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Otmar Issing*

Theoretical and Empirical Foundations of the Deutsche Bundesbank's Monetary Targeting

Criticism of the course followed by the Deutsche Bundesbank has been increasing recently. Professor Dr. Otmar Issing explains the theoretical concept of German monetary policy and the basic principles of the Bundesbank's monetary targeting.

Monetary theory is a theory of exchange based on the use of money.¹ There is a well-developed model explaining exchange, namely the theory of general competitive equilibrium. The situation with regard to the use of money is, however, less satisfactory. Frank Hahn states in this context: "The most serious challenge that the existence of money poses to the theorist is this: the best developed model of the economy cannot find room for it."² The problem is not how to introduce money as a unit of account and as a means of payment into the general equilibrium model. "In the common version of the theory of total competitive equilibrium, cash holdings simply do not exist. They can only be explained if transaction costs are taken into account..."³ Efforts are currently being made to expand the theory, with transaction costs, overlapping generations and institutional factors all playing a prominent role.

As important as these approaches may be for the development of the theory, they have little direct bearing on the policy of the central bank, which is faced with the task of having to manage and/or influence macroeconomic variables. In principle, a model of general equilibrium can be transformed by aggregation into a model of macroeconomic equilibrium.⁴ Such a model contains a macroeconomic commodity market as well as labour and money markets. In it, prices, wages and interest rates are flexible and react so swiftly that the markets can at all times be cleared and full employment is the economic norm. In such a system, the money stock circulates at a constant rate and is determined by exogenous factors. A dichotomy

exists here between the monetary and the real economic spheres: real production, employment and relative prices do not depend on the size of the money stock. The latter determines absolute prices in keeping with Irving Fisher's classical quantity theory of money:⁵ the money stock and the level of prices are strictly proportional to one another.

John Maynard Keynes presented his "General Theory" with its strong short-term orientation as a discussion and criticism of Irving Fisher's classical theory.⁶ Given sluggish reactions of prices (and comparably swift volume adjustments), his notion of demand for money exhibiting interest rate elasticity leads potentially to ongoing under-employment scenarios with the extreme case being a liquidity trap. In such a situation, monetary policy is not able to boost economic activity, whereas fiscal policy is particularly effective. Orthodox disciples of Keynes have in the post-war years concluded from this, with quite fatal consequences, that "money doesn't matter".

Theories explaining inflation that have a neo-Keynesian thrust confine the relation between money stock and prices to the wings. In a world of imperfect competition, long-term contracts and transaction costs—to mention but

¹ This definition (our translation) is given in R. Richter: Geldtheorie, 2nd ed., Berlin 1990, p. VII.

² Frank Hahn: Money and Inflation, Oxford 1982, p. 1.

³ R. Richter, op. cit., p. 3, our translation.

⁴ See B. Hansen: A Survey of General Equilibrium, New York 1970, pp. 128-134.

⁵ See I. Fisher: The Purchasing Power of Money, New York 1911. On the origins of the quantity theory of money, see D. Hume: Writings on Economics, 1752, ed. E. Rothwein, Madison 1955.

⁶ See J. M. Keynes: The General Theory of Employment, Interest, and Money, London 1936.

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a few possible causes of rigidities – these approaches regard inflationary trends as delayed adjustments to changes in wage and material costs, in which context the level and speed of change of capacity utilisation influence the dynamics of the process involved. However plausible these deliberations may seem to be for the short term, ignoring the money stock has quite disastrous consequences in the longer term as has been shown by the bitter experiences made with inflation in some countries in the 1950s and 1960s.

Quantity Theory of Money

As a reaction to the increasing neglect of monetary factors in the determination of aggregate demand, Milton Friedman succeeded in re-establishing quantity theory as a framework with long-term validity.⁷ The central insight of this theory, which Harry G. Johnson has described as the “monetarist counter-revolution,”⁸ is that active monetary policy can admittedly influence real economic activity in the short term but that in the long term the money stock has an impact solely on the level of prices. Like Keynes, Friedman assumes that the money supply is determined exogenously, and in his opinion, demand for money is a stable function of a small number of relevant variables. To his mind, a stable relationship obtains between the money stock, on the one hand, and nominal income, on the other, as well as between the money stock and a monetary impulse that is linked to nominal income via a complicated transmission mechanism – assuming adaptive expectations. The time-lags associated with the monetary impulse are, however, considerable and, moreover, variable. As we have an insufficient knowledge of the exact transmission mechanism and time-lags involved, measures to stabilise the business cycle can in reality hardly be implemented in due time. Monetary policy therefore inevitably risks adding to rather than smoothing cyclical movements.

Ensuring that the money stock does not grow faster than potential output is a necessary long-term condition for stable prices. Thus, in the long run price stability can be achieved by controlling the money supply. Monetarist theorists explain the subdivision of nominal growth into prices and real growth in the short-term by theories which are based on the “expectations-augmented” Phillips curve. On the basis of backward-looking or adaptive expectations, a short-term “trade-off” occurs between inflation and unemployment. A policy of disinflation has real costs in the form of dampened growth and a loss of jobs. However, the swifter these expectations are adjusted to the new situation, the less heavy the real losses in terms of growth and employment caused by anti-inflationary measures. The more credible a central bank is and the

greater the reputation it has established for itself, the swifter expectations adjust and the less the real economic costs of disinflationary policy.

The central wisdom contained in the “new quantity theory” à la Friedman, namely that monetary policy cannot in the long term influence real economic activity, was transposed to a short-term proposition by representatives of New Classical Macroeconomics by means of the concept of rational expectations.⁹ In the framework of simple, stylised macro-economic models these theorists come to the astonishing conclusion that, contrary to what Friedman thinks, monetary policy – to the extent that it is conducted systematically – has absolutely no effect because informed economic agents anticipate and then neutralise its real impact. Only non-anticipated, unsystematic changes in the money supply can temporarily have a real influence. Such extreme conclusions, which rest on the combined assumption of permanent market clearing and rational expectations, have not gone unchallenged. Meanwhile more realistic models have been developed.

Consequences for Monetary Policy

Nevertheless, these analyses generated a deeper understanding of the important role which credibility and reputation of a central bank play in the economy. If measures or strategies are announced that are not believed to be credible then they will not influence expectation formation – with the result that it will be harder to implement them and that they will entail unnecessary costs. The problem of time consistency also plays a role in this context. If the objective function of monetary policy depends negatively on the inflation and unemployment rates and economic agents regard the strategy of monetary policy announced to be credible, then the central bank might be tempted in the interim to pursue a more expansionary policy than that initially announced, as this would improve the objective function. Kydland and Prescott therefore argue that a target of full employment should not be part of a central bank’s system of objectives.¹⁰ This insight can in particular be put into practice by setting up a politically independent central bank whose brief is solely to pursue the goal of price

⁷ See M. Friedman (ed.): *Studies in the Quantity Theory of Money*, Chicago 1956.

⁸ See H. G. Johnson: *The Keynesian Revolution and the Monetary Counter-Revolution*, in: *American Economic Review, Papers and Proceedings*, Vol. LXI, 1971, pp. 1-14.

⁹ See R. E. Lucas: *Studies in Business Cycle Theory*, Cambridge (Mass.) 1981.

¹⁰ See F. Kydland und E. C. Prescott: *Rules Rather than Discretion: The Inconsistency of Optimal Plans*, in: *Journal of Political Economy*, Vol. 85, 1977, pp. 473-492.

stability. These "new" theoretical perceptions have, significantly enough, traditionally been firmly anchored in the Bundesbank Act from the outset.

As this brief overview indicates, work on the edifice of monetary theory has by no means yet been completed. It at any rate possesses sound foundations in the form of the long-term quantity theory of money, or, put differently: in no country and at no time has an economy benefited from a central bank neglecting "the" money stock. (Clearly this by no means answers the question of how the money stock can be meaningfully defined nor how to distinguish between the short and long term time frame.) This conviction rests in the final analysis on an axiomatic insight that most economists would probably accept irrespective of what other differences they might have and that reads: "The objectives of agents that determine their actions and plans do not depend on any nominal magnitudes. We know this as the axiom of the absence of money illusion, which it seems impossible to abandon in any sensible analysis."¹¹

This has two important consequences for monetary policy. Firstly, it should concentrate exclusively on the goal of price stability and should not attempt to influence real economic developments, for it cannot and should not try to delude economic agents systematically over the longer term. In this context, one should, however, not go so far as to exclude the possibility of agents on occasion erring in their decision-making. Secondly, it follows that monetary policy should set the overall monetary framework by announcing clear targets and should build up and preserve its credibility by pursuing a consistent anti-inflation policy. As a consequence, economic agents will be able to orient themselves reliably and this will avoid unnecessary losses owing to disruption.

The Deutsche Bundesbank's Concept

As long as monetary theory "can at best be regarded as scaffolding and not as the building" (F. Hahn), monetary policy will not be able dogmatically to follow one particular theoretical strand. When, at the end of 1974, the Deutsche Bundesbank adopted monetary targeting, announcing a monetary growth target for the first time that year and initially intending it as an experiment, this was misunderstood in certain quarters as constituting such a doctrinaire approach.¹²

Until 1973 money creation by central banks took place to a large extent through purchases of foreign exchange. Given a regime of fixed exchange rates, this process was hard to control. An exchange-rate oriented monetary policy thus repeatedly came into conflict with domestic economic requirements. The fixed exchange rate regime made it harder for the Bundesbank to fulfil its legal mandate to uphold price stability. The title Otmar Emminger chose for his "Memoirs of a Bundesbank President" is not coincidental: German monetary policy within the Bretton Woods system was all too often tangled up in the "D-Mark, Dollar and Exchange Rate Crises" triangle.¹³ "By releasing the Bundesbank from its duty to intervene on the foreign exchange markets ... the Federal Government freed monetary policy from the obligation to create central bank money involuntarily via purchases of foreign exchange."¹⁴ This enabled the adoption of a policy of monetary targeting. The Bundesbank was the first central bank to announce a monetary target and thus to enter into a certain commitment vis-à-vis the public. A little later the US central bank followed suit, and in due course numerous other central banks did the same. In the meantime most other central banks have turned their backs once again on the practice of setting monetary targets. Although in the individual cases very different reasons may have played a part in this trend, this has less to do with fundamental principles and more to do with the practical difficulties of monetary targeting.

As of 1974 the Deutsche Bundesbank has been announcing an annual monetary target that is understood as a medium-term system of monetary control geared to the production potential. The monetary target is based on a macroeconomic projection, the key variables of which are determined using normative criteria. The main focus is on benchmarks for the growth of macroeconomic production potential and the desired price trend (a price norm). Owing to the middle and long-term significance of monetary developments with regard to maintaining a stable level of prices, growth of the money stock should be in line with potential output growth – if necessary adjusted for the long-term change in the velocity of circulation of money. On the basis of the quantity equation

$$(1) \quad M \cdot V = P \cdot Y,$$

according to which the product of money stock (M) and velocity of circulation (V) by definition corresponds to

¹¹ F. Hahn, op. cit., p. 34.

¹² See H. Schlesinger: Zehn Jahre Geldpolitik mit einem Geldmengenziel, in: W. Gebauer (ed.): Öffentliche Finanzen und monetäre Ökonomie, Frankfurt 1985, pp. 123-147.

¹³ See O. Emminger: D-Mark, Dollar, Währungskrisen, Stuttgart 1986.

¹⁴ H. Schlesinger: Die Geldpolitik der Deutschen Bundesbank 1967-1977, in: Kredit und Kapital, Vol. 11, p. 11. Schlesinger continues (p. 17): "Frequent changes in the exchange rate seemed to offer a way of remaining loyal to a system of fixed exchange rates while at the same time detaching oneself from the international 'inflation convoy'. Changes in parities proved, however, to be a difficult, indeed at times almost insoluble task in political terms."

the product of price level (P) and real GNP (Y), the monetary target can be determined by applying the following rule:¹⁵

$$(2) \Delta \bar{m} = \Delta \bar{p} + \Delta \hat{y}^* - \Delta \hat{v}^*$$

Here, $\Delta \bar{m}$ is the targeted growth rate of the money stock, $\Delta \bar{p}$ the specified price norm, $\Delta \hat{y}^*$ the estimated growth rate of potential output and $\Delta \hat{v}^*$ the estimated long-term rate of change in the velocity of circulation of money. Until 1987 the Bundesbank announced a monetary target for the central bank money stock. Since 1988 a target for M3 was adopted because the former proved to be too heavily dependent on cash holdings.¹⁶ Further examples of technical changes in the design of the Bundesbank concept of monetary control were the transition from setting a target figure to announcing a target corridor and

the switch from specifying an average target to setting a four-quarter target. The above formula used to derive the monetary target to a certain extent constitutes an idealisation. It has never been applied mechanically and

¹⁵ In what follows lower case letters describe natural logarithms of variables ($x = \ln X$), and the symbol Δ stands for differences in a time series, i. e. $\Delta x = x - x_{-1}$. Letters with an asterisk (x^*) designate long-term variables, whereas those variables presented with a circumflex (\hat{x}) represent estimated variables and those with a cross bar (\bar{x}) stand for specified normative variables.

¹⁶ See Deutsche Bundesbank: Methodological Notes on the Monetary Target Variable 'M3', in: Monthly Reports of the Deutsche Bundesbank, Vol. 40 (3), 1988, pp. 18-21.

¹⁷ In the Report of the Deutsche Bundesbank for the year 1975 the following is to be found on p. 10: "In setting a monetary growth target the Bundesbank was mainly guided by the following variables: the growth of the production potential, the change in the utilisation of the production potential, the rate of 'unavoidable' price rises and the change in the 'velocity of circulation'."

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the factors it contains have in part undergone re-interpretations. Thus, at the outset, the talk was of an "unavoidable" rate of inflation whereas we regard this today as a price norm.¹⁷

Medium-term Orientation

If one compares the monetary targets the Bundesbank has set annually since 1975 with the actual results and, furthermore, considers the practical limits to managing a broad monetary aggregate, then one can without doubt say that although such a policy is difficult (for example it was not always possible to realise the desired targets for monetary growth), measured in terms of the ultimate aim of monetary policy it has nevertheless clearly been successful.

Taken together with the quantity equation (1) ex-post deviations between the inflation rate that actually emerged and the desired price norm can be subdivided into five components:

$$(3) \Delta(p - \bar{p}) = \Delta(m - \bar{m}) - \Delta(y^* - \hat{y}^*) + \Delta(v^* - \hat{v}^*) \\ - \Delta(y - y^*) - \Delta(v^* - v)$$

This subdivision highlights, on the one hand, the practical difficulties entailed in the concept of monetary targeting and, on the other, also that compliance with the monetary target is, in the short term, neither a necessary nor a sufficient condition for attaining the goal of stability.

The first component measures the degree to which actual figures overshoot or undershoot the target, i. e. the deviation of actual monetary growth from targeted growth. The next two factors are based on errors in predicting growth of potential output and of the long-term rate of change of the velocity of circulation. The last two components result from changes in the utilisation of potential production and changes in the "degree of liquidity", i. e. deviations of the velocity of circulation from its long-term (equilibrium) level. These latter two factors reflect the fact that the Bundesbank's targeting concept is geared to medium-term potential output, a concept that is not so ambitious as to wish to attain the stability goal from one period to the next but is rather prepared to accept temporary fluctuations in capacity utilisation and in the "degree of liquidity" in terms of the effects both these elements have on the price trend. However, in the medium term changes in capacity utilisation and the "degree of liquidity" balance out so that deviations from the price target are never long-lasting.

Despite large deviations in individual periods, on average over the last decade the actual growth of money stock has only been one percentage point higher than the monetary target (the midpoint of the target corridor). This

overshooting of the target did not, however, lead to a corresponding rise in the level of prices, for the larger part of the former was absorbed by a decline in the velocity of circulation which had on the whole been underestimated.

Monetary targeting also proved to be highly beneficial during intra-German unification. On inauguration of the German monetary union on July 1, 1990 the monetary variables, i. e. money stocks and interest rates, were the first all-German economic data forthcoming. Monetary targeting geared to potential output specifies the variables that had to be calculated in order to create a low-tension "monetary cloak" for Germany as a whole. Even if it is not easy to determine potential output in eastern Germany with any precision, and the distinction between relative price changes and absolute price changes remains difficult, the concept of monetary targeting has also proved its value for this regime change in the overall German system.

Choice of an Intermediate Monetary Target

By choosing a broadly defined money stock as the intermediate monetary target, the Deutsche Bundesbank emphasises the special role this plays as an information variable (indicator variable) in the complex transmission process. The indicator variable is meant to show the thrust and strength of monetary policy and it must be possible for the Bundesbank to control it with sufficient accuracy. Yet the variable should also be as closely related to the ultimate aim of monetary policy as possible. An indicator situated in the early phase of the transmission process of monetary policy, as for example the money market rate for three-months funds, would admittedly provide a more or less unadulterated response to the impulse of monetary policy. However, its relation to the ultimate monetary target can be disturbed by many other factors such as expectations of inflation, changes in real interest rates and interest rate trends abroad. An indicator in the late phase of the process, such as nominal GNP, is more closely linked to that ultimate monetary target, yet, owing to the large "distance in terms of contents and time" involved, the indicator can no longer accurately reflect the influences of monetary policy. Furthermore, there is a danger that measures of monetary policy will cease to exercise their important function of setting signals.

Were the central bank to orient itself towards the concept of targeting interest rates and thus to adopt a market interest rate as an indicator and intermediate target, then interest rates would cease to have their important allocational function in a market economy by virtue of being relative indicators of scarcity.¹⁸ When setting an interest rate, as with the case of fixing exchange

rates, all changes in the demand for money must be accommodated and the central bank thus loses control over the quantity of money in circulation. Unlike management of the money stock (by changes in the velocity of circulation), a monetary policy oriented towards interest rates loses any endogenous stabilisation. The risk of procyclical destabilising behaviour is, in the final analysis, the inevitable weakness at the heart of such a concept. Indeed, the attempt to control nominal GNP also does not promise much success. Firstly, the issue of the control of this variable creates even greater problems than managing the money stock. Secondly, if real potential output does not depend on developments of the money stock, then this concept in actual fact amounts to prescribing a target for price performance. Given, however, that the splitting up of nominal growth into a real component and a price component, can, in the short term, be influenced, the danger arises thirdly, that monetary policy has to shoulder the burden of responsibility for real economic developments. All three factors contribute to the policies of the central bank sooner or later losing credibility.

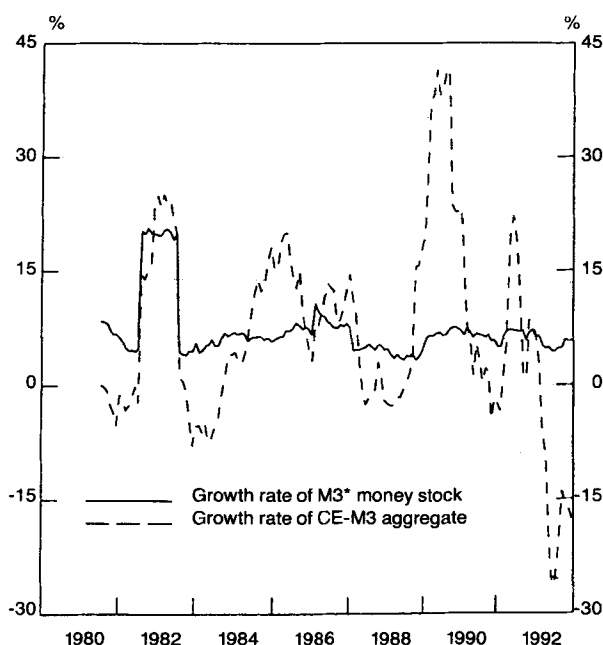
Both with, initially, the central bank money stock (at constant reserve ratios) and with, currently, the M3 money stock, the Bundesbank has opted for a broad monetary aggregate that is to be located somewhere in the "middle of the transmission link." It thus presumes, on the one hand, that a long-term link obtains between the money stock chosen and the level of prices and, on the other, that there are stable relations between the impulses of monetary policy and the money stock. With regard to the link between the money stock and the level of prices, empirical studies conducted on the basis of causality tests show that the broad monetary aggregates tend to be superior compared

with a narrower definition.¹⁹ Empirical studies based on cointegration theory point in a similar direction.²⁰ The relationship between monetary impulses and the money stock is stable if the money demand function is likewise.²¹ We can assume this to continue to be the case because demand for money in the Federal Republic of Germany tends to be more stable than in the other western industrial countries.²²

Problems Connected with a Broad Definition

These favourable results should not, however, lead us to ignore the problems connected with a broad definition of the money stock even if money demand is stable. If monetary capital grows more swiftly than incomes, which was the case in the Federal Republic of Germany in the past, then a long-term income elasticity of money demand of more than one arises even if the transaction component of money demand develops proportionally to incomes (transaction volume) and a constant portion of monetary capital is held in comparatively liquid investment instruments. Another possible explanation for the high income elasticity of money demand we can observe would be Friedman's hypothesis that money resembles a luxury good for which above-average demand arises with any increase in prosperity. Whatever the reason for the high

Figure 1
Annual Growth Rates of Different Money Stock Concepts on the Basis of Non-seasonally-adjusted End-of-month Levels



* The sharp rise in the money stocks from June 1990 to May 1991 can be attributed to intra-German monetary union.

¹⁸ See W. Poole: Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model, in: Quarterly Journal of Economics, Vol. 84, 1970, pp. 197-216.

¹⁹ See Deutsche Bundesbank: The longer-term Trend and Control of the Money Stock, Monthly Report, Vol. 37 (1), 1985, pp. 13-26 and the bibliography provided there.

²⁰ See Deutsche Bundesbank: The Correlation between Monetary Growth and Price Movements in the Federal Republic of Germany, Monthly Report, Vol. 44 (1), 1992, pp. 20-29; as well as K.-H. Tödter and H.-E. Reimers: Das Konzept der Preislücke für die Bundesrepublik Deutschland, discussion paper, June 1992, Deutsche Bundesbank.

²¹ There is not the space here to discuss the numerous investigations of this question; there is a survey of them in S. M. Goldfeld and D. E. Sichel: The Demand for Money, in: B. M. Friedman and F. Hahn (eds.): Handbook of Monetary Economics, Amsterdam 1990, Vol. 1, pp. 299-356.

²² See J. M. Boughton: Long-Run Money Demand in Large Industrial Countries, in: IMF Staff Papers, Vol. 38, 1991, p. 1-32; H. Schlesinger and W. Jahnke: Geldmenge, Preise und Sozialprodukt: Interdependenzzusammenhänge im Lichte ökonomischer Forschungsergebnisse für die Bundesrepublik Deutschland, in: Jahrbücher für Nationalökonomie und Statistik, Vol. 203 (5-6), 1987, pp. 576-590.

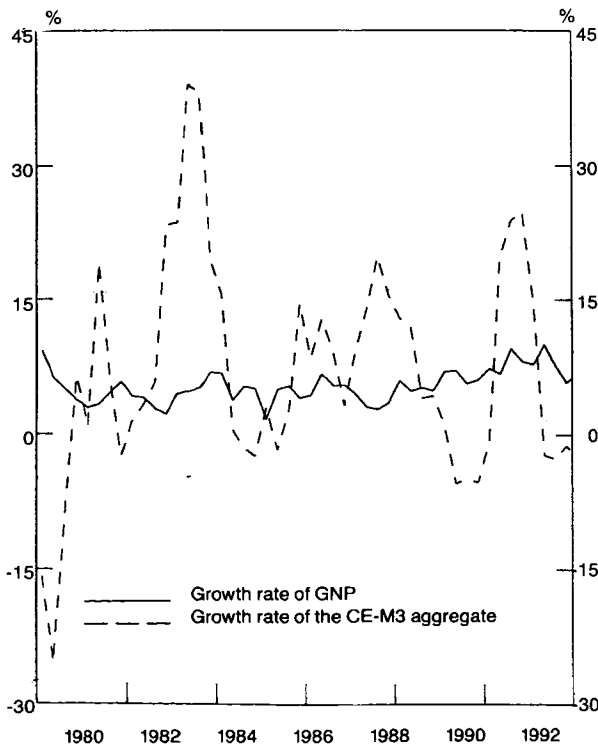
income elasticity of money demand may be, the resulting decline in the velocity of circulation that tends to occur does not exactly simplify money stock control, for corresponding predictions and corrections to the desired growth path of the money stock have to be made, as has already been elaborated above.

If a monetary aggregate has been chosen that for good reasons, as explained above, includes interest-bearing assets, then the question arises as to the criterion used for the definition. Confronted with the theoretical "imprecision" of the definition of the money stock, the central bank must attempt to find an empirical answer. The portfolio theory which is based on yield and risk considerations might be of assistance here. It derives portfolio shares as functions of all interest rates or interest rate differentials and a transaction variable respectively. Those assets which increase empirically when the transaction volume rises are most probably those which also "serve as liquidity", while other assets that are reduced in the wake of an expansion of the transaction volume can hardly be considered a monetary component.²³

The heterogeneous interest borne by the different components of a broad money stock can also be a source

of difficulties. As long as changes in central bank rates alter the level of interest, without however affecting the term structure, it is only the relative rate of interest earned by cash in circulation, and sight deposits, on the one hand, and interest-bearing assets, on the other, that changes. Hence, an increase in the interest rates then clearly leads to a decline in the money stock. Should the term structure change, however, because for example short-term interest rates react more swiftly and more strongly to measures of monetary policy than do long-term rates, then a change in relative rates occurs and with it a reallocation of interest-bearing assets. If an increase in central bank rates, for example, is passed on to short-term interest rates including the rate for time deposits while long-term rates remain unchanged (or even decline owing to the impact of expectations) then, on the one hand, a shift from savings deposits and cash in circulation as well as sight deposits into time deposits is to be expected, something that has no influence on the growth of M3. On the other hand, shifts are also to be foreseen from monetary capital that has thus become less attractive into time deposits, a process which accelerates the growth of M3. In the case of such inverse reactions on the part of the pattern of interest rates, the function of the money stock as an indicator can, temporarily at least, be impaired. This does not mean that the long-term link that obtains between it and price trends has inevitably also been undermined or that the strong expansion in money balances does not contain an inflation potential.

Figure 2
Annual Growth Rates of the
CE-M3 Aggregate and GNP



Alternative Concepts

Some observers who are currently criticising the Bundesbank's anti-inflationary approach and believe that M3 overstates the pace of monetary expansion would appear to have overlooked M3's double role as both indicator and intermediate target. In this context, they like to point to alternative ways of construing the money stock which in the current situation, but by no means always, attest to lesser growth (see Figure 1). Unlike M3, which is formed by the addition of its component parts, such constructs accord weights to the components (Currency Equivalent (CE)-aggregate) and/or the growth rates of the components (Divisia-Aggregates) in terms of their degree of liquidity.²⁴ There, the degree of liquidity is measured in terms of the opportunity costs of holding money as a difference between a maximum yield of a less liquid

²³ Empirical estimates of the portfolio demand system would appear to suggest that a broad definition of the money stock should be used which embraces not only cash and sight deposits but also savings deposits. The coefficient for time deposits is admittedly negative yet not significantly different from zero; cf. K.-H. Tödter and M. C. Wewel: Ein ökonomisches Portfoliomodell für den privaten Sektor in der Bundesrepublik Deutschland, in: Kredit und Kapital, Vol. 24 (2), 1991, pp. 235-253.

investment instrument and the actual yields on the component in question. In both concepts, cash and sight deposits are weighted most strongly owing to their maximum interest rate disadvantage, whereas the other components are assigned weightings all the lower, the higher the interest they bear.

These aggregates are therefore very "cash and giro-money biased." In phases with an interest rate pattern in which the yield on time deposits is almost that on the yield on public bonds outstanding, time deposits to all intents and purposes disappear from the definition of the money stock (CE aggregates) or hardly contribute at all to money stock growth (Divisia-Aggregates). Should time deposit rates indeed exceed the yield on bonds outstanding, then this leads either to negative growth of these aggregates or the changed maximum interest rate is taken into consideration so that monetary capital components possibly contribute to growth in the money stock. The reason here is that – based on a utility maximization approach – liquidity is measured in terms of forfeited yields, while the dimension of risk – contrary to the portfolio optimization approach – is not taken into account. The interest rate for a particular form of investment not only contains a premium for foregoing liquidity but also a risk premium owing to yield volatility. As empirical studies show, in particular the CE-M3 aggregate has in the past been subject to extreme fluctuations and the correlation with growth rates of GNP was in fact negative (see Figure 2). Furthermore, the velocity of circulation of this aggregate was substantially more instable than that of M3.

Some of the critics of Bundesbank policy quite clearly simply ignore these facts. We are, needless to say, fully aware of the problems connected with the inverse term structure just as we know that the "economic shock" of intra-German unification raised money demand over its "traditional level" and, furthermore, can in principle be a source of possible future instabilities. Finally, special movements in the cash in circulation triggered off by the debates on interest income taxation and the function that the D-Mark exercises as a parallel currency outside Germany should be monitored on an ongoing basis and taken into consideration when necessary.

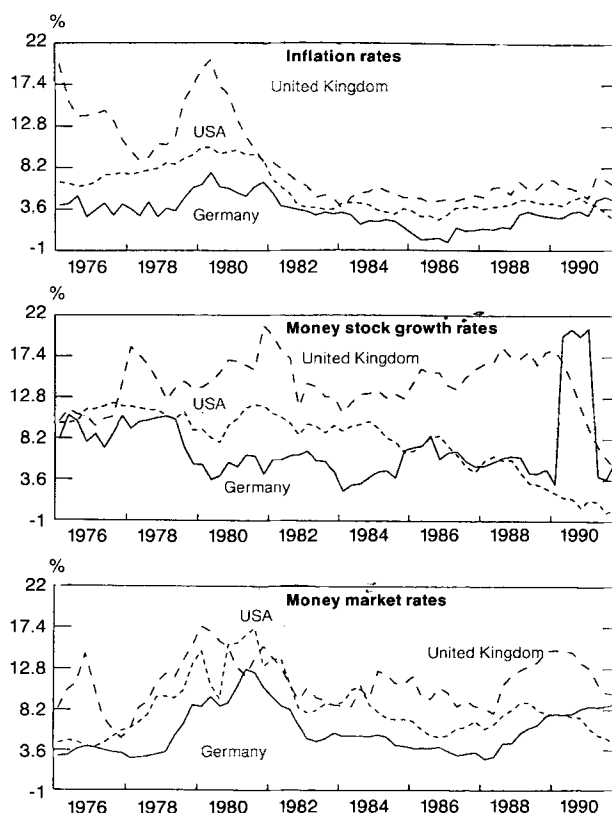
When explaining the Central Bank Council's decisions of July 16, 1992 we discussed these factors in detail.²⁵ If

²⁴ See J. J. Rotemberg, J. C. Driscoll and J. M. Poterba: Money, Output and Prices: Evidence from a New Monetary Aggregate, National Bureau of Economic Research, Working Paper No. 3824, 1991; A. Serletis: The Demand for Divisia M1, M2, and M3 in the United States, in: *Journal of Macroeconomics*, Vol. 9 (4), 1987, pp. 567-591.

²⁵ See Deutsche Bundesbank: Review of the 1992 Monetary Target and the Raising of the Discount Rate, Monthly Report, Vol. 44 (8), 1992, pp. 15-20.

developments are carefully monitored continuously from the outset, then one must in the final analysis ineluctably conclude that the economy continues to be furnished with generous liquidity and that the strong monetary expansion must be regarded as excessive. In the circumstances, there can truly be no talk here of a quasi-rigid monetary approach in the sense of some "blind insistence" on the monetary target originally decided on. The Bundesbank has always included a broad spectrum of other indicators in its analysis and taken them into account in its decisions, an approach, incidentally, that has met with the displeasure of orthodox monetarists. But what conclusions arise from this assessment? Does the ongoing strong expansion in credit speak against the view that an inflationary potential exists?²⁶ Should we be satisfied with an inflation rate of over 3.5% which is what we must expect on average this year? Yet we must not oversee the fact that the "home-made factors" by no means give cause to sound the "all clear". To date foreign trade is almost exclusively the source of relief; in July 1992 import prices were 4.1% down on the previous year. What

Figure 3
Inflation Rates, Growth Rates of Money Stocks
and Money Market Rates on an
International Comparison



external value of the D-Mark, what change in import prices and what domestic inflation rate would be the result of a different, more expansionary monetary policy? The Bundesbank never understood an orientation towards a monetary target as meaning that no other factors could be included in its deliberations. The specifics of the current situation give no cause to depart from this practice at the present time. This concept is not rendered obsolete merely by the fact that on occasion it does not seem possible to achieve the target set for a year and/or it does not seem desirable given certain conditions, for such a concept merely accentuates the medium-term character of a monetary strategy oriented towards potential output.

Financial Innovations

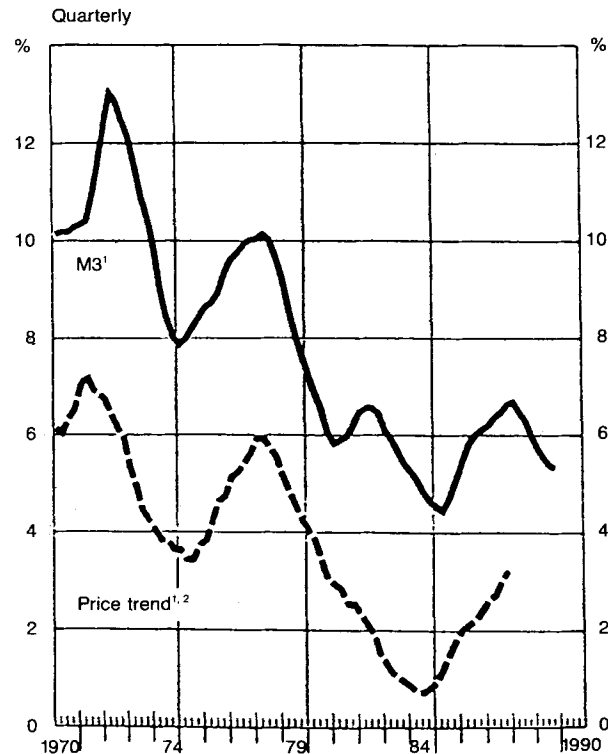
The above-mentioned problems of money stock control that are bound up with the imprecision latent in the definition of the money stock can become even greater owing to financial innovations. All those developments in the monetary domain are referred to as financial innovations which afford market participants the opportunity to avail themselves of new investment and/or financing instruments hitherto not covered by existing services on the market. Financial innovations are the product of changes in information resources, the shape of financial instruments and possibilities of action although there is to date no one self-contained theory that is able to explain these developments. On the one hand, developments in computer technology have drastically lowered transaction and information costs and at the same time increased market transparency. Furthermore, deregulation set a new legal and economic framework for the financial markets which afforded market participants new possibilities. Borrowers can to a great extent flexibly shape the size, interest payments and currency of the loans and thus minimise interest-rate and foreign exchange risks. In the seventies, attention focused on such considerations to a greater extent as risks, measured

in terms of volatility of interest and foreign exchange rates, increased.

Financial innovations have played and continue to play an important role in the United States and the United Kingdom, whereas in Germany the financial system would appear to have been less in need of innovation. This is, on the one hand, the result of what were former strongly regulated Anglo-Saxon financial markets being exposed to a strong wave of liberalisation whereas the relatively liberal German financial market did not require similar measures.

On the other, the volatility of interest and inflation rates in the United States and the United Kingdom was substantially higher than it was in the Federal Republic.²⁷ In this context, financial innovations have generated numerous new investment instruments that were not contained in the traditional money stock definitions. As a consequence, the traditional money stock aggregates described a money stock trend that clearly underplayed the stock of financial assets used to liquidate the transaction volume.

Figure 4
Long-term Trends of Money Stock and Prices



²⁶ I cannot go into the "mechanics" here of an ex-post balance between savings and investments that always occurs. "Only if overall demand (investments, consumption and exports) permanently exceeds the existing supplies offered by domestic and foreign manufacturers given initially stable prices (sic! O. I.) are inflationary processes triggered." (DIW, Wochenbericht 36/92, p. 430). Whoever pens such a sentence with regard to the current situation in Germany (!) is either adhering to some naive Keynesianism or relapsing into a bout of the same. Upholding such doctrines, with which modern representatives of Keynesianism certainly do not wish to see themselves identified, has left its inflationary mark in many a country.

²⁷ In the first quarter 1976 to first quarter 1991 period, the variance in inflation rates (measured against the deflator for domestic demand) was 5.97 in the United States and 20.19 in the United Kingdom with it being 2.89 in Germany. The variance in market rates for three-months' money for the period first quarter 1975 to fourth quarter 1991 was 9.45 for the United States, 6.44 for the United Kingdom and 6.14 for Germany. Clearly lower variances were recorded for yields on public bonds outstanding; the respective values are 3.74 for the United States, 3.84 for the United Kingdom and 1.82 for Germany (cf. also Figure 3).

¹ Change from previous year, smoothed with a 10-period mean.

² Deflator of domestic demand, smoothed growth rates shifted back 10 quarters.

Source: Bundesbank.

Financial innovations have "softened" the link between transaction volume and money stock and have also led to an "erosion" of the link between the instruments of monetary policy and the money stock, a development which has impaired the latter's quality as an indicator.²⁸ At the same time, financial innovations influence the transmission channels of measures of monetary policies. However, it is by no means certain whether this diminishes the efficacy of monetary policy in general.²⁹ On the one hand, ever closer international links have constrained the scope for national monetary policy as the isolated impulses of interest rate policy have been blunted by agents procuring cross-border loans. Moreover, the impact of such impulses is curbed and delayed by hedging activities. On the other, the efficacy of interest rate policy increases owing to the greater use of floating-rate debt instruments. By virtue of the fact that credits are coupled to a money market rate, costs of external resources are passed on to the debtor much more swiftly. In this regard, the interest rate has come to be of greater importance in the transmission process.

Broadly speaking, monetary targeting has certainly become more difficult owing to the presence of financial innovations, in particular in the United States and in the United Kingdom, and things will not get easier in the future. Yet the pilot should not leave the ship just because the water is getting choppy or fog looms on the horizon. Under such conditions, the orientation which can only be provided by a policy of monetary targeting will become all the more important. This is especially the case given that the conditions for a monetary policy geared to interest rates have by no means improved in this environment.

Equilibrium Price Level and Price Gap

Drawing on long-term quantity theory, staff members of the Federal Reserve Board have constructed an indicator for the long-term link between the money stock and price

trends.³⁰ They define the equilibrium price level (P^*) as the money stock (M) per unit of real potential GNP (Y^*) given an equilibrium velocity of circulation (V^*):

$$(4) \quad P^* = (M/Y^*) \cdot V^*$$

The equilibrium price level constitutes the price level that would occur given current money balances held if output and velocity of circulation were in equilibrium. This occurs in the case of full capacity utilisation and when cash holdings correspond with the long-term average. Deviations of the equilibrium from the current level of prices indicate either an acceleration or a deceleration of inflationary trends. As a comparison of equation (4) with the quantity equation (1) shows, the relation of equilibrium price level to current price level (the price gap) is made up of two components: the utilisation of production capacity and the "degree of liquidity":

$$(5) \quad P^*/P = (Y/Y^*) \cdot (V^*/V)$$

This breakdown shows that an acceleration of inflation is to be expected not only given over-utilisation of capacity but also if the velocity of circulation is lower – and cash holdings thus higher – than in the long-term equilibrium. The price gap thus not only takes into account imbalances on the commodity market but also the inflationary potential of excessive money balances (a liquidity overhang). This allows us to develop a dynamic model of the price adjustment process which can be represented in simple form by the equation:

$$(6) \quad \Delta p = (1 - \lambda) \Delta p_{-1} + \lambda \Delta p^* + \alpha(p^*_{-1} - p_{-1}) + \varepsilon$$

with ε being a stochastic variable with mean zero.³¹ According to this the inflation rate (Δp) exhibits no systematic tendency to change if the current level of prices and the equilibrium price level concur ($P = P^*$) and P^* grows at a steady rate. Imbalances between the two variables lead in subsequent periods to an acceleration or deceleration in price increases in the course of which in the longer term a new dynamic balance is reached between the two variables.

Should the central bank wish to achieve an inflation rate

²⁸ See A. Lamfalussy: The Restructuring of the Financial Industry: A Central Banking Perspective, in: Deutsche Bundesbank, *Auszüge aus Presseartikeln*, No. 18, March 6, 1992, pp. 11-15. The suggestion that taxes be levied on international capital transactions (the so-called Tobin tax), an idea that could be extended to include domestic financial transactions, could, however, well have a counter-productive effect and trigger off a new wave of innovations. See J. Tobin: A Proposal for International Monetary Reform, in: *The Eastern Economic Journal*, Vol. 4, 1978, pp. 153-159.

²⁹ See G. Laske: Eine Untersuchung über Innovationen im internationalen Bankgeschäft durch die Notenbanken der Zehnergruppe, in: A. Gutowski (ed.): *Neue Instrumente an den Finanzmärkten: Geldpolitische und bankenaufsichtliche Aspekte*, Berlin 1988, pp. 43-63.

³⁰ See J. J. Hallman, R. D. Porter and D. H. Small: M2 per Unit of Potential GNP as an Anchor for the Price Level, Board of Governors of the Federal Reserve System, Staff Study No. 157, 1989; as well as by the same authors: Is the Price Level Tied to the M2 Monetary Aggregates in the Long Run, in: *American Economic Review*, Vol. 81, 1991, pp. 841-858.

³¹ This price adjustment process can be viewed as a generalised Phillips relation in which the inflation rate depends on the expected inflation rate and the price gap in the form of a combination of capacity utilisation levels and the degree of liquidity ($\Delta p = \Delta p^* + \alpha(p^*_{-1} - p_{-1})$), as well as on asymptotic rational expectations (cf. J. L. Stein: *Monetarist, Keynesian and New Classical Economics*, Oxford 1982, p. 51), which are oriented towards changes in equilibrium prices ($\Delta p^* = (1 - \lambda) \Delta p_{-1} + \lambda \Delta p^*$).

³² Even ex post, only estimates are available for these non-observable variables.

³³ For further details of the P-Star concept cf. also Deutsche Bundesbank: *The Correlation between Monetary Growth and Price Movements in the Federal Republic of Germany*, op. cit.

of $\Delta \bar{p}$ and should it succeed in managing the money stock in line with the simple rule

$$(7) \quad \Delta \bar{m} = \Delta \bar{p} + \Delta y^* - \Delta v^*$$

then the equilibrium price level rises in accordance with equation (4) at the rate of $\Delta p^* = \Delta \bar{p}$ and according to equation (6) so does the current price level ($\Delta p = \Delta p^*$). As a comparison with the Bundesbank's derivation of the monetary target (equation 2) shows, this rule corresponds with the Bundesbank's concept – with the exception that, when announcing the monetary target, use has to be made of estimates of the growth of potential output and the long-term velocity of circulation.³² To this extent, in the opinion of the Bundesbank the P-Star approach is not a new concept and does in no way constitute changing the indicator used as some have erroneously assumed.³³

With regard to applying the equilibrium price level and the price gap in analytical studies of Germany, the American concept has two exceptional weaknesses. Firstly, it assumes the long-term constancy of the velocity of circulation. This is an assumption that cannot be made with regard to money stock M3 which the Bundesbank prefers for the reasons given above; rather the velocity of circulation of M3 tends to drop. Secondly, the equation

used to describe the inflationary dynamics by means of P^* only takes into account the long-term influences on price trends and with the exception of the intrinsic dynamics of the inflationary processes themselves it ignores all other shorter-term factors. In this context, mention should be made especially of the impact of wage developments and import prices (prices of raw materials, in particular the price of oil, and the effect of exchange rate changes). Any empirical account of price trends must not overlook these factors. It is not coincidental that the Bundesbank pays great attention in its ongoing analyses to the development of negotiated wages and actual earnings as well as to inflationary risks prompted by external factors.

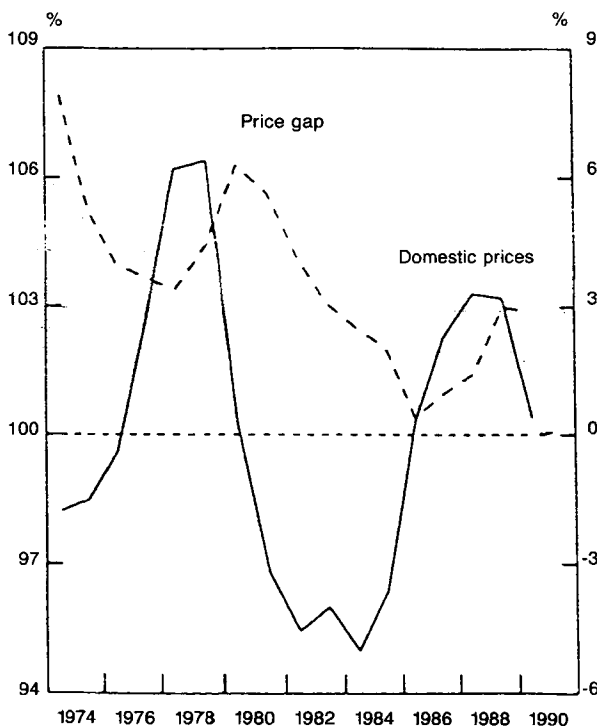
Allowing for Additional Factors

Without going into the details here, the Bundesbank has attempted to overcome these two weak links in the US P-Star concept. By introducing a long-term money demand function with an estimated income elasticity (β) that is larger than one, the decreasing tendency of the velocity of circulation can be explained and linked to the development of the potential output. As a consequence we therefore define in modified form the equilibrium price level as follows:

$$(4') \quad P^* = (M/Y^*) \cdot V_0 \cdot Y^{*1-\beta},$$

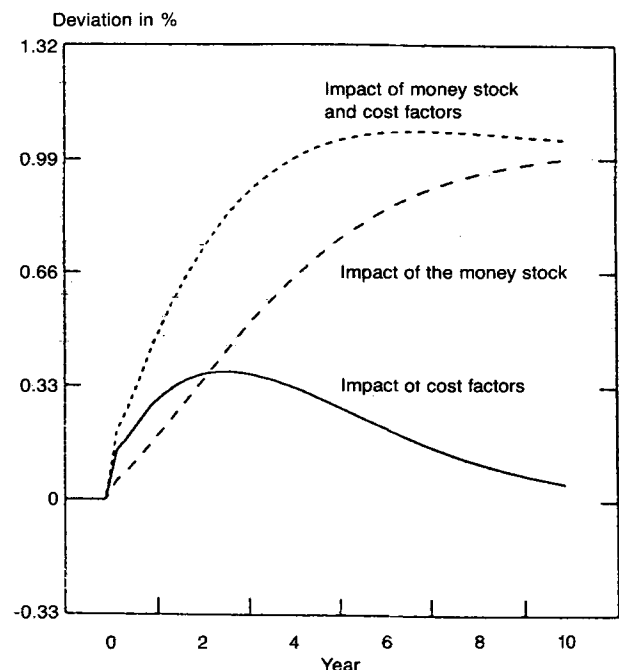
whereby V_0 is a constant term describing the level. The

Figure 5
Development of the Price Gap
and Domestic Prices¹



Relation of the long-term price level to actual price level in % (left scale) or change from previous year in % (right scale).

Figure 6
Reaction of Domestic Prices to a 1% rise in
the Money Stock and in Cost Factors



second "innovation" consists in taking into consideration cost influences (K). Put simply, the price adjustment equation reads as follows:

$$(6') \quad \Delta p = \lambda_1 \Delta p_{-1} + \lambda_2 \Delta p^* + \lambda_3 \Delta k + \alpha(p^*_{-1} - p_{-1}) + \varepsilon.$$

This equation links the long-term adjustment of the price level to the equilibrium level presented by P^* to the shorter-term influences resulting from cost development.³⁴ The equation thus forges a link between, on the one hand, the long-term link between the money stock and the level of prices (and by extension the responsibility of the Bundesbank for the goal of stability in the longer term) and, on the other, the responsibilities to be borne by industry and labour and the influence of other factors on achieving that stability goal from one period to the next. If exaggerated demands are made on the national product, be it by industry and labour, by corporations or by public budgets, the Bundesbank cannot offset the inflationary impulses that thus arise by means of discretionary measures of monetary policy. The information resources this would require and the edge with regard to information the Bundesbank would have to have would have to be far higher than could be realistically assumed in view of the complexities and time lags involved. Above all, however, the attempt to keep the level of prices stable in the shorter term given such circumstances fails owing to the high real macroeconomic costs entailed by such attempts.

Yet the Bundesbank can, by strictly upholding its medium-term production-potential-oriented concept of monetary targeting and by refusing to accommodate inflationary demands made on the national product, prevent the spread and the strengthening of inflationary processes in the longer run and thus ensure that economic developments remain fully on a stability course or, if necessary, return to such a path. The more credible the Bundesbank's anti-inflationary policy is in this sense, the more likely it is that exaggerated demands would be corrected, expectations adjusted accordingly and the less friction would be involved in the economic process. Even special influences or indeed an exceptional situation such as that posed by intra-German unification are no cause to abandon this concept even if only for a brief period of time. Administering an "inflation drug" would, at best, only have a short-term palliative effect, whereas the subsequent withdrawal symptoms would be painful and enduring.

Outlook

The concept of medium-term monetary targeting geared to potential output has a sound theoretical footing and has proved itself in practice as a monetary policy strategy with which to realise the Bundesbank's statutory

stability goal. Adoption of this strategy would not only suggest itself in the context of the European Monetary Union but a closer look would reveal that, to my mind, there is no other convincing alternative.

The current coordination mechanism with its asymmetric functional mode and the anchor role played by the D-Mark cannot be retained in a monetarily unified Europe. On the basis of the historical experiences made with the Bretton Woods system, flexible exchange rates vis-à-vis third countries are absolutely indispensable in order to shore up the foreign trade and payments side to a European stability goal. The concept of medium-term monetary targeting oriented toward potential output focuses on the long-term link between the money stock and the level of prices. It sets out a clear scope for action for a future European central bank that would enable the latter to pursue an anti-inflationary goal. Allocating that bank this role at the same time ensures that parties implicated in the distribution conflict, industry and labour as well as the public authorities, cannot feel themselves relieved of co-responsibility for macroeconomic developments. One can today only conjecture as to what the concrete results of monetary targeting by the European System of Central Banks would be. The strategy of a policy oriented toward the money stock appears at any rate to be the only alternative that promises to be successful on a wider pan-European level. It is robust, does not require an excessive amount of information or an information edge on the part of the central bank, is at the same time transparent and thus offers those involved in the economic process a reliable point of orientation.

75 years ago Schumpeter wrote at the end of a clearly critical analysis of the interconnections described by quantity theory: "... All the fundamental shortcomings of a doctrine of metal currencies and of quantity theory, which I, as the reader will have seen, have certainly not defended, do not alter the fact that the theories so often damned for belonging to one of those two camps contain many healthy insights and much practical wisdom, both of which are a more reliable guide than much of what contemporary writings contain. Above all they contain much seriousness and sincerity, both of which we urgently need today."³⁵ For all the undeniable progress that has been made in theoretical terms it appears to me appropriate to draw your attention to that enduring core of "practical wisdom".

³⁴ On the longer-term connection between the money stock and price trends, the development of the price gap and domestic prices, and the reaction of domestic prices to a rise in the money stock and in cost factors, compare Figures 4 to 6.

³⁵ J. A. Schumpeter: *Das Sozialprodukt und die Rechenpfennige*, Glossen und Beiträge zur Geldtheorie von heute, p. 116; reprinted in: J. A. Schumpeter: *Aufsätze zur ökonomischen Theorie*, Tübingen 1952 (our translation).