could not have been further from the experience of most of the industrialized countries that adopted monetary targets, with the exception of Germany. The experiences of the industrialized countries twenty years ago are not isolated events; they are in fact our most closely examined practical guides to the way that countries perform under monetary targeting.

Figure 3



During the 1970s the annual targets were rolled over quarter by quarter. This ceased in 1978. To simplify the chart the Q4-Q4 target ranges for those earlier years are shown.

Source: Federal Reserve Bulletin, various issues, e.g., (April 1978, p. 267). (April 1985, p. 179) Goodhart (1989).

Transition economies have also failed the test of monetary targeting under similar circumstances. There is limited ability to control monetary aggregates to the fine degree required by monetary targeting. Table 1 shows that, excepting Poland and the Czech Republic, broad money growth has been high and volatile. Although these countries and other transition economies have an improving record on monetary control, the inflation rate has declined much more than the money growth rate, which suggests that monetary targeting may not have played a significant role in this process. This has not prevented many of these countries from attempting to set targets for money growth or kept them from continuing to do so, since these countries may have good reasons based on the restraint of inflationary pressures. We do not have counterfactual information on the growth rates that might have occurred without targets to constrain inflationary expectations and public finances. Given the experience of volatility, we can only claim that the monetary targeting policy has been useful in that it has helped to restrain excess rather than to finely adjust monetary conditions.

Table 2. Broad Money Growth
(percent change per annum)

	1991	1992	1993	1994	1995	1996	1997
CEE Countries:							
Albania	104.4	152.7	75.0	40.6	51.8	43.8	41.3
Bulgaria	110.0	53.6	47.6	78.6	39.6	124.5	359.3
Croatia*	n/a	n/a	n/a	111.9	24.6	37.9	20.9
Czech Republic	26.8	20.7	19.8	19.9	19.8	9.2	10.1
Estonia	n/a	71.1	86.5	31.0	30.5	36.6	40.4
FYR Macedonia	n/a	n/a	n/a	n/a	0.3	0.5	8.0
Hungary	35.7	27.3	15.7	13.0	20.1	22.5	19.4
Latvia	153.0	169.9	84.1	47.7	-23.1	19.9	38.7
Lithuania**	143.0	245.3	100.4	62.9	28.5	-3.5	34.1
Poland	37.0	57.5	36.0	38.2	35.0	29.3	29.6
Romania	101.2	79.6	141.0	138.1	71.6	66.0	48.9
Slovak Republic**	n/a	n/a	16.8	20.1	19.2	16.5	8.9
Slovenia	n/a	131.6	64.2	50.7	30.2	19.4	22.6
CIS Countries:							
Armenia	n/a	n/a	n/a	684.0	68.7	35.1	20.6
Azerbaijan	n/a	n/a	685.9	486.1	122.2	25.8	14.3
Belarus	n/a	n/a	n/a	181.8	173.7	52.4	111.4
Georgia	n/a	464.0	4319.0	2229.0	146.4	41.9	29.0
Kazakhstan	211.0	391.0	692.0	576.0	103.8	14.7	12.9
Krygystan	84.0	428.0	180.0	125.0	76.7	22.4	19.9
Moldova	n/a	361.7	320.2	115.7	65.2	15.3	25.7
Russia	125.9	568.1	425.8	197.5	127.5	33.7	30.0
Tajikistan	68.0	579.0	1429.0	159.0	413.0	144.0	112.3
Turkmenistan	n/a	n/a	n/a	984.0	448.0	429.0	82.0
Ukraine	n/a	n/a	758.0	573.0	117.0	35.0	28.0
Uzbekistan	n/a	468.0	784.0	680.3	158.0	100.0	34.6

Source: EBRD
* = M1, ** =M2.

There is instability in the short-run money demand function that makes econometric identification difficult. This may simply be due to the short data sample from which the estimates are derived. Alternatively, it may be because the observations at the beginning of the sample come from a distribution very different from the ones at the end of the sample, and each successive observation adds more information from the latter. If this is so, the solution is simply to wait for data to accrue and to be wary of coefficient estimates based heavily on behavior in the early stages of transition. Whatever the true reason, the short-run money demand function is highly unreliable—with a number of economic factors all contributing to a shifting money demand function: the rapid innovation in credit and financial markets, the reform of pricing structures, the variation in output due to the reorganization of production, and a host of reforms to exchange rate arrangements. Money demand functions of transition economies in recent years have been equally difficult to predict due to the internal and external shocks that have buffeted their economies in the wake of the Asian crisis, and for this reason have not been sufficiently stable to be relied upon for policy purposes.

D. Money as a Corroborative and Incremental Indicator

What role is left for money under these circumstances? In an inflation-targeting framework, money growth can serve as a corroborative and incremental indicator of inflationary conditions. Data on the growth of the money supply may be useful as a reference value if the structure of the economy ensures that inflationary impulses and pressures are observed in monetary data first. Thus, money may be a good leading indicator because it corroborates information that will be observed elsewhere at a later date. The information content of money is important in this case as a corroborative measure of inflationary pressure that will ultimately be confirmed in other data collected at a lower frequency, and as an incremental variable that adds information on the current conjuncture. For this reason, money retains a central place in an inflation targeting approach; even if it is not the final target of policy, it is an important indicator.

Monetary growth figures are a central part of this information set. As we have already argued above, money growth in relation to a reference value may have some value as an indicator of the inflationary stance of the economy for the operational side of a central bank's activities, even if the reference is not a target as such. An alternative to a reference value is a measure of the extent to which the stock of money departs from its equilibrium level. This view assumes that money markets do not clear within the typical period of measurement for empirical work so that departures of money balances held (m_t) from their desired long-term level (m_t*) persist. A justification for this view can be found in the concept of money as an inventory of purchasing power, or a buffer stock notion of money, Laidler (1982).

This view immediately raises the question of how should we define equilibrium? Defining m_t* to correspond to a full equilibrium situation means all forcing variables in the function determining m_t* would need to be at their steady state for equilibrium to result, and all expectations should equal their actual values. Not only is it difficult to agree on a measure of the steady state value of the forcing variables but it is the exception rather than the rule. If m_t* is defined in this way, m_t will depart from m_t* most of the time and disequilibrium will be the norm. Perhaps a better definition of m_t* is as an equilibrium that is dynamically consistent with the behavior of m_t. Allowing m_t* to be a well defined, stable function of a small number of forcing variables is the conventional approach, just as the summary of the money demand literature by Judd and Scadding (1982) asserts. The money demand relation has been much more stable in the long run as tables of historical estimates of these functions demonstrate (see Artis, M.J., P.D. Mizen, and Z. Kontolemis (1998), so a measure of m_t* based on a stable long-run money demand relation would be appropriate and feasible. In view of the statistical advances that have been made in treating the properties of economic series that are non-stationary, these relations have been confirmed as meaningful statistical relations and not spurious ones. We can conclude that a useful empirical concept of m_t* is the cointegrating relation between m_t and weakly exogenous forcing variables in the long run. The measure (m_t - m_t*) is then a stationary variable by definition that explains the mean reverting behavior of money balances. From the Granger Representation Theorem we know that this will be systematically related to the change in money balances over the short term, explaining the

dynamic evolution of money balances. Even with the relatively short spans of data available in transition economies a simple cointegrating relationship may be discernible.

If we adopt a measure of disequilibrium, we will have a clearer view of the level of unwanted balances held. But the interpretation of deviations of m_t from m_t^* is not straightforward either. There are many reasons for m_t to deviate and for m_t^* to change from a value that would ensure $m_t = m_t^*$. Variations to m_t^* may arise due to adjustments to money balances for transaction reasons arising from future increases in expenditures because of growth in income streams; adjustments to money balances for precautionary reasons arising from uncertainty about the future requirements for money balances; or adjustments to money balances for speculative reasons arising from news or information that changes expectations about portfolio arrangements.

These amount to permanent shocks to income, interest rates, risk assessments and inflation expectations over the forecast horizon. To avoid simply matching these changes, one must assume that there is some sluggishness in the adjustment of m_t. If an inherited level of money balances from the previous period has not been fully adjusted towards equilibrium, this amounts to a view that money balances are autocorrelated due to the impact of transactions or search costs. But m_t^* may adjust slowly if there is a permanent change to *expected* future receipts to money balances (adjustments are made to balances held for transactions purposes in the light of known receipts); a temporary change to *expected* future receipts to money balances are smoothed (adjustments are made to balances held for transactions purposes in the light of known requirements); or if money balances rise due to *unexpected* receipts (balances held are held as a buffer stock). The first case would constitute the effect of an expected permanent shock to future money balances. It originates in a change in the expected future evolution of m_t^* and is transmitted to m_t because the costs of adjustment to a new level of desired money balances can be minimized by anticipating the future requirements. The second case, refers to a temporary but expected change in m_t^*, which may result in a smoothed path for m_t. It will entail less disruption than the first case simply because it is temporary. Finally, the last case is an unanticipated shock to money balances. The excess balance would held in liquid form to avoid adjustment costs.

A disequilibrium due to any of these reasons is difficult to interpret as a signal of future inflationary behavior because it could arise for many different reasons. Consumers may be reluctant to spend owing to an uncertain economic environment or they may have built up a stock of resources in anticipation of the need to spend in excess of the long-term level in response to imminent events. In the first case, there would be a dampening effect on the real economy, with an expectation of a more placid inflationary outlook, while in the second, where the anticipated need to spend is a signal that the imbalance in outstanding balances will shortly be run down by spending on other assets or goods (i.e., a forewarning of inflationary pressure). The use of a disequilibrium measure on its own is useful only in conjunction with other information from other indicators. Although the use of impulse response functions and the reduction of the change to m_t^* into contributions from the constituent components would help to assess the underlying reasons behind shifts in $(m_t - m_t^*)$, if there were no other information to rely on.

Nevertheless there is a sense in which it is better to look at (m_t - m_t*) rather than just money growth. This can be explained in terms of the parallel between money and inventories. When we consider the effect of innovations to inventory management in industrialized countries we will note that optimal inventories of finished good in the United States and United Kingdom have fallen steadily as a result of computerized management (just-in-time technology). This means that the growth rate of inventories is below trend because the level of inventories has been run down systematically over the period. Management processes have reduced the optimal level of inventories. We should assess the (falling) optimal level and monitor the deviation of the actual level from it to get a clear picture of inventory patterns at a time when the desired level was not a fixed notion.

The analysis above implies that we should look at (m_t- m_t*) as well as the growth of m_t during periods of financial innovations. Clearly, some aggregates will be more affected by financial innovations and economic transition than others. Velocities may be unstable in transition economies and difficult to assess but we are better off knowing where aggregates lie in relation to m_t* than if we remain ignorant about the evolution of desired balances.

E. Conclusions

This chapter has set out the principal role of money under an inflation-targeting framework. For domestic and international reasons, monetary targets are regarded as likely to be as unstable as they were in the experience of the industrialized countries in the late 1970s and early 1980s. It is possible that the instability could be worse since the transition economies are experiencing much more rapid transition in the real economy and financial markets than any of the industrialized countries. At the same time, the most dramatic experiment in monetary policy design is being engineered on their doorstep as the euro is adopted as the common currency of the EU countries.

While we have argued that these countries would be unwise to follow monetary targeting if a viable alternative exists, we have not suggested they should ignore money altogether. Rather, to answer the question of what role *remains* for money to play in the transition economies, we have suggested that money has a key role as a provider of incremental and corroborative information. This chapter has made the case for a careful assessment of monetary conditions through the analysis of the growth of monetary aggregates in relation to a reference value given by a McCallum rule. It has also argued that a simple notion of the optimal dynamic equilibrium for money balances would help to determine where in relation to that level money balances lie. These would be a useful input to the assessment of inflationary conditions in the economy, along with other vital economic indicators, as part of the policy of inflation targeting.

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