ECB OBSERVER

Analyses of the monetary policy of the European System of Central Banks

Challenges to ECB credibility

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CONTENT

SUMMARY

Part 1: Fundamentals of ECB credibility

Since its inception, the ECB's price stability promise has been credible from the point of view of financial markets. This achievement can be ascribed to a large extent to the institutional framework governing monetary policy in the euro area, that is, for instance, the independence of the ECB, its price stability mandate and the requirements of the European Stability and Growth Pact ("Pact"). Some of the pillars of ECB credibility seem to be increasingly challenged: the structural weaknesses in the euro area economies, resulting in low growth, high unemployment and unsound fiscal balances, run the risk of eroding the consensus for price stability oriented monetary policy. In particular, a continuation of the lack of persistent fiscal policy discipline is likely to pose a serious threat for a stable currency going forward. That said, it is of the utmost importance for governments to adhere to the Pact's requirements, e.g. achieve balanced budgets, and not only to continue but intensify reform efforts to improve economic growth perspectives.

Part 2: ECB strategy review – the problem of the "open flank"

An important outcome of the ECB's strategy review was the *de facto* downgrading of the role of money. In view of the fact that (i) the ECB's interest rate policy has been largely driven by actual rather than future inflation and (ii) inflation projections have been based on (real) economic rather than monetary developments, the rearrangement of the "two pillar strategy" appears to be a straightforward decision. However, it is certainly not supported by empirical evidence analysing the factors driving inflation in the euro area. Money – as measured through the "price gap" or "real money gap" – outperforms alternative measures, such as the "output gap". Thus, it would have seemed rational to strengthen – rather than weaken – monetary analysis in the ECB strategy concept. As long as money demand is stable and the M3 price gap is a valid indicator for future inflation, M3 should be used – together with other variables – to derive the ECB's inflation projections and play a greater role in the bank's interest rate setting. Moreover, the rearranged "new strategy" runs the risk of increasing the bank's open flank vis-à-vis political pressure, and provoking a more discretionary monetary policy, which could ultimately negatively affect the bank's credibility.

Part 3: Uncertainty – provoking pressure for easy monetary policy

In the current low growth environment, accompanied by a high degree of uncertainty, calls for an even easier ECB monetary policy have gained momentum. However, our model approach – which rests on the so-called theory of the "option value of waiting" – shows that the impact of monetary policy on growth and employment is strongly diminished in an environment of high (revenue) uncertainty. This finding is actually based on the existence of sunk investment, e.g. hiring, costs. Against the background of the currently prevailing uncertainty, our model provides at least three important implications for ECB monetary policy: (1) cutting interest rates is not effective as long as high uncertainty continues to prevail; (2) by cutting rates under high uncertainty, the ECB reduces the option value of waiting, thereby reducing its effectiveness in future periods; and (3) a hectic ECB monetary policy, that is frequent interest rate changes, induces additional uncertainty to the economy which is likely to aggravate the weakness of investment and consumer goods demand.

Part 4: ECB policy review and outlook

Since December 2002, the ECB's rate cuts appear to have been largely motivated by the decline in the HICP inflation and short-term business cycle considerations. The medium- to long-term inflation indicators, such as the "real money gap", did not play an important role in the bank's decisions. In the euro area, deflationary pressure is not discernible. Liquidity is very high with the "real money gap" having risen to more than 6%, representing a substantial inflation potential. Bank loan expansion, though having declined since 2000-Q3, does not suggest any supply side restrictions but seems to be in line with the cyclical position of the euro area. As things stand, the ECB is widely expected to lower rates further towards 1.5% until the end of this year. However, in view of the already very high money overhang and our inflation forecast of 1.8% for 2003 and 2.2% for 2004, such a policy might deteriorate the price stability outlook in the euro area. In the current economic environment, further monetary policy easing could run the risk of causing an "asset price inflation" and, in addition, reduce the economic incentives to bring about structural reforms in the euro area.

ZUSAMMENFASSUNG

Teil 1: Grundlagen der EZB-Glaubwürdigkeit

Das Preisstabilitätsversprechen der EZB wird seit ihrem Bestehen von den Marktakteuren als glaubwürdig angesehen. Dieser Erfolg kann zu einem wesentlichen Teil dem institutionellen Rahmen der europäischen Geldpolitik zugeschrieben werden. Hierzu zählen z. B. die Unabhängigkeit der EZB, die Vorgabe des Ziels Preisstabilität und die Vorgaben des Europäischen Stabilitäts- und Wachstumspaktes („Pakt"). Der Erhalt der Glaubwürdigkeit steht jedoch vor Herausforderungen: Die strukturelle Wachstumsschwäche, hohe Arbeitslosigkeit und unsolide Staatsfinanzen laufen Gefahr, den Konsens für eine preisstabilitätsorientierte Geldpolitik zu unterspülen. Insbesondere die wieder steigende Staatsverschuldung in einer Reihe von Ländern ist auf Dauer ein ernstes Bedrohungspotential für die Stabilität des Euro. Es ist daher von überaus großer Wichtigkeit, dass die Staaten am Pakt festhalten und ihre Anstrengungen zur Reform der Produkt- und Faktormärkte, die eine Verbesserung der Wachstumsaussichten versprechen, nicht nur beibehalten, sondern auch intensivieren.

Part 2: EZB-Strategierevision – das Problem der "offenen Flanke"

Ein wichtiges Ergebnis der Revision der EZB-Strategie war die de facto Abwertung der monetären Säule. Vor dem Hintergrund, dass (i) die EZB ohnehin ihre Zinspolitik primär an der laufenden Inflation und (ii) ihre Inflationsprojektionen auf Basis realwirtschaftlicher Variablen und nicht an monetären Größen erstellt, erscheint das Ergebnis der Strategierevision zunächst logisch. Aber die Ratio der Strategieneuordnung wird nicht durch die empirischen Befunde rationalisiert. Die Geldmenge M3 – gemessen anhand des „Price Gap" oder „Real Money Gap" – besitzt nach wie vor herausragende Qualitäten zur Prognose der Inflation im Euroraum. Sie „outperformed" z. B. das „Output-Gap". Es wäre daher rational gewesen, wenn die EZB die Rolle der Geldmenge gestärkt und nicht geschwächt hätte. Solange die Geldnachfrage stabil ist und sich das Price Gap als ein valider Inflationsindikator erweist, sollte die EZB diese Größe – zusammen mit anderen Variablen – zur Erstellung ihrer Inflationsprojektionen verwenden und auch ihre Zinspolitik verstärkt an der Veränderung des Price Gap ausrichten. Die neugeordnete Strategie könnte zum einen die „offene Flanke" der Bank gegenüber politischem Druck vergrößern und zum anderen einer verstärkt diskretionären Geldpolitik Vorschub zu leisten. Dies könnte letztlich der Glaubwürdigkeit der Bank abträglich sein.

Part 3: Unsicherheit – Druck für eine Politik des billigen Geldes

Im aktuellen Umfeld langsamen Wachstums, das von hoher Unsicherheit begleitet wird, gewinnen Forderungen nach einer noch lockereren Geldpolitik zunehmend an Eigendynamik. Dennoch zeigt unser Modell, das auf der so genannten Theorie des „Optionswerts des Wartens" beruht, dass der Einfluss der Geldpolitik auf Wachstum und Beschäftigung in einem Umfeld hoher (Ertrags-) Unsicherheit nur stark eingeschränkt zur Geltung kommt. Dieses Ergebnis basiert auf der Existenz von versunkenen Investitionskosten, wie zum Beispiel den Einstellungskosten. Vor dem Hintergrund der gegenwärtig nach wie vor herrschenden Unsicherheit lässt unser Modell mindestens drei Schlussfolgerungen für die Geldpolitik der EZB zu. (1) Zinssenkungen bleiben wirkungslos, solange hohe Unsicherheit fortdauert; (2) durch Zinssenkungen bei hoher Unsicherheit vermindert die EZB den Optionswert des Wartens, wodurch sie ihre Effektivität in zukünftigen Perioden verringert; und (3) eine hektische Geldpolitik der EZB, die sich durch häufige Zinsänderungen auszeichnet, ruft zusätzliche Unsicherheit in der Volkswirtschaft hervor, die mit hoher Wahrscheinlichkeit die Schwäche der Investitions- und der Konsumgüternachfrage noch verschärft.

Part 4: EZB-Geldpolitik- Rück- und Ausblick

Die Zinssenkungen der EZB seit Dezember 2002 scheinen vor allem durch die gesunkene Inflation sowie Sorgen über den Konjunkturverlauf im Euroraum motiviert gewesen zu sein. Mittel- bis langfristige Inflationsindikatoren wie z. B. die „reale Geldlücke" scheinen eine untergeordnete Rolle gespielt zu haben. – Im Euroraum ist ein Deflationsdruck nicht erkennbar. Die monetäre Ausstattung, gemessen anhand der realen Geldlücke, ist mit mehr als 6 % mittlerweile sogar sehr hoch und repräsentiert ein beträchtliches Inflationspotenzial. Auch die Bankkreditexpansion im Euroraum, die sich seit 2000-Q3 deutlich abgeschwächt hat, steht im Einklang mit der konjunkturellen Situation und lässt auf keine ungewöhnliche Kreditangebotsrestriktion schließen. – Es wird weithin erwartet, die EZB werde den Leitzins bis Endes des Jahres auf 1,5 % senken. Mit Blick auf die sehr hohe Liquiditätsausstattung und unsere Inflationsprognose von 1,8 % in 2003 und 2,2 % in 2004 sind jedoch keine weiteren Zinssenkungen zu empfehlen. – Im aktuellen Umfeld ist nicht auszuschließen, dass weitere Zinssenkungen nicht die Konjunktur beleben, sondern eine „Asset Price Inflation" auslösen und zudem auch Anreize für weitere Strukturreformen reduzieren könnten, die letztlich die Wachstumsaussichten im Euroraum schmälern würden.

Introduction

The accumulation of individual events such as the end of the "New Economy" boom, the stock market correction, the 11th September 2001 terrorist attacks in the US and the ensuing war against terrorism, numerous cases of corporate malfeasance and the de facto collapse of the geopolitical security architecture have drastically challenged market agents' confidence in a continuation of hitherto experienced income growth. Despite all these unfavourable developments, however, the global economy and, most importantly, the financial system, have shown enormous resilience. Global economic growth appears to have returned, and it seems that the United States once more is leading the way towards recovery.

It would be premature, however, to conclude that international economies are heading towards "business as usual". The consequences of some of the shocks mentioned above may yet be materializing. Some of the shocks may even prove to have longer-lasting ramifications than is currently thought. In particular, it appears that the deep erosion of the sense of trust, which is undoubtedly one of the most important ingredients of a well-functioning market economy, will take considerable time to be restored. Market agents' loss in confidence is being translated into a heightened degree of perceived uncertainty, resulting in higher risk premiums, exerting a dampening effect on capital spending and thus economic growth.

Such a fundamental change in market agents' expectation of future income and trust in the reliability of institutions that have hitherto contributed to a favourable economic well-being will most likely have consequences for how monetary policy should be conducted. With inflation having brought down to a level seen in the 1950s and 1960s for the last time, the relatively weak growth scenario has translated into deflationary concerns. Monetary policy in the US and the euro area has come under increasing pressure to pursue a rather short-term rather than medium-term oriented course. The claim that monetary policy should no longer be confined to pursuing price stability, at least not in exceptional times like these, is gaining prominence.

At things stand, monetary policy acts out of a position of strength, built up laboriously over past decades by bringing inflation to low and stable levels. In view of central banks' sound reputation capital, and the associated increased power, it is no surprise that the temptation has certainly increased to stretch monetary policy beyond its proven capability, which is keeping the economy's price level stable. Monetary policymakers have increasingly become willing to gear their actions towards short-term growth concerns rather than medium-term oriented inflation perspectives. However, one should not forget that monetary policies' reputation capital, that is its credibility, hinges on its ability deliver on its ultimate promise: keeping inflation in check.

Unlike other institutions, central banks' credibility has not been subject to particular scrutiny. This is all the more favourable as today's money system is based on a "paper money standard". Over time it became all too obvious that the effective functioning of such a system rests in particular on the adherence to and acceptance of certain institutional arrangements, such as the independence of the central bank and monetary policymakers' willingness and ability to keep inflation low. Periods in which hitherto reliable economic relations are increasingly called into question, such as the relationship between money, income and inflation, pose a serious challenge to price stability oriented monetary policy.

This report has been motivated by the challenges posed by the changes in market agents' income perspectives, the macroeconomic pressures to adjust to the new environment and the increasing calls for a growth rather than price stability oriented monetary policy. It attempts to analyse and highlight the determinants of and challenges to a successful monetary policy in the current economic and political environment.

Part 1: Fundamentals of ECB credibility

CONTENT: *1.1 Credibility – definition, determinants and measuring. – 1.2 ECB credibility and the risk of unsustainable public finances. – 1.3 Monetary policy credibility in a low growth environment. – 1.4. Digression: The EU constitution and ECB independence.*

SUMMARY: *Since its inception, the ECB's price stability promise has been credible from the point of view of financial markets. This achievement can be ascribed to a large extent to the institutional framework governing monetary policy in the euro area, that is, for instance, the independence of the ECB, its price stability mandate and the requirements of the European Stability and Growth Pact ("Pact"). Some of the pillars of ECB credibility are increasingly being challenged: the structural weaknesses in the euro area economies, resulting in low growth, high unemployment and unsound fiscal balances, run the risk of eroding the consensus for price stability oriented monetary policy. In particular, a continuation of the lack of fiscal policy discipline is likely to pose a serious threat for a stable currency going forward. It is therefore of the utmost importance for governments to adhere to the Pact's requirements, e.g. achieve balanced budgets, and continue or even intensify their reform efforts to improve economic growth perspectives.*

1.1 Credibility – definition, determinants and measuring

Monetary policy is credible if market agents believe in the central bank's price stability promise, that is if market agents base their economic dispositions on the central bank's inflation promise.[1] To make a central bank's price stability promise credible, however, a number of requirements have to be met. To start with, an unequivocal stability mandate of the central bank can be seen as a necessary condition ("*willingness* to bring about low and stable inflation"). It is determined by the central bank's (primary) objective(s) as set out, for instance, in the central bank's constitution. The sufficient condition for monetary policy credibility is the central bank's actual ability to deliver on its promise ("*ability* to bring about low and stable inflation"). The latter hinges to a large extent on institutional arrangements governing monetary policy. In the following, we take a brief look at (1) the European Central Bank's (ECB) primary objective, (2) the constitution governing the ECB, and (3) the "time inconsistency problem". Lastly, we make (4) an attempt to measure ECB's credibility.

Ad (1): Primary objective of the ECB. – Maintaining price stability is the ECB's primary objective as stated in the Maastricht Treaty ("Treaty"). The ECB Governing Council specified the Treaty's objective with keeping inflation in the form of an annual rise of the Harmonized Consumer Price Index (HICP) of close to 2%, coming from below, in the medium-term.[2] The cross-reference to keeping inflation to close to 2% in the medium term represents an "escape clause", making allowance for temporary fluctuations in the HICP due to cost push factors (such as oil price changes and changes in exchange rate driven import prices) for which monetary policy cannot be held responsible. The escape clause clears the ECB from target deviations that are beyond the responsibility of monetary policy and prevents the bank from en-

[1] In the following, we will draw heavily on ECB OBSERVER No 1, Inflationsperspektiven im Euroraum, 19 April 2001.

[2] "Price stability is defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%. Price stability is to be maintained over the medium term." This was the ECB's price stability definition since 13 October 1998, the day when the ECB announced its monetary policy strategy. On 8 May 2003, the ECB Governing Council confirmed this definition and announced it will aim to maintain inflation rates close to 2% over the medium term. See ECB Press Release, The ECB's monetary policy strategy, 8 May 2003, www.ecb.int.

gaging in an overly activist policy. With such an escape clause in place the ECB must make sure that the ensuing discretionary scope will not be misused by demands from politics and/or other pressure groups for a less price stability oriented policy. With the primary objective clearly understood and accepted by the general public, the ECB's additional objective – that is supporting the macroeconomic policy of the European Community as long as it does not entail endangering its primary objective – does not represent any source of danger for price stability. The fact that the ECB does not posses "goal independence"[3] is unlikely to compromise the ECB's independence. Quite the opposite is the case: as the bank's primary objective has been explicitly enshrined in the Treaty, potential pressure on the bank to alter its objective(s) frequently, which could ultimately undermine the bank's credibility, is in fact reduced.

Ad (2): Constitution governing the ECB. – In view of the institutional framework governing the ECB's monetary policy, namely the central bank constitution, two aspects deserve particular attention: (i) "political independence" and (ii) "economic independence".[4]

It is a generally acknowledged fact and an empirically supported hypothesis that a central bank's political independence is negatively correlated with inflation. In the pre-preparation of the European Economic and Monetary Union, the EU Commission pointed to the "Alesina formula", implying that "the higher the independence of the central bank is, the lower is inflation."[5] This is because a politically independent central bank reduces the risk that under the re-election restriction, monetary policy is being forced to seek a trade-off between short-term output gains and the long-term costs of inflation.

The Treaty grants political independence to the ECB. To start with, the ECB's objective of keeping price stability is predetermined (Article 105 paragraph 1 of the Treaty and Article 7 of the ESCB/ECB Statute), thereby reducing political pressure brought to bear on the bank to compromise output for price stability. Moreover, the ECB decision makers are independent from taking instructions (Article 107 of the Treaty and Article 7 of the ESCB/ECB Statute), a diversification of the nomination of ECB Governing Council members is guaranteed, the term of a national central bank governor is a minimum of five years, and a re-election of ECB Executive Board members is excluded (Article 112.2 of the Treaty and Article 11.2 and 50 of the Statute of the ESCB/ECB). As far as the consequences of the recent reform of the ECB Governing Council are concerned, see Box 1.1.

The economic independence of the ECB makes sure that the operational conduct of monetary policy – including, for instance, recruiting policies and making use of policy instruments – will not be influenced by any financial dependencies on day-to-day politics. Economic independence consists of three dimensions:

— *Financial independence*: Financial independence guarantees that the ECB has adequate access to fund its activities. The ECB can finance itself autonomously from its profits, i.e.

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3 See *Debelle* and *Fischer* distinguish between "goal independence" and "instrument independence". Goal independence can be described as the ability of a central bank to autonomously choose its policy objectives, whereas instrumental independence refers to the ability to use monetary policy instruments to pursue monetary policy goals without any restrictions. See *Debelle, G., Fischer, S.* (1995), How Independent Should a Central Bank Be?, in: *Fuhrer, J. C.* (Edit.), Goals, Guidelines and Constraints Facing Monetary Policymakers, Federal Reserve Bank of Boston Conference Volume, pp. 195 – 221. Also Deutsche Bundesbank (1998), Informationsbrief zur Europäischen Wirtschafts- und Währungsunion, Nr. 10, Anforderungen an die rechtliche Konvergenz, http://www.bundesbank.de.

4 See *Grilli, V., Masciandaro, D., Tabellini, G.* (1991), Political and Monetary Institutions and Public Financial Policies in Industrial Countries, in: Economic Policy, Vol. 13, October, pp. 341 – 392.

5 See Kommission der Euroopäischen Gemeinschaften (1990), Ein Markt, eine Währung, Brüssel. See also *Alesina, A., Summers, L. H.* (1993), Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence, in: Journal of Money, Credit and Banking, Vol. 25, pp. 151 – 162.

its equity capital. It is important to note that the ECB's initial capital is in the hands of the national central banks.

— *Instrumental independence*: The instrumental independence allows the bank to make use of all (traditional) monetary policy instruments necessary to achieve its policy goals. For instance, the ECB can base its open market operations on debt instruments issued by public sectors and/or private agents and require banks to hold minimum reserves.

— *Functional independence*: Under the functional independence, the Governing Council has the autonomy to define its monetary policy strategy aimed at achieving its objective(s). Moreover, it allows the ECB to define price stability. What remains, however, is a "potentially open flank": the choice of the exchange rate regime is made by the EU Council of Finance Ministers, which has to take into account that such a regime has to be compatible with price stability. This arrangement might cause conflicts with the bank's price stability objective if ideas gain ground for preferring exchange rate policy over price stability.

Box 1.1. – ECB Governing Council reform – overview and potential consequences

In order to ensure that the ECB Governing Council will be able to take decisions in a timely and efficient manner after allowing a large-scale enlargement of the euro area, the EU Council in the composition of Heads of State or Governments recently adopted a decision on the adjustment of voting modalities in the Governing Council on the basis of a recommendation from the ECB.[1]

When designing a suitable new voting system, the ECB Governing Council was bound by the limits imposed by the "enabling clause". These restrict the reform to a change of the voting modalities as laid down in Article 10.2 of the Statute. As a result, any adjustment of the voting modalities had to be without prejudice to the right of all members of the Governing Council to be present during the Governing Council meetings (Article 10.1 of the Statute), and to participate in the discussions. Moreover, any adjustment of the voting modalities was not to have any implications for voting on decisions taken under Articles 28, 29, 30, 32, 33 and 51 of the Statute (Article 10.3 of the Statute). More fundamental reform options, such as changes to the composition of the Governing Council or a different distribution of tasks between the Executive Board and the Governing Council – as mentioned, inter alia, by the European Parliament and the European Commission in their official Opinions – were, therefore, considered to be outside the scope of the enabling clause as contained in the Treaty of Nice.

In designing the precise features of the rotation system of voting rights, the Governing Council was guided by the following guiding principles: (i) "one member, one vote", (ii) "ad personam participation", (iii) "representativeness", (iv) "automaticity", and (v) "transparency".

In an attempt to simultaneously fulfil these five principles and respecting the limits imposed by the enabling clause, the Governing Council reached a unanimous agreement on the new voting system. However, a closer look reveals that the new voting system does not comply with a number of guiding principles.[2] To start with, with a maximum of 15 national central bank governors plus 6 Executive Board members (the latter enjoying permanent voting rights), the number of voting members in the Governing Council will remain relatively large, suggesting little efficiency gains when compared to the status quo of decision making. Second, large and small countries will be treated differently, that is the former will enjoy the exercise of voting rights more often than the latter. Third, and most importantly, the principle "one member, one vote" will be violated. This, in turn, might provide incentives which may lead to a substitution of a euro wide oriented monetary policy for a more national oriented monetary policy voting. Fourth, the new voting modalities appear to be rather complex and of relatively little transparency, running the risk of causing a lack of acceptance in the public at large. And fifth, the voting modalities raise the question about accountability of Governing Council members: according to the ECB's model, the responsibility of interest rate decisions will be with 15 out of 27 national central bank governors, with 12 members holding no voting right and thus responsibility for the decision made.

The decision making process within the Governing Council ranks among the crucial institutional arrangements determining ECB monetary policy credibility from the point of view of market agents. At this juncture it is hard to say how the envisaged reform of the voting modalities will actually play out. However, it seems fair to say that much depends on the actual "handling" of the new arrangement through the Governing Council, that is by making the voting scheme transparent and avoiding any misunderstandings about the actual responsibility for decision making.

[1] See ECB, The adjustment of voting modalities in the Governing Council, in: Monthly Bulletin, May 2003, pp. 73 – 83. [2] For a more detailed analysis see Belke, A., Polleit, T., Die Reform des europäischen Zentralbankrates – Gegen den EZB-Ratsvorschlag, für eine Delegationslösung, *forthcoming*.

Ad (3): Preventing the "time inconsistency" problem. – In addition to the ECB's willingness and ability to bring about low and stable inflation, the solution of the well-known "time inconsistency" problem of monetary policy plays a crucial role for the credibility of the ECB's stability mandate.[6] The time inconsistency problem can be explained as follows. Let us assume the central bank announces an inflation target, which, in turn, is believed in by market agents so that they base their economic dispositions on it (such as settling wage and debt contracts). After market agents have made their decisions, the central bank might have an incentive to allow for a higher inflation than originally promised ("surprise inflation") to stimulate output and employment. If, however, market agents have reason to expect the central bank might opt for surprise inflation, they are unlikely to put any trust in the bank's inflation promise right from the start: they will expect an inflation level exceeding that promised by the central bank. The result would be an inflation level that would be higher than the rate originally promised by the central bank with output and employment unchanged. As inflation is associated with (considerable) costs, the result would be sub-optimal in terms of welfare. So it is rationale from the point of view of monetary policy to take measures preventing the time inconsistency problem.

In designing the European monetary policy, the time inconsistency problem was certainly taken into account. The policy objective(s) and the institutional framework of the ECB are geared towards evading incentives to trade off the output target against the inflation target. The ECB's primary objective, that is maintaining price stability, ranks higher than any output and employment target. The bank's independence status – both in political and economic terms – also prevents monetary policy decisions being governed by short-term considerations, which would be detrimental to price stability in the medium to long term.

It should be stressed that the institutional set-up of the ECB will prove to be much more important for securing the bank's credibility than the individual personalities serving in the ECB Governing Council. Even though some members of the Council might serve as "opinion leaders" and/or "anchor men" in public, it can be assumed that the central bank constitution, objective and strategy translate into a kind of "de-personalisation" of the ECB: as monetary policy preferences of individual Council members are presumably relatively little known in public, it is fair to assume that market agents form their inflation expectations with a view on the institutional policy framework rather than on the policy merits of the individual Governing Council members as long as minutes are not published. That said, market agents can be expected to base their confidence in price stability to a large extent on the ECB's institutional framework.

Ad (4): Measuring credibility. – For measuring monetary policy credibility, a number of ad-hoc approaches might be chosen:

[6] The time inconsistency problem in monetary policy theory has been brought forward especially through the work of *Barro, R. J., Gordon, D. B.* (1983), A Positive Theory of Monetary Policy in a Natural Rate Model, in: Journal of Political Economy, Vol. 91, No. 4, pp. 589 – 610. Also *Kydland, F. E., Prescott, E. C.* (1977), Rules rather Discretion: The Inconsistency of Optimal Plans, in: Journal of Political Economy, Vol. 85, No. 3, pp. 473 – 491.

(1) A comparison between consumer and producer surveys about expected future inflation and the inflation promised by the central bank might be seen as a check on whether market agents believe in the central bank's stability promise. However, using surveys could have some drawbacks. For instance, they might not necessarily reflect "true inflation expectations". This is simply because there might be a difference between voiced and truly held inflation expectations.

(2) Wage settlements might also provide useful information about market agents' inflation expectations. However, nominal wages consist of expected productivity gains and expected inflation and it could be difficult to separate a nominal wage increase into these two components.

(3) Do expert inflation forecasts reflect market agents' inflation expectations? Not necessarily. First, forecasters' forecasts are not necessarily shared by the general public. Second, market agents usually produce inflation forecasts for the coming one or two years, which might too short a forecasting period for monetary policy to draw conclusions about market agents' confidence in the central bank's stability promise.

(4) Another approach to measuring credibility is an observation of the so-called "break-even" inflation (BEI) derived from inflation-indexed bonds. In what follows, we take a closer look at this approach.

The BEI can be calculated by comparing the yield of a nominal coupon bearing bond with that of an inflation-indexed bond. The yield of a nominal coupon bearing bond, i_{nom}, can be written as follows:[7]

$$(1) \qquad i_{nom} = (1 + i_{real}) \cdot (1 + \pi^e) \cdot (1 + \phi) - 1,$$

where i_{real} = real interest rate, π^e = inflation expectation and ϕ = risk premium. Solving equation (1) for the inflation expectation simply yields:

[7] The expected returns on nominal coupon bearing and inflation-indexed bonds are likely to differ for four reasons: (1) The most obvious reason for the expected returns to differ is that an indexed security offers the investor protection against unanticipated changes in inflation, while a nominal security does not. Because investors might be compensated for bearing inflation risk, the yield on the nominal security may include an inflation risk premium. If this risk premium is positive, as is often assumed, inflation compensation will exceed the expected rate of inflation. (2) The expected returns on the securities may also differ because of differences in the patterns of their payments (and hence in their durations). Expressed in real terms, the payments on the indexed security are fixed, while those of the nominal security decline over its maturity as inflation erodes the value of its nominal payments. The nominal security therefore has a shorter duration with respect to real interest rate changes than the indexed security. (3) The difference in the duration of the securities affects their expected returns in two ways. First, the difference in the durations implies that expected future real interest rates at various horizons are weighted differently in determining the yields on the two securities. Hence, if the real interest rate were expected to vary over the maturity of the securities, investors would not demand the same return on the nominal and indexed securities (as long as expected inflation does not equal zero). Second, the nominal and indexed securities would have different amounts of real interest rate risk, also causing their expected returns to differ. The final reason that the expected returns may not be equal is that the liquidity of the nominal and indexed securities may differ. This consideration is particularly important in the case of the on-the-run nominal securities, whose liquidity is typically much greater than that of off-the-run securities, owing to the extensive use of on-the-run securities in hedging and other trading intensive investment activities. (4) Because some investors value this greater liquidity, yields on on-the-run Treasury securities are often lower than yields on off-the-run Treasury securities with similar maturities. Inflation-indexed securities have liquidity levels that are closer to off-the-run nominal securities. As a result, yield spreads relative to the on-the-run issues typically understate inflation expectations. See *Sack, B.*, Deriving inflation expectations from nominal and inflation-indexed Treasury yields, Board of Governors of the Federal Reserve System, 16 May 2000.

$$(2) \qquad \pi^e = \frac{1+i_{nom}}{(1+i_{real})\cdot(1+\phi)} - 1.$$

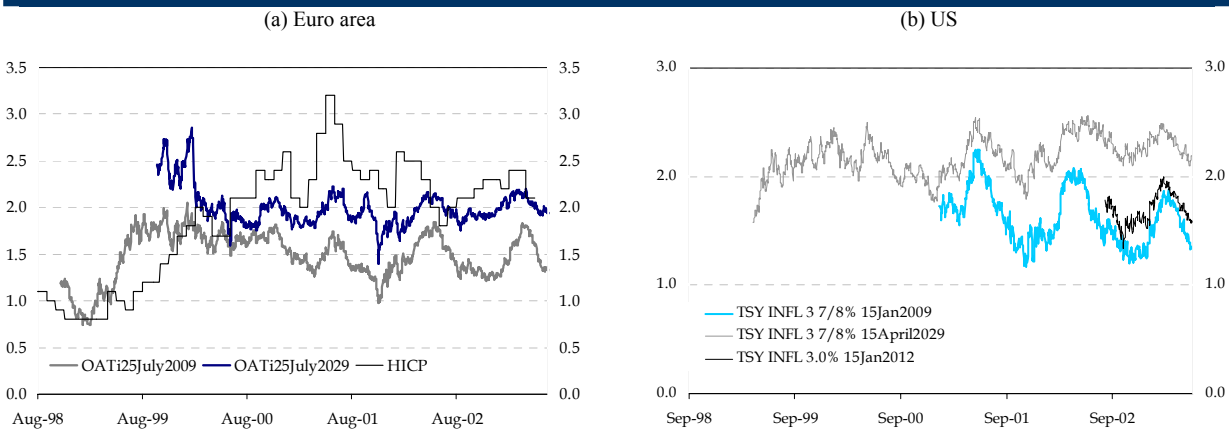
In contrast to the nominal and real interest rate, the risk premium is not directly observable. As a result, the market's inflation expectation is usually calculated as follows:

$$(3) \qquad \frac{1+i_{nom}}{1+i_{real}} - 1 = \underbrace{\phi + \pi^e + \pi^e\phi}_{\text{"Break-Even"-Inflation}} .$$

Equation (3) represents the so-called the "Break-Even" inflation (BEI). It includes, by definition, market agents' inflation expectations plus a risk premium. If, however, the latter is not too high relative to the total yield and, in addition, does not vary too much over time, the BEI might be used as a relatively good proxy for market agents' inflation expectation.

Fig. 1.1 (a) shows the BEI for euro area bonds maturing in 2009 and 2029 from September 1998 until the beginning of July 2003. In addition, the graph shows the average monthly increase in the HICP. Two findings stand out. First, the BEI for all maturities seems to have been relatively closely linked to the ECB's promise of keeping inflation below 2% since the beginning of the single currency area. Second, the BEI bears relatively little resemblance to actual inflation, which can be taken as evidence that market agents' inflation expectation does not necessarily equal actual inflation but is driven by the confidence in the central bank delivering its promise. On the basis of the development of BEI over time, the ECB's price stability promise appears to have been considered credible from the point of view of market agents. Fig. 1.1 (b) shows the BEI for the US. Whereas the US Federal Reserve does not have an officially specified definition of price stability, the BEI suggests that inflation expectations in the US are around 2 percent, a norm that is generally regarded as being in line with price stability.

Fig. 1.1. – „Break-Even"-inflation in percent, September 1998 to July 2003



Data source: Bloomberg; own calculations. – Fig. 1.1 (a) shows the annual change in the HICP on a monthly basis.

1.2 ECB credibility and the risk of unsustainable public finances

To make the ECB's price stability oriented monetary policy successful, it must be accompanied by sound fiscal policy.[8] In fact, unsustainable government debt levels pose a serious threat to the bank's mandate of keeping inflation (expectations) at a low and stable level. This conclusion can be explained by at least four, albeit interrelated, political-economic considerations:

(i) In the euro area, the bulk of government debt outstanding is fixed in nominal terms. That said, an actual inflation, which exceeds inflation prevailing at the point of time of issuing, reduces the real government debt burden ("inflation tax"). As the government debt burden rises, the economic incentive for politicians, which are subject to the short-term re-election restriction, to demand an inflationary monetary policy rather than seeking politically painful spending cuts and/or tax increases can be expected to rise.

(ii) As interest rate costs to be paid on government debt become an ever larger share of governments' total expenditure, the political pressure on the central bank is likely to rise to pursue a policy of keeping interest rates at low levels in order to provide for cheap funding costs. Such a scenario is even more likely in an environment where the average maturity of government debt outstanding is relatively low so that central bank rates have a relatively strong impact on the market's short-term yield levels compared to a situation where most of the debt has a long-term maturity.

(iii) A relatively high level of government debt is usually accompanied with a strong degree of government intervention in the markets. If such a policy results in output and employment losses, governments – and the public at large – are most likely to increasingly demand an output rather than price stability oriented monetary policy, trying to trade off short-term output gains against medium- to long-term inflation costs.

(iv) A central bank's profit, in addition to incomes generated from managing foreign reserves, from the so-called "seigniorage", is usually transferred to governments' coffers. That said, highly indebted governments would most likely develop a strong interest in an expansionary monetary policy as this would translate into higher central bank profits.

A growing government debt burden can be expected to exert pressure on the central bank to pursue an easy monetary policy. As history has shown, even an independent central bank is most likely to fall victim to political calls for an inflationary policy. In view of the considerations above, it is rationale to provide for an institutional arrangement preventing a situation in which government debt burdens continue to rise, e.g. becomes unsustainable. The Maastricht Treaty ("Treaty") has given substantial incentives to improve the fiscal positions in the countries participating in Stage Three of EMU. From 1995 to 2000, the deficit-to-GDP-ratio for the euro area as a whole declined from 5.1 % to 1.0 %. In the same period, the government debt-to-GDP ratio fell from 74.2% to 69.6% (see Fig. 1.2). In view of the objective of improving fiscal balances in the euro area further, the implementation of the European Stability and Growth Pact ("Pact") in 1999 has been an economically efficient decision.

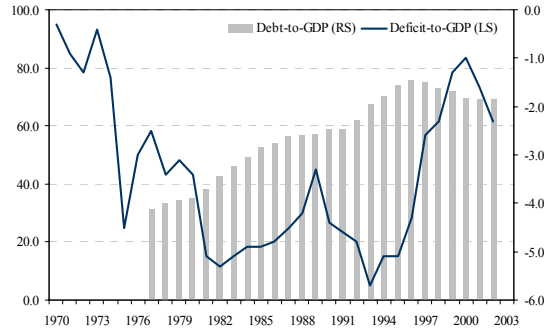
Whereas government debt-to-GDP ratios have only slightly declined from 69.2% in 2001 to 69.1% in 2002, the Pact has not prevented government deficit-to-GDP ratios from rising to 1.6% in 2001 and 2.3% in 2002. Unfortunately, debt ratios in some large countries such as Germany and France have increased by quite a margin. Given the politically painful process of bringing about fiscal consolidation, a debate has emerged discussing ways to relax the deficit-to-GDP target ratios as outlined in the national stability and convergence plans, or

[8] In this context see, for instance, *Bolt, W.* (1999), Fiscal restraints, ECB credibility and the Stability Pact: a game theoretic perspective, in: De Nederlandsche Bank, DNB Staff Report, No. 38.

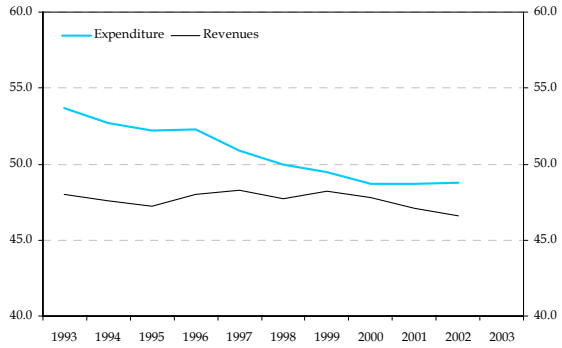
even to abolish the Pact altogether. Not only would any relaxation bode badly for the continuation of the fiscal consolidation process, but such discussion also raises questions about the governments' determination to stick to their growth strategy declared by the European heads of state and governments in Lisbon in March 2000 (see Box 1.2).[9]

Fig. 1.2. – Euro area government debt- and deficit-to-GDP ratios in percent

(a) Debt and deficit



(b) Expenditure and revenues



Data source: EU Commission, Autumn 2002; ECB Monthly Bulletin. – Deficit-to-GDP ratios include proceeds from the sale of UMTS licences.

There should be no doubt about the fact that in a number of euro area countries further progress is required – especially in view of forthcoming demographics – to secure the stability of public finances going forward. A number of countries would have to start paying down debt in order to prevent debt levels per capita from rising as demographic trends unfold. In order to prevent the tax burden from rising further, governments will have to reduce expenditures drastically, i.e. at a much quicker rate than is currently the case. It should explicitly be noted that for improving the growth momentum in the euro area it is important that governments do not increase the tax burden to compensate for the reduction in debt funding.

Box 1.2. – What the Maastricht Treaty envisages

The general guidelines and rules provide that Member States shall conduct their economic policies with a view to contributing to the achievement of the objectives of the Community. According to Article 2 of the Maastricht Treaty, these objectives are: "to promote throughout the Community a harmonious and balanced development of economic activities, sustainable and non-inflationary growth respecting the environment, a high degree of convergence of economic performance, a high level of employment and of social protection, the raising of the standard of living and quality of life, and economic and social cohesion and solidarity among Member States".

The budgetary rules of the Stability and Growth Pact

The European Council decided to provide clarification of the Treaty's budgetary rules in 1997 by implementing the Stability and Growth Pact which lays down the rules for economic policy co-ordination and defines the conditions under which to apply the excessive deficit procedure in Stage Three of EMU. In tune with the Maastricht Treaty the Pact mainly aims at (a) ensuring lasting compliance of fiscal policies with the requirement of budgetary prudence, and (b) monitoring fiscal developments with a view to releasing early warnings in the event of budgetary slippage. In this context, the European Council underlines the importance of safeguarding sound government finances as a means of strengthening the conditions for price stability and strong sustainable growth conducive to employment creation.

As the main provision to ensure sound budgetary policies on a permanent basis, the Resolution of the European

[9] In this context see ECB Observer No 3, Can the ECB do more for growth?

Council on the Stability and Growth Pact incorporates the Member States' commitment to respect the medium-term budgetary objective of positions close to balance or in surplus. This objective will allow all Member States to deal with normal cyclical fluctuations, while keeping the government deficit at or below the reference value of 3.0% of GDP. Deficits of above 3.0% of GDP will be regarded as excessive, unless they are expected to be temporary and have occurred under exceptional circumstances.

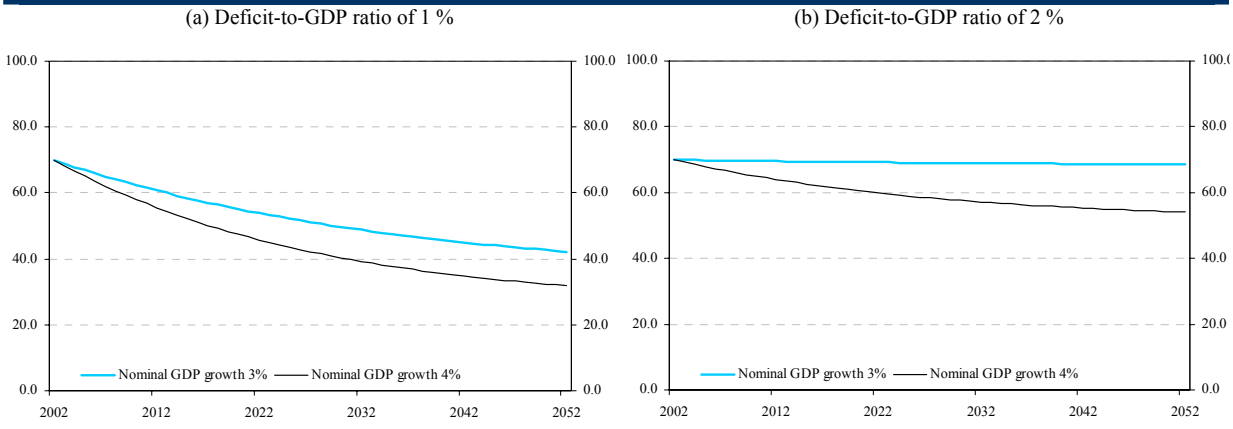
Circumstances are qualified as temporary and exceptional if the deficit overshoot is driven either by an unusual event beyond the control of the Member State or by a severe recession. An excess over the reference value resulting from a severe economic downturn will, as a rule, only be considered to be exceptional by the European Commission if there is an annual fall in real GDP of at least 2%. A smaller decline in real GDP can only be considered as exceptional by the ECOFIN Council, on the initiative of the Member State concerned, when this is suggested by supporting evidence, related in particular to the abruptness of the downturn or the accumulated loss of output relative to past trends. In evaluating whether or not an economic downturn is severe, as a rule Member States will take as a reference point an annual fall in real GDP of at least 0.75%.

The implementation of the Stability and Growth Pact

The procedure for the implementation of the Stability and Growth Pact starts with the presentation of the stability and convergence programmes by Member States. After that, the European Commission has to adopt a recommendation on each programme. This recommendation will constitute the basis on which the ECOFIN Council will elaborate an opinion, after consulting with the Economic and Financial Committee, within two months of submission. The ECB participates in the Economic and Financial Committee, where its members have the opportunity to discuss in depth the programmes presented by Member States. If the ECOFIN Council considers that the objectives announced in the programme should be strengthened, it invites the Member State concerned to do so. In the event of significant divergence from the objectives set in previous programmes being detected, the ECOFIN Council has the prerogative to issue a recommendation urging the Member State concerned to adopt offsetting measures. Annual updates of the programmes shall provide a detailed account of plans to offset deficit overruns in the short term. This latter requirement is aimed at preventing the medium-term objective of a budget in balance or in surplus from being deferred indefinitely.

Source: ECB.

Fig. 1.2. – The development of debt-to-GDP ratios under alternative scenarios



Legend: The graphs show the development of the government debt-to-GDP ratio under alternative deficit-to-GDP ratios and nominal GDP growth rates; own calculations.

A simple sensitivity analysis reveals that for reducing government debt-to-GDP ratios in the euro area it is of the highest importance to stick strictly to the requirements of the Pact. If, for instance, the annual inflation rate in the euro area does not increase by more than 1.5% on average, and the annual real GDP growth does not exceed 1.5%, a deficit-to-GDP ratio of 2.0% will result in hardly any reduction in the government debt level going forward (see Fig. 1.2 (a)). If the average budget deficit remains at 2% and nominal GDP growth is 4%, the debt-to-GDP ratio would decline from currently around 70% to 54% in 2052. Thus, in order to

bring down a government debt-to GDP ratio, a balanced budget should be the "minimum" aim of fiscal policy.

Even though being heavily criticized, the Pact represents a productive rule. From a political-economic point of view, there are strong arguments that the Pact is actually conducive to bringing about fiscal consolidation in the euro area which, in turn, can be expected to exert a positive impact on future growth. The Pact exerts a disciplinary impact, avoiding "negative externatilities" and "moral hazard". Most importantly in this context, the Pact helps render the ECB's stability promise credible. Against the background of forthcoming demographic trends in the euro area and the level of government debt outstanding, it is indeed hard to justify any deviation from the consolidation course, let alone the scrapping of the Pact altogether. It is fair to say that efforts to bring down government deficits or, even more preferable, start paying down government debt must become a top priority of fiscal policy in a number of euro area countries.

1.3 Monetary policy credibility in a low growth environment

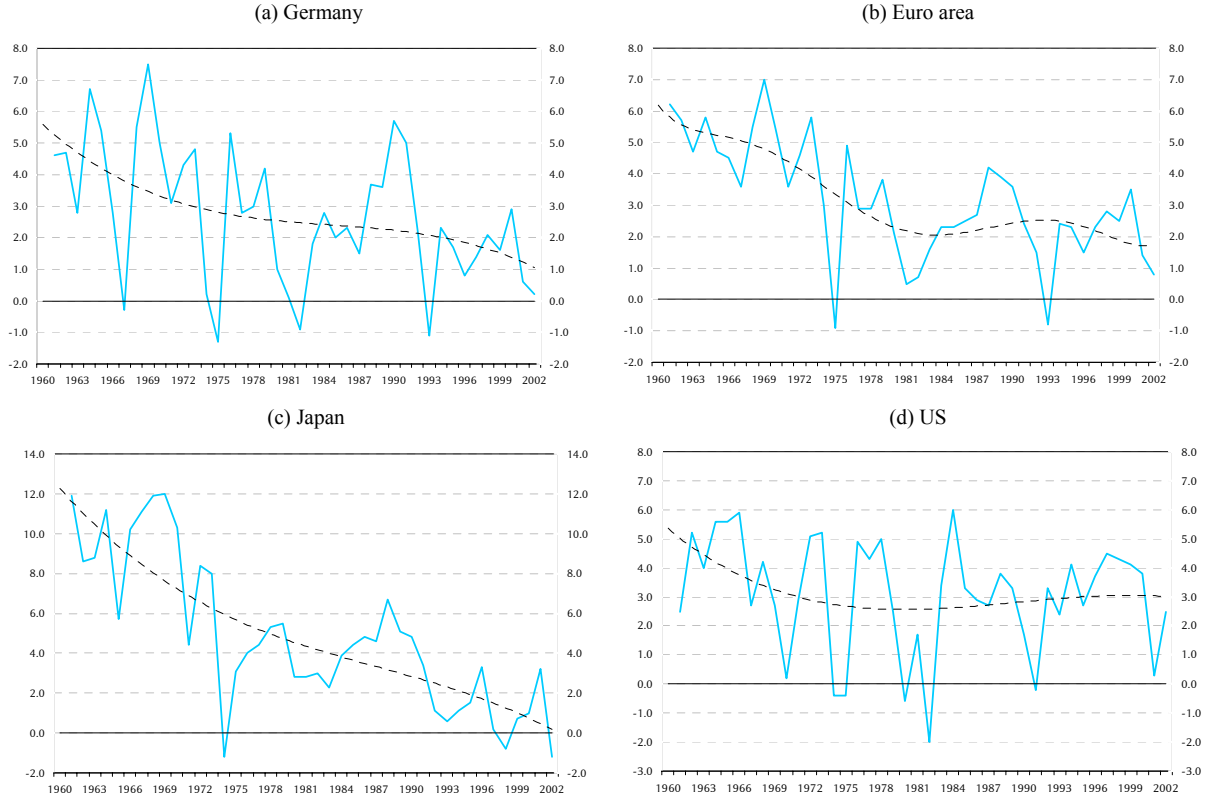
Low economic growth, accompanied by high unemployment and increasing public sector deficits, will sooner or later pose a challenge for a price stability oriented monetary policy. In an attempt to relief, or even circumvent, economically and politically painful adjustments of relative prices, calls for an easier monetary policy are most likely to result. Such a scenario is all the more plausible if current inflation is widely considered to be "under control", thereby allegedly providing leeway for monetary policy to assign a greater role to the objective of stimulating economic growth. There is certainly reason for the suggestion that structural deficiencies can be held responsible to a large degree for the decline of economic growth paths in a number of euro area countries (for an overview on the growth paths of selected countries see Fig. 1.3 (a) to (d)). In view of potentially increasing calls for a more growth oriented monetary policy, it is worth taking a brief look at what impact monetary policy might have on economic growth.

The relationship between monetary policy and real output growth is traditionally discussed in some type of "Phillips-curve" (*A. W. Phillips* (1958)). In its original form, the Phillips curve describes the relationship between unemployment and nominal wages. The modified Phillips-curve, derived by *P. A. Samuelson* and *R. M. Solow* in 1960, analyses the relationship between inflation and unemployment: under the assumption of exogenously determined, static expectations, an expansion of money growth will foster output and reduce unemployment. However, the emergence of the monetarist (*M. Friedman*) and the neo-classical (*R. E. Lucas*) school of thought challenged the classical argument: assuming adaptive or even rational expectations, the trade-off between inflation and employment will disappear at least in the medium and longer run. Even under the assumption of transaction costs, which may explain the existence of medium-term contracts, an inflationary policy will be effective only for a relatively short period of time. Thus, even in a neo-Keynesian world the traditional Phillips-curve does not hold over an extended period and cannot be permanently exploited by monetary policy.

In standard macroeconomic theory, the medium-term Phillips-curve is closely linked to the so-called "NAIRU" (non-accelerating inflation rate of unemployment) concept. The NAIRU corresponds with the natural growth path of the economy, which cannot be altered by monetary policy. In this context, a more microeconomic-oriented argument for a long-run trade-off and thus for admitting higher inflation comes in: the so-called "grease-effect". According to this concept, inflation promotes wage flexibility because it helps to overcome

"downward nominal wage rigidity". *Groshen* and *Schweitzer* characterise this effect. Consider the position of a manager who must allocate a firm's fixed salary budget between two kinds of employees: highly skilled and low skilled. In a non-inflationary environment, the manager wishing to keep the wage of the highly skilled in line with the prevailing market wage may be forced to lay off low-skilled workers because wage rigidity rules out a reduction in money wages. In periods of inflation, however, there is no need to take recourse to layoffs or money salary cuts. Here, the manager can leave the nominal wage of the second group unchanged or raise it by an amount less than the change in the cost of living.

Fig. 1.3. – Annual real GDP and trend growth in percent, 1961 to 2002



Data source: EU Commission. – The trend lines (polynomials) were chosen arbitrarily, choosing a trend figure revealing a relatively good "fit".

In such a world, inflation would, on balance, allow the firms' management to respond more flexibly to changes in (labour) market conditions. The "acceptable" inflation rate is said to be within the range of 2.5% to 5.0%, depending on the range of the nominal wage rigidity. Nobel laureates *J. Tobin* and *G. A. Akerlof* are presumably the most prominent supporters of this line of argument. There is a traditionally shaped Phillips-curve, starting at zero inflation and ending at the optimal inflation rate which, in turn, determines NAIRU. From this point of view, monetary policy should realize the optimal inflation rate by shifting the demand curve to the right until the optimal demand and inflation is reached. Under this concept, inflation is actually assumed to exert a positive effect on the economy. Downward nominal wage rigidities can be overcome both at the micro level (adjustment of relative wages) and macro level (Phillips curve effect, which is, however, only short-lived). However, the grease effect systematically ignores the benefits of a strictly stability oriented monetary policy. In today's world, however, an increasing number of economists are well aware of the costs of inflation,

e.g. disturbances of relative prices and wages ("sand effect" of inflation). In fact, it is an empirical question whether inflation supports or harms growth and employment.

The traditional theories may establish a positive short-term and a long-term neutral relation between monetary policy and growth. In all these models, the monetary policy leverage is increasing inflation. Empirical analyses, however, support the notion that an inflationary environment with rates over 5% to 10% is negative for economic welfare. It harms growth. Thus, a monetary policy trying to influence output and employment via changing inflation does not recommend itself for improving growth – even the exact rate cannot be controlled exactly. The channel through which monetary policy enhances growth is by providing a credible promise of maintaining price stability and stabilising inflation expectations. However, a lack of structural reform effort, which will ultimately spill over into calls for an easier monetary policy is most likely to pose a serious challenge to a central bank's credibility. That said, for the success of the ECB in delivering its prise stability promise it is essential for EU governments to continue and even intensify reforms, thereby improving the overall growth perspectives.

1.4 *Digression*: EU Constitution and ECB independence

On 13 June 2003, the Convention on the Future of Europe adopted the first draft constitution for an enlarged European Union (EU) by consensus.[10] Key reforms include the appointment of a president of the European Council, an EU foreign minister and a slimmed-down executive European Commission of 15 full members. The draft constitution formed the basis for the European convention in Tessaloniki on 20 June 2003. In transferring the provisions on the ECB and the ESCB from the existing Treaty to the Constitutional Treaty, the ECB demanded that no changes in substance should occur. After assessing an amended draft text issued by the Praesidium, the ECB Governing Council suggested the following changes:

— including a reference to price stability in Article I-3 on the objectives of the Union;
— bringing the wording of Article I-29 more closely in line with the present Treaty provisions;
— aligning the procedures for the involvement of the European Parliament irrespective of whether legislation is initiated by the Commission or the ECB in Article III-76;
— preserving the ECB's prerogatives in its fields of competence in the external representation of the euro area in Article III-81;
— adjusting the provisions on the convergence criteria in Article III-87.

Most of the ECB's suggestions have been taken into account, such as stipulating the ECB's role as a component of the European System of Central Banks and stating that the ECB's decision making bodies govern the European System of Central Banks (Article I-29 paragraph 1). Also, the draft constitution explicitly states that the ECB shall be independent in the exercise of its power and finances (Article I-3, paragraph 3). However, the convention did not follow the ECB Governing Council's request to reflect in Article I-3, which should set out the Community's objective of maintaining price stability. "Omitting such a crucial objective from those listed in Article I-3 could possibly create uncertainties regarding the nature of balanced economic growth in the Union."[11] In view of the importance of price stability for economic well-being, it would have certainly been desirable to assign this policy objective a

[10] For part 1 and 2 of the draft constitution see http://european-convention.eu.int/docs/Treaty/cv00797-re01.en03.pdf.

[11] ECB Governing Council press statement, Annex, p. 3 (http://www.ecb.int/pub/pdf/ecblettervge-annex_en.pdf).

highly prominent role in the EU's overall objectives. Given the explicit and unequivocal statement of the ECB's primary objective of maintaining price stability in Article I-29 paragraph 2 of the draft constitution, however, the omission should not necessarily have a negative implication for the price stability mandate of the ECB.

As far as part III of the draft convention is concerned, it is expected to be finalised at end of June. Article III-87 paragraph 1 (c), which refers to the exchange rate criteria for accession countries, might be of particular interest for ECB monetary policy. The Governing Council has suggested that there should be a participation in the exchange rate mechanism ERM II for at least two years, without severe tensions, and without devaluing against the euro. In this context, the Governing Council no longer mentions the +/- 15 % fluctuation band of the original ERM. This seems to be because fluctuation margins are expected to be much smaller than provided for by the original band width with tensions potentially arising even within a +/- 15% band.

The exchange rate criterion certainly plays an important part for a member state with a derogation in fulfilling the obligation regarding the achievement of the European Economic and monetary union (EMU). From the point of view of monetary policy, the compliance with the exchange rate criterion might be seen as being conducive to bringing about a close cooperation between central banks of accession countries and the ECB in the preparation of joining EMU. Of course, the importance of the exchange rate criterion has to be seen in the context of the other "Maastricht convergence criteria", that is the achievement of a high degree of price stability, the sustainability of the government financial positions, and the durability of convergence achieved by a country being reflected in the long-term interest rate levels. These requirements have been outlined in Article III-87 of the draft constitution, providing a favourable stability framework for the extension of EMU.

Part 2: ECB strategy review – the problem of the "open flank"

CONTENT: *1.1 The two pillar strategy – before and after the revision. – 1.2 Empirical evaluation. – 1.3 Further considerations. – 1.4. Outlook.*

SUMMARY: *One important outcome of the ECB's strategy review is the de facto downgrading of the role of money. In view of the fact that (i) the ECB's interest rate policy has been largely driven by actual rather than future inflation and (ii) that the inflation projections have been based on (real) economic rather than monetary developments, the rearrangement of the "two pillar strategy" appears to be a logical consequence. However, such a decision is certainly not supported by empirical evidence analysing the factors driving inflation in the euro area. Money – measured through the "price gap" or "real money gap" – outperforms alternative measures such as the "output gap". It would have seemed rational to strengthen – not weaken – monetary analysis in the ECB strategy concept. As long as money demand is stable and the M3 price gap is a valid indicator for future inflation, M3 should be used – together with other variables – to work out inflation projections and play a greater role in ECB's interest rate setting. Lastly, the rearranged "new strategy" runs the risk of increasing the bank's open flank vis-à-vis political pressure, which could ultimately negatively affect the bank's credibility.*

2.1 The two-pillar strategy – before and after the revision

A well-formulated monetary policy strategy supports the credibility of the central bank's price stability promise. With this in mind, the ECB Governing Council has devoted extensive efforts to formulate and communicate its strategy concept to the general public. In October to December 1998, the Governing Council announced the main elements of its so-called "stability-oriented monetary policy strategy". It consists of five main elements (see also Box 2.1):

(1) providing an economic rationale supporting price stability as an important monetary policy objective ("stressing the benefits of price stability");
(2) giving a quantitative definition of the ECB's primary objective, that is price stability as defined by a rise in the HICP of close to below 2%;
(3) making use of "two pillars" (Pillar one: reference value for the growth rate of M3, pillar two: broadly based assessment of the outlook for future price developments) to achieve price stability;
(4) communicating that the bank's interest rate policy should be consistently based on the information content of the two pillars; and
(5) taking into account the behaviour of fiscal policy as far as it can be expected to affect the ECB's objective of maintaining price stability.

In the ECB's "two pillar strategy" the first pillar assigned a prominent role to money in the form of the reference value concept. The second pillar represented a comprehensive analysis of real economic and financial variables. From a theoretical point of view, the strategy formed a compromise between the two most prominent monetary policy strategies, namely "monetary targeting" ("MT"), allegedly pursued the by Deutsche Bundesbank, and "inflation targeting" ("IT"), used by, for instance, the Bank of England. The ECB's "two pillar compromise" has never enjoyed full support by any strand of monetary economists. Proponents of IT would like to downgrade or even abolish the role of money in the ECB strategy completely (e.g. L. E. O. Svensson). Most of these economists deny the influence of money on inflation and are afraid that the money demand function will become instable. In contrast, proponents of MT argue that there are good reasons for the ECB to focus on money when set-

ting rates. They highlight the stability of the money demand function which allows the application of a concept based on the fundament of classical monetary theory, the famous Fisher equation:

$$(1) \qquad \Delta M + \Delta V = \Delta Y + \Delta P,$$

whereas M = stock of money, V = velocity of the stock of money, Y= real income and P = price level (all variables in logarithms).

Box 2.1. –Basic considerations for the ECB's "two pillar strategy" in 1998

Guiding Principles for Assessing Monetary Policy Strategy

On the basis of the experience gained by NCBs and following the provisions of the Treaty as well as the Statute of the ESCB, the European Monetary Institute (EMI) based its assessment of alternative monetary policy strategies potentially available for ECB monetary policy in Stage Three of EMU on the following guiding principles:

- Effectiveness: the strategy should be effective in the pursuit of the final objective "price stability".
- Accountability: the strategy should involve the formulation and announcement of targets so that the ESCB can be held accountable to the public for its actions.
- Transparency: the process of setting targets and of making decisions on the basis of the strategy should be clear to the public.
- Medium-term orientation: the strategy should be able to deliver its final objective over the medium term, thereby providing an anchor to inflation expectations, but nevertheless provide the central bank with some discretion in response to short-term deviations from the target.
- Continuity: the strategy of the ESCB should build on the experience gains by participating national central banks before the start of Stage Three of EMU.
- Consistency – with the independence of the ESCB: the strategy must be consistent with the independent status granted to the ESCB by the Treaty and should support it as far as possible.

Specific Situation at the Start of Stage Three

When preparing a monetary policy strategy for Stage Three, the ESCB had to take into account that monetary policy will be confronted with a number of specific challenges at the start of Stage Three. Firstly, the ESCB did not have a stability track record of its own and had, therefore, to attach highest priority to establishing a high degree of credibility right from the start. Secondly, the transition to Stage Three constituted a major regime shift, which was be accompanied by a high degree of uncertainty concerning economic and financial conditions and development in the Monetary Union. Thirdly, the strategy chosen had to be sufficiently flexible to allow for integration of new countries over time, as not all EU Member States are to join EMU as from January 1, 1999. And lastly, the economic and financial environment at the start of Stage Three had to be given particular attention in preparing ESCB monetary policy strategy.

From January 1, 1999, the ESCB was operating in an environment that in many respects differed significantly from those with which most national central banks in the Union were confronted. Most important in this context was – and still is – the existence of structural differences across the EU countries within EMU both in terms of national banking sectors and macroeconomic policies. Due to the existence of national differences in financial institutions, regulations, tradition and macroeconomic policies, the EMI rightly assumed that structural differences between EU countries were more significant than regional differences within individual countries. This fact, for instance, was reflected by differences across national banking sector refinancing behaviour and private sector funding policies. As regards macroeconomic policy, structural differences

across countries participating in EMU from the start arose in, for instance, public funding methods (tax or debt funding, short- or long-term funding, the issuance of tradable or non-tradable securities, etc.). On balance, the structural differences across EMU countries contributed to the specific monetary policy transmission mechanism the ESCB is still being confronted with as of January 1, 1999.

When introducing the two pillars, the ECB argued that "[i]nflation is ultimately a monetary phenomenon. The Governing Council therefore recognised that giving money a prominent role in the Eurosystem's strategy was important. Money constitutes a natural, firm and reliable 'nominal anchor' for monetary policy aiming at the maintenance of price stability. The important role played by money in the overall stability-oriented strategy also emphasises the responsibility of the Eurosystem for the monetary impulses to inflation, which a central bank can control more readily than inflation itself."[12] The quantitative value of money growth in the definition of the stock of M3, the so-called "reference value" (ΔM^{ref}), is based on the modified Fisher equation:

$$(2) \qquad \Delta M^{ref} = \Delta Y^* - \Delta V^* + \Delta P^*,$$

ΔY^* is the growth rate of potential output (2.0 to 2.5 %), ΔV^* is the trend growth rate of money velocity (–1.0 to –0.5 %), and ΔP^* is the price norm (around 1.5 %). For 1998, 1999, 2000, 2001, 2002 and 2003, the ECB has set the reference value to 4.5 %. According to the ECB's interpretation, *substantial or prolonged* deviations of monetary growth from the reference value should signal risks to price stability over the medium term. At the same time, however, the ECB made clear that interest rates changes will not be a mechanistic function of (short-term) deviations of M3 growth from the reference value.

The adoption of the second strategy pillar takes into account the fact that the price level, at least in the short to medium term, might be influenced by other factors than money growth ("cost-push"-factors). As a result, "a broadly based assessment of the outlook for price developments and the risks to price stability in the euro area will play a major role in the Eurosystem's strategy."[13] Such an assessment is made by using a wide range of real economic variables (such as GDP growth, wages, business and consumer surveys and fiscal policy indicators) and financial economic variables (such as the exchange rate, bond prices and the yield curve). The variables of the second pillar were also used by the ECB to work out its inflation projections, which have been published since December 2000 on a regular semi-annual basis in the ECB Monthly Bulletin.

On May 8th 2003, the ECB pronounced the outcome of its evaluation of its monetary policy strategy. The details of the strategy revision have been published in detail in the ECB Monthly Bulletin June 2003.[14] The major aspects were as follows:

1. "Cum grano salis" the Governing Council confirmed its definition of price stability. According to the ECB's revision, inflation as measured by an annual increase in the HICP should be – "coming from below" – close to 2% over the medium term. This might suggest that inflation should now be in the range of 1.5 to 1.8%. Reasons for

[12] See the article "The stability-oriented monetary policy strategy of the Eurosystem", ECB, Monthly Bulletin, Jan. 1999.

[13] See the article "The stability-oriented monetary policy strategy of the Eurosystem", ECB, Monthly Bulletin, Jan. 1999.

[14] See the article "The outcome of the ECB's evaluation of its monetary policy strategy", ECB, Monthly Bulletin, June 2003. All further direct or indirect citations of the ECB are taken from this article.

the new specification of the price stability definition may be found in the following considerations:

- providing a "buffer" against the danger of deflation;
- taking into account the problem that might be associated with "zero lower bound for nominal interest rate";
- making allowance for the possibility of an upward measurement bias in measured actual inflation;
- doing justice to the downward nominal rigidities in prices and labour compensations ("Phillips-curve effect" and "grease effect");
- preventing regional deflation when structural inflation differentials across the regions exist.

In view of its statements, however, the Governing Council's willingness to keep inflation close to 2% seems to have been largely driven by looking for a sufficient safety margin to guard against the risk of deflation.

2. The ECB Governing Council confirmed that its monetary policy decisions will continue to be based on a comprehensive analysis of the risks of price stability as indicated by the two-pillar framework. However:
   - the ranking of the two pillars has been changed. The former first (second) pillar has become the new first (second) pillar. The "new" first pillar represents a comprehensive economic analysis to identify short- to medium-term risks to price stability. The new second pillar shall be used to assess ("cross-check") the findings of the first pillar from a medium- to long-term perspective.
   - The reference value of money M3 will no longer be reviewed on an annual basis as the assumptions about the medium-term trends in potential output and the income velocity of M3 are not expected to change frequently. Therefore, the decision to discontinue the regular annual review of the reference value is considered to be more in line with the medium-term nature of the reference value concept.
3. The ECB will continue to publish projections of future inflation on a regular basis. These projections will continue to be based on the variables contained in first pillar, that is the economic analysis.
4. The ECB reiterated that it will react, i.e. change key interest rates, when the path of future inflation is not regarded to be in line with the ECB's objective of price stability over the medium term.

At first glance, the results of the ECB's strategy revision appear to be acceptable and prudent from the point of view of a medium-term oriented monetary policy. First, the ECB stressed that there was not a "fundamental change" in its strategy. Second, the ECB made clear it would continue to use information of both pillars to identify risks to price stability. And third, the changes were widely considered as adjusting the strategy to its actual handling in practice. However, the strategy review has certainly more wide ranging ramifications than ECB rhetoric would suggest. A closer look reveals that in the "new strategy" the economic analysis has certainly gained in importance at the expense of the monetary analysis. In fact, the downgrading of money began in December 2000 already, when the ECB started publishing macroeconomic, e.g. inflation, projections compiled by ECB economists in cooperation with the national central banks for the first time. The inflation projections were derived on variables contained in the former second pillar. Money did not play any role. Such a decision was all the more surprising given the ECB's thesis that money exerts a systematic and dominant impact on inflation.

Box 2.2. – P-star, real money gap and nominal money gap and the reference value

The transaction equation, which can be written as follows:

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

where M = is the stock of money, V = the velocity of money, Y = real output and P = price level. Equation (1) simply says that the stock of money, multiplied by the number of times a money unit is used for financing purposes, equals the real output valued with its price level. Taking logarithms and first differences of the variables (Δ), equation (1) can be easily rearranged as follows:

(2) $\Delta m + \Delta v = \Delta y + \Delta p$.

When using long-term values of the variables, namely 2.0 to 2.5% for potential growth, 0.5 to 1.0% for the decline in velocity and an envisaged inflation of around 1.5%, the adequate money supply growth is:

(3) $\Delta m^T = \Delta y^* + \Delta p^* - \Delta v^* \approx 2.25\% + 1.5\% + 0.75\% \approx 4.5\%$,

where asterisks mark long-term values. The "real money gap" is closely affiliated with the so-called P-star model. To start with, the actual price level is:

(4) $p = m + v - y$.

The long-term price level can be formalised as:

(5) $p^* = m + v^* - y^*$.

The difference between equations (4) and (5) is the so-called price gap:

(6) $p - p^* = (v - v^*) + (y^* - y)$.

The price gap ($p - p^*$) consists of (i) the liquidity gap $(v - v^*)$ and (ii) the output gap $(y^* - y)$. If, for instance, actual output exceeds potential ($y^* < y$) and actual velocity equals the long-term equilibrium ($v = v^*$), the actual price level can be expected to rise in the future.

The actual "real money gap" is defined as actual money supply less actual price level:

(7) $m_{real} = m - p$.

The real equilibrium real money holding is:

(8) $m^*_{real} = m - p^*$.

The difference between equation (7) und (8) is the real money gap, which represents nothing other than the price gap with a negative sign:

(9) $m_{real} - m^*_{real} = (m - p) - (m - p^*) = -p + p^* = -(p - p^*)$.

Against the background of these findings, it is easily shown that a simple comparison between actual money growth and the reference value might lead to misleading policy signals as monetary expansions, which occurred in the past and will have a bearing on future prices, are systematically neglected. Using a more formal approach, the equilibrium price level is:

(10) $p^* = m^T + v^* - y^*$,

where m^T is the envisaged money supply growth as determined by the reference value concept. The deviation between the actual and equilibrium price level is:

(11) $p - p^* = m + v - y - (m^T + v^* - y^*) = (m - m^T) + (p - p^*)$.

The deviation of the actual from the envisaged price level can be explained by the deviation of actual from the envisaged stock of money and the price gap (or, alternatively, the negative real money gap). And only if the price gap is zero, it makes sense to base monetary policy decisions on the reference value concept.

In the following, we will analyse the rational for downgrading the monetary analysis ("new second pillar") relative to the economic analysis ("new first pillar") in the ECB monetary policy strategy in light of empirical findings. In a first step, theoretical and empirical findings are outlined, indicating that the stock of M3 has a systematic and strong impact on euro area inflation. Against the background of these findings, a number of considerations will be discussed which could rationalize ECB strategy going forward.

2.2 Empirical evaluation

In this section the influence of money in the definition of M3 on euro area inflation is analysed using a model presented in ECB OBSERVER No 1, 17 April 2001. Under the model, quarterly changes to the annual change in the euro area consumer price index (*DDLNCPI*) are regressed onto the following variables:

- a constant (*C*),
- dummies to correct structural breaks and outliers (*DUM*),
- quarterly differences to the annual change (log diff.) in oil prices (*DDLNOIL*),
- quarterly differences to the annual change (log diff.) in the euro/US dollar exchange rate (*DDLNEUROUSD*),
- quarterly differences to the annual change (log diff. gliding four-quarter average) in the output gap (*DDLNOG*),
- quarterly differences to the annual change (log diff. gliding four-quarter average) in the price gap (*DDLNPG*),
- lagged quarterly differences to the annual change (log diff.) in the price level (*DDLNCPI*).

The "price gap" ("PG), or "real money gap" ("RMG" as L. E. O. Svensson calls it) is the relevant variable through which money M3 influences inflation. The PG can be written as the accumulated output gap, i.e. the difference between real GDP and potential GDP (in logarithms, respectively), and the liquidity gap, i.e. the difference between actual liquidity minus trend liquidity (in logarithms, respectively):

(1a) $PG = P^* - P = (y - y^*) + (v^* - v)$.

The PG can also be written as RMG, that is the stock of money less the price level, plus trend velocity minus potential GDP (all variables in log form):

(1b) $PG = m - p + v^* - y^*$.

The RMG that has not been absorbed by potential output should have an impact on inflation. In the following, we provide the results of testing the hypothesis, making use of two alternative model specifications. The first model contains the PG and additional variables that belong to economic analysis represented by strategy pillar one. The second model is based on a hypothesis expressed several times by the ECB: "Not actual money growth rates but the trend of money growth should have a significant impact on inflation". In this second model, the PG will be based on trend rather than actual money:

(1c) $PG = m^* - p + v^* - y^*$.

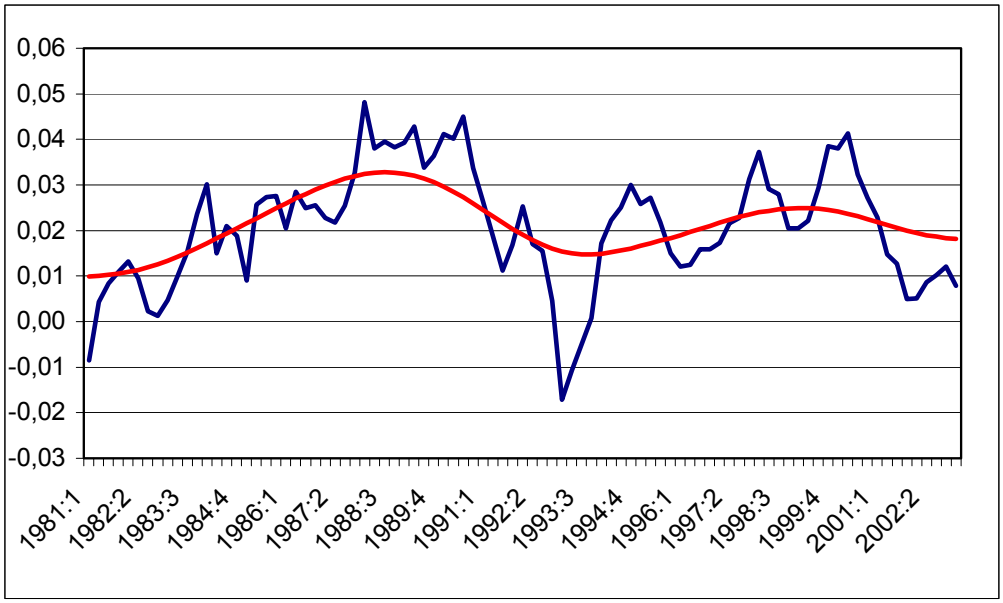
Starting with the first model, the structural breaks caused by German unification (1990, second quarter) and by the euro area enlargement when Greece adopted the euro in January 2001 were eliminated. The shocks in the time series are:

Shock	impact on GDP	impact on M3
1. 1990:2 (German unification)	+ 2.04 %	+ 3.3 %
2. 2001: 1 (Euro area enlargement)	+ 1.93 %	+ 2.63 %

Sources: ECB, Monthly Bulletin Jan. 2001, Deutsche Bundesbank, Monthly Bulletin Aug. 1991.

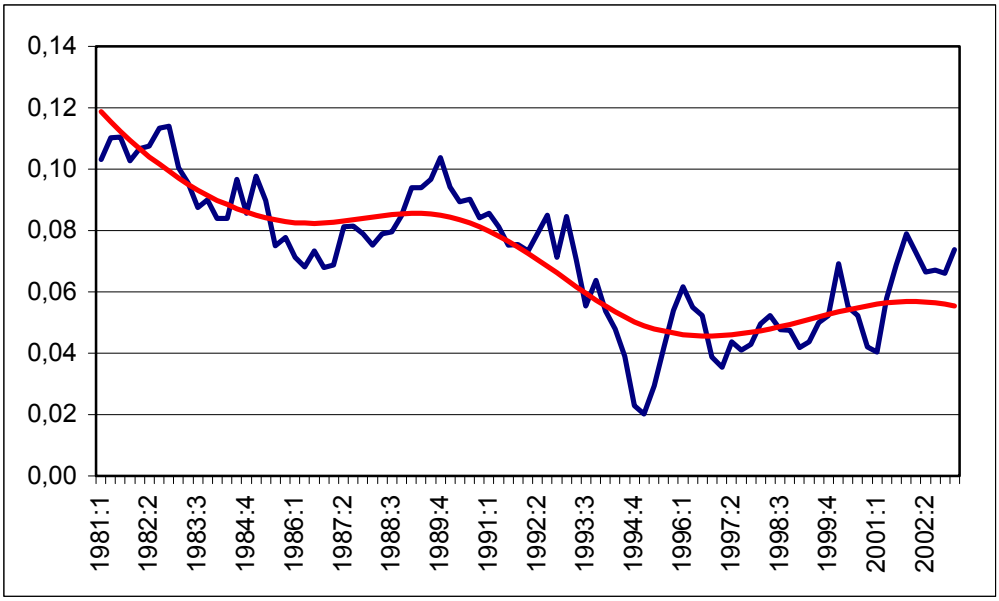
We used the magnitudes of the shocks outlined above to construct shock free time series of M3 and real GDP. These series formed the basis for building trend money, M3*, and potential GDP, Y*, by using the Hodrick-Prescott Filter (smoothing parameter $\lambda = 1600$ for quarterly data). Fig. 2.2.1 and 2.2.2 show the results. The regression results for the first model, the "normal" price gap as shown in equation (1b), are shown in Fig. 2.2.3.

Figure 2.2.1. – Growth rate of real GDP (blue line) and of potential GDP (red line)



Data source: ECB, online data; own calculations.

Figure 2.2.2. – Growth rate of M3 (blue line) and of trend money M3* (red line)



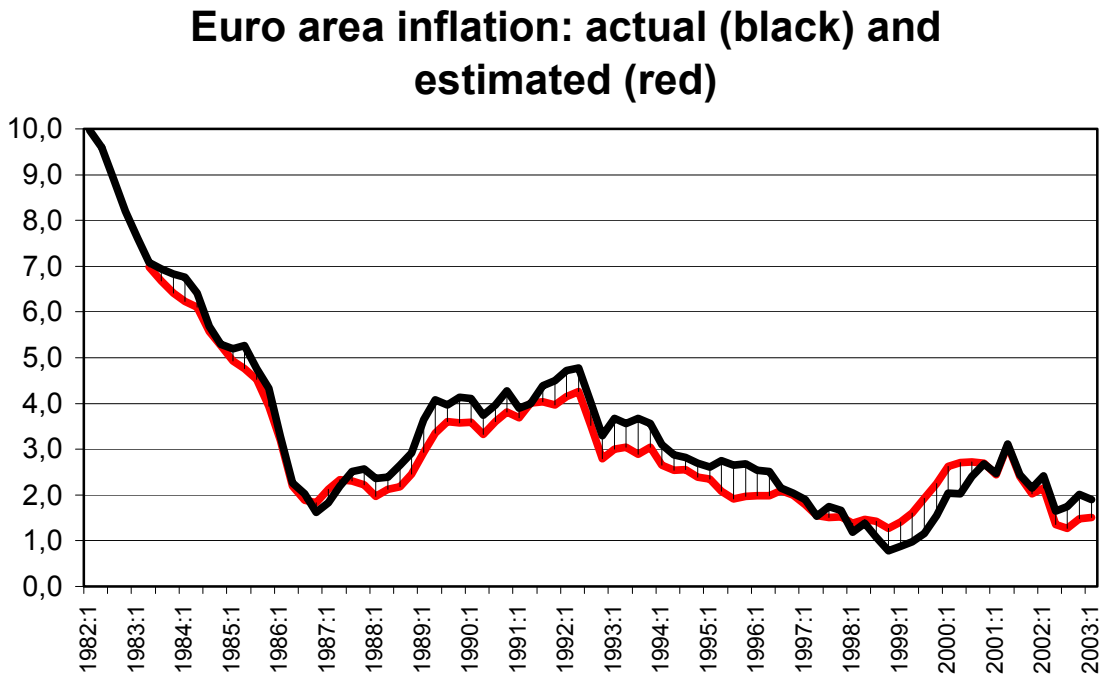
Data source: ECB, online data; own calculations.

Figure 2.2.3. – Euro area inflation estimated by a model including the M3-price gap

Dependent Variable: DD4DLNP
Method: Least Squares, Sample(adjusted): 1982:2 2003:1, Included observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000765	0.000363	-2.107774	0.0385
DUM(1980,1-1987,4)	-0.002731	0.000569	-4.795601	0.0000
DUM(1992,3-1992,4)	-0.004559	0.001467	-3.107545	0.0027
DUM(2001,2)	0.009806	0.002022	4.848745	0.0000
DUM(2001,3)	-0.005564	0.002042	-2.724278	0.0081
DUM(2002,2)	-0.009824	0.002119	-4.636864	0.0000
DDLNOIL	0.005415	0.001163	4.653899	0.0000
DDLNEUROUSD(-1)	-0.017492	0.003908	-4.476525	0.0000
DDLNOG(-1)	0.309327	0.105716	2.926017	0.0046
DDLNPG(-1)	0.308344	0.083657	3.685823	0.0004
DDLNP(-1)	0.187845	0.071345	2.632907	0.0104
DDLNP(-4)	-0.166504	0.079207	-2.102138	0.0390

R-squared	0.745601	Mean dependent var	-0.000907
Adjusted R-squared	0.706734	S.D. dependent var	0.003551
S.E. of regression	0.001923	Akaike info criterion	-9.538517
Sum squared resid	0.000266	Schwarz criterion	-9.191258
Log liklihood	412.6177	F-statistic	19.18361
LM Test (4 lagged) Obs*R^2	5.421563	Prob(F-statistic)	0.000000
White Test Obs*R^2	14.77104	Jarque-Bera	0.231329



Source: GDP, M3, Euro-$ (ECU-$) European Central Bank online data; Crude Oil Import FOB Price http://www.economagic.com/em-cgi/data.exe/doeme/cofmuus

The results presented in Fig. 2.2.3 show that the model explains the inflation path fairly well. Since 2001, however, several dummies have been used to smooth outliers. All variables are statistically significant at conventional measures, and according to the statistical tests there seem to be no violations of the assumptions concerning the empirical OLS-model. Based on these empirical findings it is fair to say that the M3 price gap and the output gap are

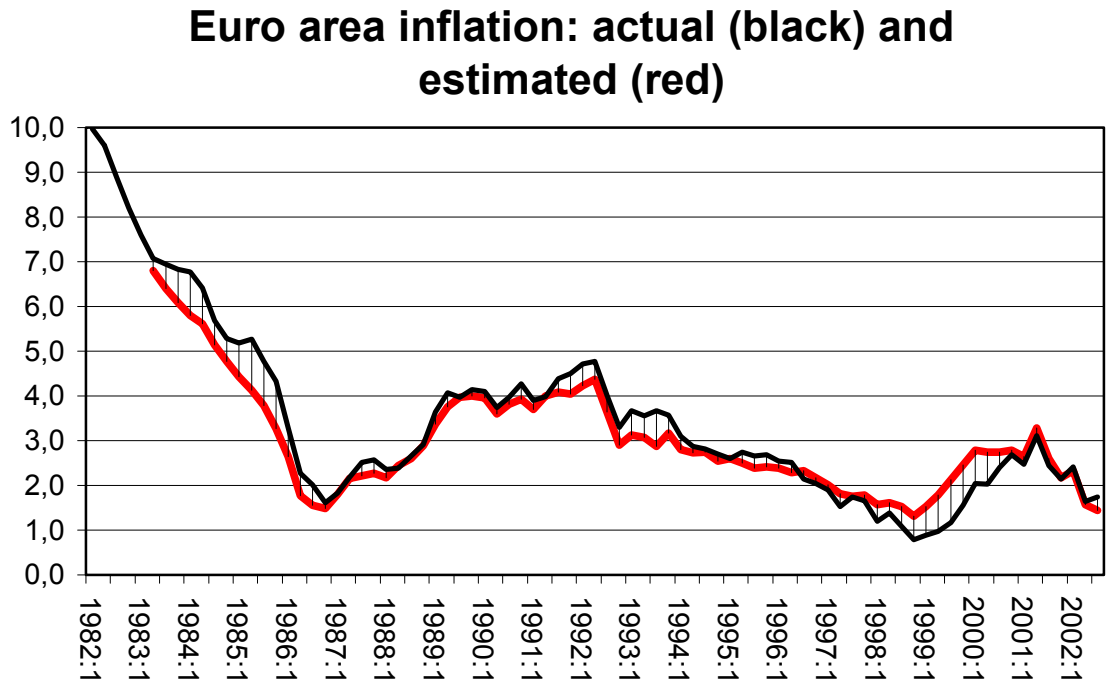
the most important variables driving inflation. The coefficients of both variables are quite similar. The result is in line with the empirical analyses in our previous reports.

Figure 2.2.4. – Euro area inflation estimated by a model including the M3*-price gap

Dependent Variable: DD4DLNP
Method: Least Squares, Sample(adjusted): 1982:2 2003:1, Included observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000958	0.000386	-2.485183	0.0153
DUM(1980,1-1987,4)	-0.002484	0.000575	-4.322355	0.0000
DUM(1992,3-1992,4)	-0.004212	0.001431	-2.944375	0.0044
DUM(2001,2)	0.007906	0.001960	4.034249	0.0001
DUM(2001,3)	-0.006321	0.001992	-3.173721	0.0022
DUM(2002,2)	-0.008583	0.002137	-4.017339	0.0001
DDLNOIL	0.005206	0.001141	4.561311	0.0000
DDLNEUROUSD(-1)	-0.015922	0.003828	-4.159028	0.0001
DDLNOG(-1)	0.111451	0.100345	1.110681	0.2705
DDLNPG(-1)	0.427541	0.108472	3.941506	0.0002
DDLNP(-1)	0.195609	0.069570	2.811696	0.0064
DDLNP(-3)	0.158583	0.070754	2.241313	0.0281
DDLNP(-4)	-0.128781	0.079459	-1.620712	0.1095

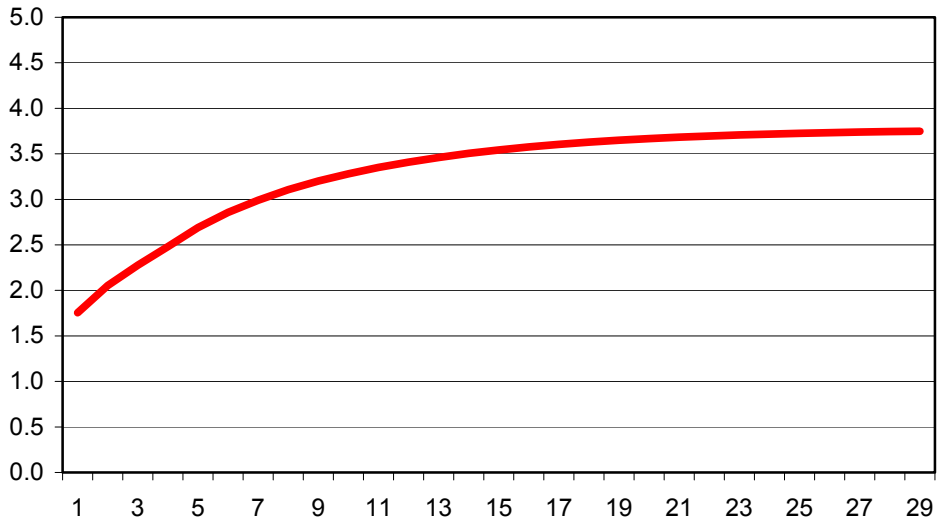
R-squared	0.760951	Mean dependent var	-0.000907
Adjusted R-squared	0.720548	S.D. dependent var	0.003551
S.E. of regression	0.001877	Akaike info criterion	-9.576943
Sum squared resid	0.000250	Schwarz criterion	-9.200745
Log likelihood	415.2316	F-statistic	18.83416
LM Test (4 lagged) Obs*R^2	5.421563	Prob(F-statistic)	0.000000
White Test Obs*R^2	6.441741	Jarque-Bera	0.427028



Source: GDP, M3, Euro-$ European Central Bank online data, Crude Oil Import FOB Price http://www.economagic.com/em-cgi/data.exe/doeme/cofmuus

Fig. 2.2.4 shows that all estimation coefficients are significant at least on a 5 % level with one exception: the output gap (*DDLNOG*). This gives a preliminary hint that money might be more relevant for inflation than the real business cycle. In fact, by making use of trend money M3, the PG becomes the most relevant variable influencing inflation. Making use of simulation techniques, Fig. 2.2.5 shows the impact of a permanent 2% increase in money growth on inflation.

Figure 2.2.5. –Simulation of a 2 % extension of trend money growth



Simulation based on equation model as shown in Fig. 2.2.3. Quarters on the x-axis, % on the y-axis.

It translates into a 2.0% increase in inflation after around 8 years. However, 50% of the adjustment process – that is an increase of inflation from 1.7 to 2.7% – occurs after a relatively short time of 6 quarters. Furthermore, money (growth) is the only variable that causes permanent effects of inflation. Even long-lasting shocks of oil prices, GDP or the exchange rate affect inflation only temporarily. The rationale for such findings is that a rise (fall) of inflation, which is not being accommodated by money supply, leads to a declining (increasing) PG. The PG corrects inflation shocks that are based on real economic variables in the long run.

2.3 Further considerations

The empirical findings as outlined above provide an adequate framework for discussing the rationale of the changes in the ECB monetary policy strategy as a result of the latest strategy review:

(1) It certainly seems advisable for a central bank to specify its price stability definition. Since 1999, the ECB has identified price stability with an inflation of less than 2%. The latest specification – that price stability would be compatible with inflation, coming from below", or close to 2% – should not be interpreted as moving away from a stability oriented monetary policy. Inflation below 2% is still relatively strict compared to the price objectives of central banks in other industrialized countries. The ECB is also right

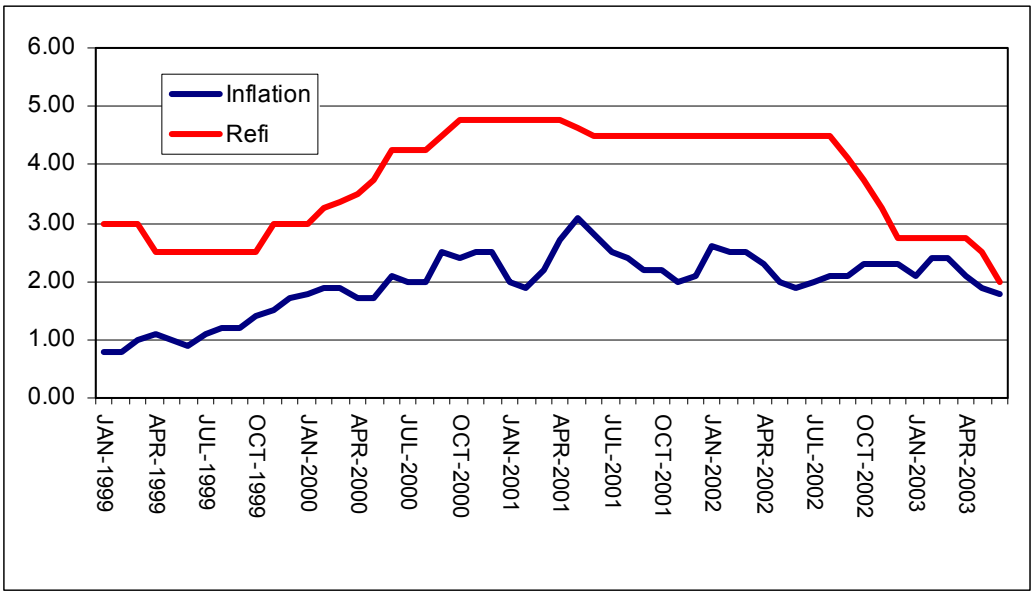
to refer to changes in the headline rather than any measure of "core inflation" of the HICP. From a consumers' perspective, the former is much more relevant than the latter.
It is certainly more favourable from the point of view of monetary policy to look at medium- rather than short-term inflation variations. Short-term variations of inflation are mainly caused by cost push-factors, such as oil price changes or variations of the euro/US dollar exchange rate. Such effects have a rather short-lived impact on inflation. That said, they usually do not require monetary policy action.
Focusing on consumer prices is broadly in line with the stability effort of international central banking. As long as consumer prices can be seen as being representative for the price development of the economy as a whole, monetary policy should be able to keep price stability by gearing its policy to stabilizing consumer prices via the "mechanism of relative prices". If, however, a gap opens up between prices of the current production and those of the stock of wealth (such as real estate, housing and stocks), consumers might become too narrow a variable to deliver price stability.

(2) The ECB should change interest rates only if expected medium-term inflation rate differs from the price norm of 1 to 2%. The corresponding reaction function would be:

$$\Delta i = a\,(\pi^{mt} - \pi^*),$$

where $a > 0$, π^{mt} is the expected medium-term inflation, and π^* is the price norm. Due to the time lag problem of monetary policy, it has to rely on future rather than actual inflation. In general, the ECB has confirmed this approach: "[T]he key ECB interest rates must evolve in such a way that the path of future inflation remains in line with the ECB's objective of price stability over the medium term". However, the ECB has so far predominantly changed rates to actual rather than (indicators for) future inflation (see fig. 2.3). Pursuing a more forward-looking monetary policy would certainly argue for less volatile interest rates, less volatile GDP growth, and less volatile inflation.

Fig. 2.3. – Inflation and ECB refi-rate



Data source: Bloomberg.

(4) It is rational for the ECB to identify future risks to price stability on the basis of a broad set of information. It would be much too risky for monetary policy to rely on a single indicator. For instance, the growing international attractiveness of the euro compared to the US dollar and different business cycles between the euro area and the US might have a negative impact on the validity of money as an inflation indicator. The output gap, too, might loose some of its indicator quality if the trend towards globalisation increases. Against this background, the two-pillar strategy makes good sense from a stability-oriented monetary policy as it provides a kind of "analytical diversification" when analysing future inflation trends. As regards the monetary analysis, however, the emphasis should be on trend rather than actual money growth: the price gap on the basis of trend M3 growth exhibits a stronger impact on inflation compared to the traditional price gap. These two measures of money, in turn, outperform the output gap in terms of the future inflation indicator qualities.

(5) It is hard to see why monetary analysis has been *de facto* downgraded in the latest strategy review. As long as the ECB's inflation projections are solely based on economic and financial indicators rather than money, the praising of monetary analysis is actually nothing more than rhetoric. The ECB emphasizes that "[t]he ECB's economic analysis has been significantly extended and enriched over the past few years, largely as a result of the progress made in the production of euro area real and financial data and in the statistical and analytical processing of such information. Furthermore, several models have been developed to better assess and understand past and ongoing developments, to make more reliable short-term forecasts and to underpin the regular macroeconomic projection exercises for the euro area economy."
From a theoretical empirical point of view it is hard to understand why inflation forecasts – over a period of 6-24 months – should not rely on monetary aggregates as well as on non-monetary factors. The ECB's statement that information from monetary aggregates cannot be easily integrated into the framework used to produce the projections is not fully convincing. It would not be a contradiction to integrate monetary as well as other indicators into an empirical analysis that builds the basis for producing forecasts and projections. The argument that variations in money growth would affect inflation variations in the long rather than medium term is also not fully convincing. There should be no (technical) problem to use lagged variables of money – as was outlined above – in an empirical model. As long as (i) inflation projections rely solely on variables other than money, and (ii) changes in interest rates depend on actual inflation or very short-term expected inflation, the role of money in the ECB strategy will certainly continue to erode – and this despite the empirical evidence that money exerts a strong impact on inflation.

(6) Devaluing the role of money in the ECB strategy might have an additional drawback from the point of view of a stability-oriented monetary policy. The economies of a number of euro area countries suffer from structural deficiencies. Government debt is already very high, the GDP growth path is declining and unemployment is rising. In addition, the forthcoming demographics might start to show their negative impact on growth soon. Against this background, governments should have an increasing incentive to put pressure on the ECB to lower the interest rates. If inflation rates are relatively low already, a short-term oriented monetary policy might find itself being forced to bring rates lower even if that implies an increase in future inflation. The ECB has clearly identified such a problem: "the two- pillar approach [should constitute] a commitment device on the part of the ECB to make sure that, while respond-

ing to economic developments as and when they arise, the fundamental factor driving prices over extended horizons – the rate of money growth – remains consistently under observation". However, such a statement appears not to be reliable as long as the ECB's policy is de facto a reaction of actual changes in inflation. It is fair to say that the ECB's interest rate policy since January 1st 1999 has been largely based on actual rather than future inflation. In this context the ECB wrote: "[I]t may be advisable for a central bank to set interest rates with a view to a time frame extending well beyond conventional forecast horizons". Unfortunately, the ECB has not yet lived up to the wisdom voiced.

The latter aspect in particular should make a case for short-term oriented monetary policy running the risk of becoming subject to political pressure to pursue a more inflationary monetary policy than might be desirable. With the de facto downgrading of the ECB's former first-strategy pillar – the monetary analysis with a prominent role for the stock of money – the ECB's "open flank" vis-à-vis political pressure should have increased by quite a margin. This should certainly not be supportive for the bank's objective of maintaining price stability. There is convincing theoretical and empirical evidence that only a medium- or even long-term oriented monetary policy will be able to (i) stabilize inflation on an acceptable level, (ii) stabilize interest rates and business cycle fluctuations, and (iii) reduce political pressure being brought to bear on monetary policy. It would therefore be rational from the point of view of the ECB to strengthen rather than downgrade the role of money in its strategy concept. All the more so as money demand seems to be stable and the M3 price gap qualifies a valid indicator for future inflation.

2.4. Outlook

One important outcome of the ECB's strategy review was the de facto downgrading of the role of money. In view of the fact that (i) the ECB's interest rate policy has been largely driven by actual rather than future inflation, and (ii) that the inflation projections have been based on (real) economic rather than monetary developments, the rearrangement of the "two pillar strategy" appears to be a logical consequence. However, such a decision is certainly not supported by empirical evidence analysing the factors driving inflation in the euro area. Money – measured through the "price gap" or "real money gap" – outperforms alternative measures, such as the "output gap". It would have seemed rational to strengthen – not weaken – monetary analysis in the ECB strategy concept. As long as money demand is stable and the M3 price gap is a valid indicator for future inflation, M3 should be used – together with other variables – to work out inflation projections and play a greater role in ECB's interest rate setting. Lastly, the rearranged "new strategy" runs the risk of increasing the bank's open flank vis-à-vis political pressure, which could ultimately negatively affect the bank's credibility. It should be noted that making use of money as a prominent indicator of future inflation does not entail adhering to a kind of "strict MT", that is mechanistically raising (lowering) interest rates once money growth exceeds (falls short of) the reference value. The "price gap" or "real money gap" does justice to the need for adequately deriving the information content of money for future inflation in the euro area and providing the ECB with a guideline to implement a forward-looking monetary policy.

In 2006 at the latest, new member states will potentially start adopting the euro currency. Such an enlargement of the euro area might pose a problem for the validity of the M3 price gap. To be more specific, the long-run monetary demand might lose (some of its) stabil-

ity properties. Does such a scenario rationalize upgrading economic analysis against monetary analysis? Not necessarily. The euro area enlargement will not inevitably destabilize the long-run relationship between money, GDP, interest rates and prices. On the contrary: there is reason to believe that the bigger the euro area – made of heterogeneous countries – becomes, the better are the changes that the demand for money will remain stable. Financial markets in the euro area are not – and will not – be harmonized right from the start when new member states join the currency area. The less integrated the European capital markets are, the less probable it will be that disturbances in the form of, for instance, tax changes and financial market innovations, will destabilize the long-term demand for money. From this point of view, the inflation indicator quality of the price gap might even be strengthened rather than weakened by the enlargement of the euro area.

Part 3: Uncertainty – pressure for an easy monetary policy

CONTENT: *3.1 Low growth and uncertainty – challenges to monetary policy. – 3.2 Uncertainty and price stability. – 3.3 Monetary policy under uncertainty – A model based on the "option value of waiting". – 3.4 Outlook.*

SUMMARY: *In the current low growth environment, accompanied by a high degree of uncertainty, calls for an even easier monetary policy have gained momentum. However, our model approach – which rests on the so-called theory of the "option value of waiting" – shows that the impact of monetary policy on growth and employment is strongly diminished in an environment of high (revenue) uncertainty. This finding is actually based on the existence of sunk investment, e.g. hiring and costs. Against the background of the prevailing uncertainty, our model provides at least three important implications for ECB monetary policy: (1) cutting interest rates is not effective as long as high uncertainty continues to prevail; (2) by cutting rates under high uncertainty, the ECB reduces the option value of waiting, thereby reducing its effectiveness in future periods; and (3) a hectic ECB monetary policy, that is, frequent interest rate changes introduces additional uncertainty to the economy, which is most likely to aggravate the weakness of investment and consumer goods demand.*

3.1 Low growth and uncertainty – challenges to monetary policy

Pressure on the ECB to cut interest rates has been growing as short-term growth prospects for the euro area deteriorate.[15] The arguments for even lower rates seem to be compelling. Inflation is now below the ECB's upper ceiling. Low growth is expected to cause downward pressure on the price level and ongoing uncertainty is assumed to dampen economic activity even further. However, a closer look at the economic implication of uncertainty suggests that demanding monetary policy easing is in fact a poor strategy. This is because in times of uncertainty, as we will show, the effectiveness of monetary policy decreases greatly.

Where does uncertainty come from? It is very popular nowadays to trace uncertainty of revenues back to the events of September 11th and the ensuing war against terrorism, which have shaken the hitherto prevailing geopolitical order. In addition, high uncertainty could also stem from certain macro-economic disequilibria, such as the US current account situation, the strong increase in corporate debt, corporate malfeasance etc.

To deal with the ramifications of uncertainty for economic decisions, economists have developed the concept of the "option value of waiting". This concept formalises a common-sense rule: if a decision involves some sunk costs, or any other element of irreversibility, it makes sense to wait until the uncertainty has been resolved. The temptation to postpone investment decisions is particularly strong when the uncertainty is likely to be resolved in the near future.

One can easily imagine investors assessing various investment projects. Some would be slightly profitable under the prevailing degree of uncertainty, but they would be even more profitable if uncertainty were favourably resolved, and would cause a loss if not. In such a situation, investors would lose little (in terms of forgone profits) if they postpone investment decisions: once the uncertainty had been resolved, it would still have the option to proceed if that was to its advantage. An analogous argument applies to the consumers that might delay their decisions to buy a durable consumer good in times of uncertainty. According to the sim-

[15] This chapter heavily relies on two recent studies by Belke (2003) and Belke and Goecke (2003) on monetary policy effectiveness under uncertainty.

ple models, uncertainty that cannot be hedged raises the variability of revenues and induces investors to apply a higher discount rate on (expected) future revenues. Dixit (1989) introduces an additional motive to explain why uncertainty should hamper investment: if investments bear an irreversible sunk cost character, there is an incentive to wait until the uncertainty has resolved; this is the "*option value of waiting*".

3.2 Uncertainty and monetary policy effectiveness

The theory of the option value of waiting has important consequences for monetary policy as far as exerting a positive impact on real economic growth is concerned. As a rule, a preemptive interest rate cut to prevent negative impacts on growth under a regime of high uncertainty is unlikely to be a prudent policy since:

(1) cutting interest rates is not effective in periods of high uncertainty;
(2) the central bank reduces its option value of waiting by cutting rate cuts. If the bank cuts today, it kills this option; and
(3) a hectic activity of monetary policy, i.e. frequent interest rate changes, induces additional uncertainty, which is most likely to aggravate any weakness of investment and consumer goods demand.

The models of decision-making under uncertainty also have further important implications for monetary policy. All economic decisions involve some kind of transaction costs – whether they are about investment, or about hiring and firing. These last are especially important in Europe. The existence of transaction costs implies that businesses facing only a small change in prices may not respond immediately. It is more likely that there is a band of inaction – a price range within which it does not pay to change decisions taken in the past. The size of this band of inaction increases as uncertainty increases. And, given the structural rigidities in the euro area economy, uncertainties probably affect decision making in Europe more than they do in the US.

The global economic climate can still be characterised by a high degree of uncertainty as approximated by, for instance, the high volatility of financial asset and commodity prices. Since there is much 'sluggishness' in labor markets, uncertainty can be expected to exert negative effects on investment and employment. However, in view of the central conclusion of our consideration, monetary policy is unlikely to be in a position to compensate for this. The marginal effect of lowering the central bank rates as the control variable on the state variables (e.g., investment/employment) is greatly diminished under uncertainty. In what follows, we outline a model analysing monetary policy under uncertainty, taking into account the option value of waiting.

3.3 Monetary policy under uncertainty – a model based on the "option value of waiting"

3.3.1 The baseline model

In the following, we focus on the micro level and disregard aggregation issues.[16] Investments are typically characterised by large set-up costs, which are often highly irreversible. These

[16] For an extensive formal treatment of the latter referring to exchange rate instead of revenue uncertainty see Belke and Goecke (2001, 2001a)

set-up costs consist of investment expenditures that cannot be resold (e.g., firm-specific investment) and the hiring and training costs for needed staff. In order to make an investment profitable, the revenues stemming from this investment project have to cover these costs.

The gross profit of an investment project, without consideration of these instalment costs, is:[17]

(1) $R_{a,t} = e_t$ (if active), otherwise $R_{p,t} = 0$ (if passive).

with: t : time index, and
e_t : present gross revenues if the investment project is executed ("earnings", variable costs subtracted)

It is assumed that the sunk investment/hiring costs H must be spent at the moment the investment is executed.[18] It has to be noted that the parameter H can also be interpreted as anticipated scrapping/firing costs. In case of a one-time non-utilization, we assume immediate depreciation. If the firm is inactive for only one period, the investment/staff must be completely re-set up and the hiring/investment costs must be paid anew. Since switching the state of activity leads to a complete depreciation of hiring costs, H have to be regarded as sunk costs ex post (Dixit and Pindyck, 1994, p. 8; Bentolila and Bertola, 1990; Dornbusch, 1987, pp. 7 ff.).[19] Specific investments in new employees close to the production process may partly be irreversible because of market regulation and institutional arrangements.[20]

The decision as to whether or not the firm should invest / hire is reached by a comparison of the expected present values of the investments with or without being active in the decision period t. In addition to the state of activity in the preceding period, the present revenues and expenditures as well as the influence of the current activity decision on the future returns must be taken into account.

Let us first introduce some important definitions relevant for an assessment of the profitability of an investment. The discount factors are defined as

(2) $\delta_0 = \frac{1}{1+i}$ and $\delta_1 = \frac{1}{1+i_1}$ (with: $i, i_1 > 0 \Leftrightarrow \delta_0, \delta_1 < 1$).

The expected value of long-term interest rate i_1 is assumed to be determined as follows:

(3) $i_1 = r + \alpha \cdot (i - r)$ (expected value of long-term interest rate i_1)

with:

- i as the short-term interest rate as the "control variable" of monetary policy which is valid until the next period,
- δ_0 as the discount factor until the next period (based on i),
- i_1 as the *expected* long-term interest rate,

17 For a related trade model see Baldwin and Krugman (1989), p. 638, and Goecke (1994). For a related model of labour demand see Belke and Goecke (1994). Here we analyse only a single firm. However, heterogeneity effects are especially important for aggregation; see Belke and Goecke (2001, 2001a). For empirical evidence of heterogeneity for Italian manufacturing firms see Guiso, Parigi (1997).

18 Investment in employment that takes 'time to build' (i.e. implementing a lead) magnifies effects of uncertainty. See Pindyck (1988), p. 973, Dixit, Pindyck (1994), pp. 46 ff.

19 We abstract from additional uncertainty over H.

20 However, one has to distinguish between specific investment as analysed in this paper and general investment, which enables the firm to cope with different situations in the future. Thus the latter type is often claimed to be positively correlated with uncertainty about revenues. See e.g. Gros (1987).

- δ_1 as the corresponding long-term discount factor based on i_1, and
- r as the "base value" for the expected long-term interest rate.

The coefficient α represents the "expectation pass-through parameter" from the short-term interest rate i to the expectation with respect to the long-term interest rate i_1. Within our model of the option value of waiting, we focus on uncertainty with respect to the general revenue performance e. However, uncertainty with respect to future interest rates is not explicitly included in our model. An interesting special case analysed by Belke and Goecke (1999) emerges

(4) for $\alpha = 1$: $i = i_1$ and $\delta_0 = \delta_1$

3.3.2 Decision without the option of waiting (certainty equivalent)

Let us now develop the model *without the option value of waiting* and regard the expected values as equivalents to certainty (i.e. we assume risk-neutrality). Motivated by the current scenario of low inflation in the euro area and in the US, accompanied by high unemployment at least in euro area and the often posed popular question "Why doesn't the ECB follow the Fed with interest rate cuts?", we limit ourselves to the analysis of only one of the two logically possible status quo situations, namely the case of an firm being "*passive in the preceding period*". Hence, we illustrate the main aim of an expansionary monetary policy, i.e., to give a stimulus for investment and employment by lowering financing costs.

3.3.2.1 Scenario "passive (unemployed) in the preceding period"

A previously non-active firm has two possibilities to act. Either it remains passive or it starts the investment project in period t. If it stays passive, it earns neither current nor future profits (i.e. no present value of future revenues has to be calculated).

However, a firm that enters / invests will gain the period t gross revenue $R_{a,t} = e_t$. To simplify matters, we assume an infinite horizon of investors. Since, we assume that an investor expects the same revenue for the whole *infinite future* ($e_{t+i} = e_t = e$), the present value of annuity due of future gross revenues under activity from period t+1 to the infinite future has to be calculated. In period t+1, the firm receives, if it is running the investment project, a present value of annuity due $V_{a,t+1}$:

(5) $$V_{a,t+1} = \frac{e}{1-\delta_1}$$

$(1-\delta_1) = \delta_1 \cdot i_1$ is the *rate of interest costs* in case of the annuity due (i.e., we apply a simple formula for present value of annuity due). Remember that e (without index t) is the certainty equivalent gross revenue without consideration of the interest / financing costs of sunk costs, i.e. the gross revenue per period before financing the sunk costs.

If the firm invests, it has to pay for the sunk instalment costs H to be able to earn current ($R_{a,t}$) and future profits (present value in current period t of annuity due of future revenues

under activity from period t+1 on, applying the short-term interest rate i in period t: $\delta_0 \cdot V_{a,t+1}$) using equations (2) and (3):

$$(6) \qquad -H+R_{a,t}+\delta_0 \cdot V_{a,t+1} = -H+e+\frac{\delta_0 \cdot e}{1-\delta_1} = -H+e+\frac{e}{(1+i)\cdot\left(1-\frac{1}{1+r+\alpha\cdot(i-r)}\right)}$$

In order to calculate the entry-trigger revenue under certainty, we have to proceed as follows.[21] The firm is indifferent between remaining passive or entering if the present value of continuing non-activity equals the present value of an instantaneous investment ("entry"):

$$(7) \qquad 0 = -H+e+\frac{\delta_0 \cdot e}{1-\delta_1} \qquad \text{resp.} \qquad \text{(indifference)}$$

$$0 = -H+e+\frac{e}{(1+i)\cdot\left(1-\frac{1}{1+r+\alpha\cdot(i-r)}\right)} \qquad \Rightarrow$$

$$(8) \qquad e^{c}_{,entry} = \frac{(1-\delta_1)\cdot H}{1-\delta_1+\delta_0} \qquad \text{resp.} \qquad \text{(entry if } e > e^{c}_{,entry})$$

$$e^{c}_{,entry} = \frac{H\cdot(1+i)\cdot(r+\alpha\cdot i-\alpha\cdot r)}{2\cdot r+2\cdot\alpha\cdot i-2\cdot\alpha\cdot r+i\cdot r+\alpha\cdot i^2-\alpha\cdot i\cdot r+1}$$

The firm enters if the gross revenues e exceeds $e^{c}_{,entry}$. The entry decision becomes favourable if the gross revenue e covers at least the interest costs on sunk investment costs. Interest costs of entry become relevant as they have to be interpreted as an opportunity gain of staying passive. Due to the sunk hiring costs, the necessary revenue (after subtracting variable costs) is larger than zero. So the required surplus over variable costs, i.e. the required gross revenue e, will be the larger the higher the sunk costs are. Entry will happen, as soon as he gross revenue covers the interest costs (i.e. approximately interest rate i_1 times H).

We now ask how the central bank can impact the profitability calculations of investors. Hence, we have to calculate the short-term interest rate i, which makes investment just worthwhile. In our model, we have to differentiate between two effects of the short-term interest rate i: (1) a short-term interest payment effect during the current period t (i.e. between the start of period t and the start of period t+1) and (2) an impact on expectations of the long-term interest rate according to parameter α and, by this, on the present value of annuity due.[22] The same is valid for a monetary authority that uses the interest rate i as a control variable.

The indifference condition results according to eq. (7). If the latter is solved for the short-term interest rate i, the interest rate that triggers investment can be derived as the following root (with an entry if $i < i^{c}_{,entry}$).

[21] The calculation is the same for a case with certainty and for a situation with uncertainty and risk neutrality, but *without* the option to wait. In this case, the corresponding present value has to be interpreted as expected values.

[22] The long-term interest rate is placed in the denominator of the formula of the present value of the annuity due and, thus, determines the realised present value (if the long-term interest rate moves to zero, the present value converges towards infinity).

(9)

$$i^{c}_{,entry} = \frac{1}{2}[e(-2\alpha - r + \alpha r) + H(\alpha + r - \alpha r) \pm$$
$$\left(H\left(-2er^2 + 6e\alpha r - 6e\alpha^2 r + 4er^2\alpha - 2e\alpha^2 r^2 - 4e\alpha^2 + 4\alpha e\right)\right.$$
$$+ H^2\left(r^2 + \alpha^2 - 2\alpha r + 2\alpha^2 r - 2\alpha r^2 + \alpha^2 r^2\right) +$$
$$\left.e^2\left(\alpha^2 r^2 - 4\alpha + r^2 + 4\alpha^2 - 4\alpha r - 2\alpha r^2 + 4\alpha^2 r\right)\right)^{1/2}\ ] \div (-H\alpha + e\alpha)$$

In this section, we illustrate the main aim of an expansionary monetary policy, i.e, to give a stimulus for investment and employment by lowering financing costs. However, our analysis is not complete in all respects. For example, we only regard the financing costs of the *sunk* investment costs. We do *not* explicitly consider the need for financing also those fixed capital costs of the whole investment project that are *not* sunk. Implicitly, this could be taken into account in our model by an increase of e (the residual revenue before financing sunk costs). Instead, we feel justified to assume in a simplifying fashion that all investment costs are sunk due to, e.g., irreversibility. The reason is that investments are to a large extent firm-specific and thus have to be considered as sunk from an ex post perspective.[23]

3.3.2.2 Special cases: No and complete pass-through of the short-term interest rate on the expected long-term interest rate

We have to consider the following special cases, which are highly relevant in our monetary policy effectiveness context:

(A) The first special case consists of the assumption of $\alpha = 1$. This parameter restriction implies static expectations, i.e. a complete identity of the short-term interest rate and the expected long-term interest rate. This exactly corresponds to scenario investigated by Belke and Goecke (1999):

(10) $\text{for}\alpha = 1 : \quad i^{c}_{,entry} = \frac{e}{H - e} > 0 \qquad \text{with} \quad H > e.$

According to eq.

(10), the interest rate has to be smaller than the "internal return" of the investment project. The “internal return” can be defined as the gross revenue e divided by irreversible investment costs H minus the instantaneous revenues from the first period, which instantaneously partly cover the investment costs.

(B) The second scenario is $\alpha = 0$, i.e. the current performance of short-term interest rates, is meaningless for the expectation of long-term interest rates. In other words, market participants expect a "mean reversion" towards the base value r after the central bank has

[23] The model was augmented by us to take account of this effect. The results become a little weaker. However, the pattern of the results stays the same. The results are available on request.

"shocked" the money market rate (at least on average in the long run, such as in an error-correction model):

$$(11) \quad \text{for } \alpha = 0: \quad i^{c}_{,entry} = \frac{2e + \frac{e}{r} - H}{H - e}$$

3.3.3 The model under one-off uncertainty and the possibility of waiting

Uncertainty about future revenues, like after September 11th 2001 and before the Iraq conflict in early 2003, typically generates an option value of waiting, and therefore introduces a bias in favour of a "wait-and-see" strategy. Since the firm's investment / employment decision can be understood as irreversible, we follow a *real option approach*. The firm's investment / employment opportunity corresponds to a call option that gives the firm the right to invest and employ, sunk investment / hiring costs being the exercise price of the option, and to obtain a 'project'. The option itself is valuable, and exercising the investment "kills" the option.

We analyse the effects of an expected future stochastic one-time shock. However, assuming a risk-neutral firm, we abstract from risk-aversion. Focusing on the impacts of uncertainty on the effectiveness of monetary policy, we further develop an idea originally proposed by Dornbusch (1987), pp. 8 f., Dixit (1989), p. 624, fn. 3, Bentolila, Bertola (1990), and Pindyck (1991), p. 1111. Option price effects are modelled in a technically sophisticated way in these references. However, based on the model by Belke, Goecke (1999), we model uncertainty effects as simple as possible, since the basic pattern to the effects of uncertainty are left unchanged.

We assume a non-recurring single stochastic change in the gross revenues, which can be either positive ($+\varepsilon$) or negative ($-\varepsilon$) (with $\varepsilon \geq 0$, mean preserving spread). This kind of binomial stochastic process was introduced into the theory of option pricing by Cox, Ross and Rubinstein (1979). Both realisations of the change ε are presumed to have the same probability of $½$: $e_{t+1} = e_t \pm \varepsilon$ and $E_t(e_{t+1}) = e_t$. From period t+1 on, the potential investor will be able to decide under certainty again. The stochastic change between t and t+1 leads to an increase in the gross revenue trigger. If the latter is passed, investment becomes worthwhile. Moreover and even more important in our context, the interest rate i which makes an investment worthwhile becomes lower than in the base scenario without option value effects.

Under certainty, the relevant alternative strategies are to invest immediately or not. Under uncertainty and the *feasibility to delay* an investment, a third alternative has to be taken into account: the option to wait and to make the respective investment decision in the future. The option to invest in the future is valuable because the future value of the 'asset' obtained by the investment is uncertain. If its value decreases, the firm will not need to invest and will only lose what it has spent to keep the investment opportunity. This limits the risk downwards and with this generates the inherent value of the option.

A *previously inactive firm* has to decide whether to invest now or to stay passive, including the option to invest later. The firm anticipates the possibility of internalising future gains by an investment in t+1 if the future revenue turns out to be favourable ($+\varepsilon$). Besides, the firm foresees that it can avoid future losses if the revenue change will be negative ($-\varepsilon$) by staying passive. Waiting and staying inactive implies zero profits in t. Conditional on a, the firm will use its option to invest in t+1 causing discounted sunk investment / hiring costs

$\delta_0 \cdot H$, and gaining an annuity value of $\delta_0 \cdot (e+\varepsilon)/(1-\delta_1)$. Thus, the present value in the case of a (+ε)-realisation is:

$$(12) \quad -\delta_0 \cdot H + \frac{\delta_0 \cdot (e_t+\varepsilon)}{1-\delta_1} \qquad \text{resp.} \qquad \frac{-H}{1+i} +$$

For a (–ε)-realisation the firm will remain passive with a present value of inactivity being 0. Consequently, the expected present value of the wait-and-see strategy is given by $E_t(V^{wait},_t)$ in eq.

(13). Hence, the expected present value of the wait-and-see strategy in period t is defined as the probability-weighted average of the present values of both ±ε-realisations:

$$(13) \quad E_t(V^{wait},_t) = \frac{1}{2} \cdot \left(-\delta_0 \cdot H + \frac{\delta_0 \cdot (e_t+\varepsilon)}{1-\delta_1} \right) = \frac{1}{2} \cdot \left(\frac{-H}{1+i} + \frac{e_t+\varepsilon}{(1+i) \cdot \left(1 - \frac{1}{1+r+\alpha \cdot (i-r)} \right)} \right)$$

The expected present value of an immediate investment (without re-exit) is $E_t(V^{entry},_t)$:

$$(14) \quad E_t(V^{entry},_t) = -H + e_t + \frac{\delta_0 \cdot e_t}{1-\delta_1} \qquad \text{since} \quad E_t(e_{t+1}) = e_t$$

The option value of having the flexibility to make the investment decision in the next period rather than to invest either now or never, can easily be calculated as the difference between the two expected net present values: $OV(e_t, \varepsilon) = E_t(V^{wait},_t) - E_t(V^{entry},_t)$, with: $\partial OV/\partial e_t < 0, \ \partial OV/\partial \varepsilon > 0$. An increase in uncertainty enlarges the value of the option to invest later. The reason is that it enlarges the potential payoff of the option, leaving the downside payoff unchanged, since the firm will not exercise the option if the revenue falls. The firm is indifferent between investment in t and wait-and-see if

$$(15) \quad E_t(V^{wait},_t) = E_t(V^{entry},_t) \qquad \text{i.e. indifference if} \quad OV = 0$$

$$\Leftrightarrow \ \frac{1}{2} \cdot \left(-\delta_0 \cdot H + \frac{\delta_0 \cdot (e_t+\varepsilon)}{1-\delta_1} \right) = -H + e_t + \frac{\delta_0 \cdot e_t}{1-\delta_1}$$

The revenue entry trigger under uncertainty follows as (investment for $e_t > e^u,_{entry}$):

$$(16) \quad e^u,_{entry} = \frac{2H - 2\delta_1 \cdot H - \delta_0 \cdot H + \delta_0 \cdot \delta_1 \cdot H + \delta_0 \cdot \varepsilon}{2 + \delta_0 - 2\delta_1}$$

From this equation, it becomes obvious that *uncertainty increases the probability that a firm stays passive*; since ε enter the expression in a positive way.

However, some words (and calculations) of *caution* seem to be justified at this stage of analysis. Our assumptions with respect to entry and exit for plus respectively minus ε are of course only valid if investors really enter the market in period t+1, if (+ε) is realized and if

there is really no entry in t+1 in cases of realisation of (–ε). A firm enters in period t+1 only if the trigger under certainty $e^{c,t+1}{}_{,entry}$ is passed. Since the calculation of the option has to be based on assumptions that are dynamically consistent, an additional condition for the size of the shock ε (see below) becomes necessary. Mathematically, the necessary condition for this can be calculated as follows (assumption):

$$(17) \quad 0 = -H + e^{c,t+1}{}_{,entry} + \frac{\delta_1 \cdot e^{c,t+1}{}_{,entry}}{1-\delta_1} \quad \Leftrightarrow \quad e^{c,t+1}{}_{,entry} = (1-\delta_1) \cdot H$$

$$(18) \quad \varepsilon > \varepsilon_{min} \qquad \text{with} \qquad \varepsilon_{min} = \frac{(1-\delta_1) \cdot (\delta_0 - \delta_1) \cdot H}{1-\delta_1+\delta_0}$$

This result implies that normally ε has to be a little bit larger than zero (in fact by not too much, since the difference $(\delta_1 - \delta_0)$ in the numerator is not too large). In the case of the significant kind of uncertainty analysed in this paper (September 11th and Iraq conflict), this assumption should be valid anyway. Approximately, this condition implies that ε has to be larger than zero. In the special case $\alpha = 1$ (i.e. $\delta_0 = \delta_1$) the following relation holds exactly:

$$(19) \quad \text{for } \alpha = 1 : \quad \varepsilon_{min} = 0 \quad \Leftrightarrow \quad \varepsilon > 0.$$

In this case ($\alpha = 1$), the profit trigger $e^{u}{}_{,entry}$ under uncertainty and the option of waiting converges to the trigger calculated for the case without the option of waiting $e^{c}{}_{,entry}$ ("c-trigger") if the size of the shock ε converges to zero.[24] Insofar as assumption (18) of a minimum realisation of ε is valid, the following relation holds (which can be shown mathematically, proof is available on request):

$$(20) \quad \text{If } \varepsilon > \varepsilon_{min} \quad \text{then} \quad e^{u}{}_{,entry} > e^{c}{}_{,entry}$$

Hence, uncertainty leads to a *higher revenue entry trigger,* which by itself causes a *more hesitant investment behaviour* that the central bank has to take into account when measuring out its intended interest rate changes. However, the final aim of our calculations is to identify the interest rate entry trigger which is of central importance for the central banks as a benchmark for interest rate setting in times of uncertainty.

The short-term interest rate threshold that makes investment worthwhile (and thus triggers off investment activity) under revenue uncertainty can be calculated as follows:

[24] If α is not equal to one, this is valid only approximately. This is due to the following. If we calculate the option value, in the formula of the present value in case of activity (realisation of + ε) only δ_1 is used for discounting, whereas in the case of immediate entry under certainty in the first period t the discount factor δ_0 (i.e., the short-term interest rate i) has to be applied. If α is smaller than one, there is a difference between i and i_1. However, these considerations are not decisive, if ε reaches the minimum level calculated before.

(21)

$$
\begin{aligned}
i^{u}_{,entry} = \frac{1}{2}[&e(2\alpha r - 3\alpha - 2r) + H(\alpha - 2\alpha r + 2r) + \alpha\varepsilon \\
&\pm\Big(H\Big(-8er^2 + 16e\alpha r - 16e\alpha^2 r + 16er^2\alpha - 8e\alpha^2 r^2 - 6e\alpha^2 - 8\alpha\varepsilon + 2\alpha^2\varepsilon - 4\alpha r\varepsilon + 4\alpha^2 r\varepsilon + 8\alpha e\Big) \\
&+ H^2\Big(4r^2 + \alpha^2 - 4\alpha r + 4\alpha^2 r - 8\alpha r^2 + 4\alpha^2 r^2\Big) \\
&+ e^2\Big(4\alpha^2 r^2 - 8\alpha + 4r^2 + 9\alpha^2 - 12\alpha r - 8\alpha r^2 + 12\alpha^2 r\Big) \\
&+ \varepsilon\big(\alpha^2\varepsilon + 4e\alpha r - 4e\alpha^2 r - 6e\alpha^2 + 8e\alpha\big)\Big)^{1/2}\ ] \div (-2H\alpha + 2e\alpha)
\end{aligned}
$$

The calculation of the entry trigger is simpler in the special cases of the parameter restrictions $\alpha = 1$ and $\alpha = 0$. Let us start now with the calculation of the interest rate entry trigger when the *first* kind of restriction is relevant (for $\alpha = 1$):

(22) for $\alpha = 1$: $$i^{u}_{,entry} = \frac{1}{4}\frac{H - 3e + \varepsilon \pm \sqrt{H^2 + 2eH - 6H\varepsilon + e^2 + \varepsilon^2 + 2e\varepsilon}}{-H + e}$$

Like in the case of the revenue trigger for $\alpha = 1$, this result converges towards the result under certainty if ε moves towards zero. The interest rate entry trigger when the *second* type of restriction is relevant (for $\alpha = 0$) can be calculated as follows:

(23) for $\alpha = 0$: $$i^{u}_{,entry} = \frac{1}{2}\frac{r(H - 3e + \varepsilon) - e + \varepsilon}{r(-H + e)}$$

Hence, uncertainty leads not only to a higher revenue entry trigger, but also to a *lower interest rate entry trigger*. Hence, a central bank has to take an area of non-reaction into account when thinking about lowering its interest rate. In this sense, monetary policy becomes less effective.

Starting, for instance, with a model with two successive stochastic revenue changes (as conducted by Belke and Goecke (1999) for successive exchange rate changes), our analysis could be extended by adding more periods of uncertainty, which induces the calculation of additional option value effects. This implies a repeated backward induction along the lines taken above, but this would be a hard way to walk. Another possibility is the transition to continuous time models with permanent uncertainty. However, we dispense with the use of the latter, since it implies the application of advanced mathematical tools (e.g. Ito's lemma) without leading to significant additional insights concerning our research purposes.[25]

[25] For an application of continuous time models in a related context see Darby et. al. (1997), Calcagnini, Saltari (1998), Dixit (1989), pp. 624 ff., Dixit, Pindyck (1994), pp. 59 ff., and Pindyck (1991), pp. 1118. Adding further periods of uncertainty will lead to a further widening of the band of inaction. However, these additional option value effects will be the smaller the more far in the future the uncertain shocks will occur, since the effects of the shock are discounted more and more. Thus, even in the case of a permanent uncertainty, the option value effect would not be infinitely large, but converges towards an upper bound. See e.g. Dixit (1989) for a model with permanent uncertainty and a limited width of the band of inaction.

3.3.4. Numerical examples

In order to convey an idea of the impacts of the underlying model and to illustrate our results, we calculate two simple numerical examples. In the first example (first scenario) we let the hiring and firing costs be quite large with an eye on the fact that in the euro area institutional rigidities may lead to such high realisations of H.[26] We take the short-term interest rate given as $i = 2\%$ and the "base value" for the expected long-term interest rate as $r = 10\%$ per period. The parameter α is set to 0.5, i.e. the expected long-term interest rate corresponds to an arithmetic average of the short-term interest rate and the "base value" r for the expected long-term interest rate. Later on, we compare the results for $\alpha = 0.5$ with the special cases of $\alpha = 0$ (second scenario) and $\alpha = 1$ (third scenario).

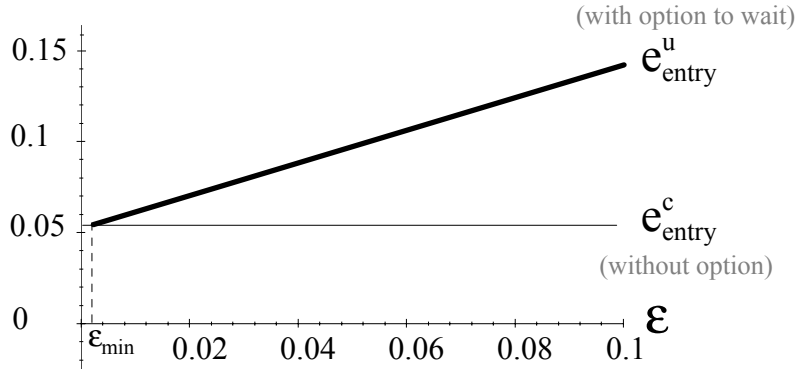
First scenario: **α = 0.5 ; H = 1** *(normalized)* **; r = 0.1**

$e^{c}_{,entry} = 0.05458437389$; $e^{u}_{,entry} = 0.05277401895 + 0.8964817321\ \varepsilon$

$\varepsilon_{min} = 0.002019399700 < \varepsilon$

Fig. 1: Gross profit trigger $e^{u}_{,entry}$ *dependent on uncertainty / shock size* ε

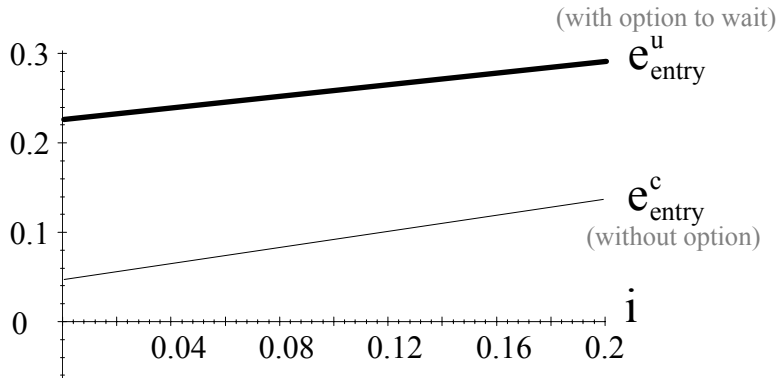
[first scenario ($\alpha = 0.5$), infinite time-horizon, $i = 0.02$]



[Comment: the higher the uncertainty ε is,
the higher is the profit e which is necessary for triggering an entry/investment.]

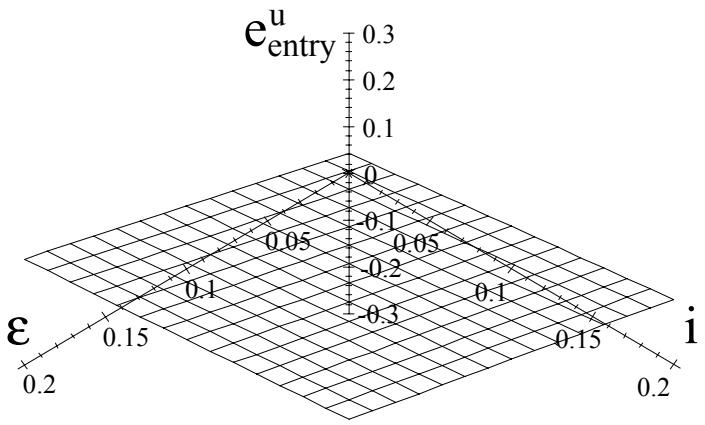
[26] For lower values of H in the US case see Krugman (1989), p. 57.

Fig. 2: Entry trigger profit under uncertainty $e^{u}_{,entry}$ *dependent on short term interest rate i [first scenario (*$\alpha = 0.5$*), and "uncertainty"* $\varepsilon = 0.2$ *]*



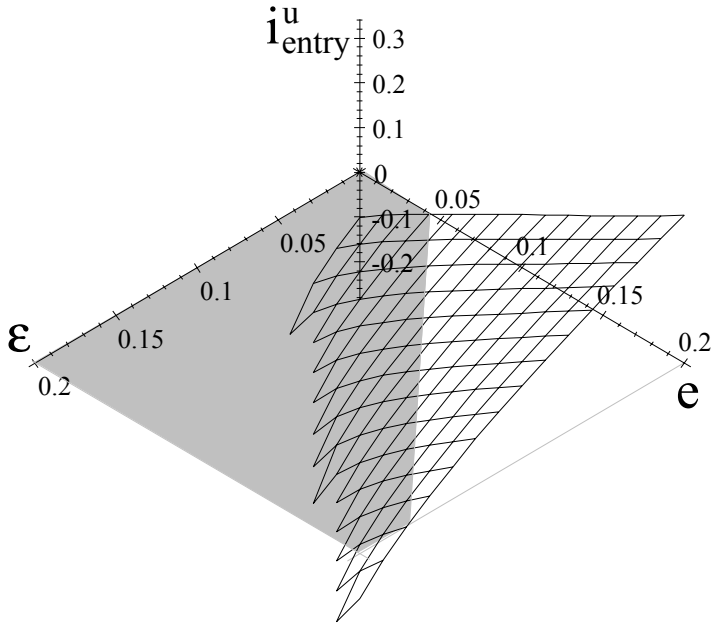
[Comment: the higher the short term interest rate i is,
the higher is the profit e which is necessary for an entry / investment.
However, the effect of short-term interest rate on trigger profit under uncertainty is relatively weak.]

Fig. 3: $e^{u}_{,entry}$ *dependent on* ε *and i [first scenario (*$\alpha = 0.5$*)]*



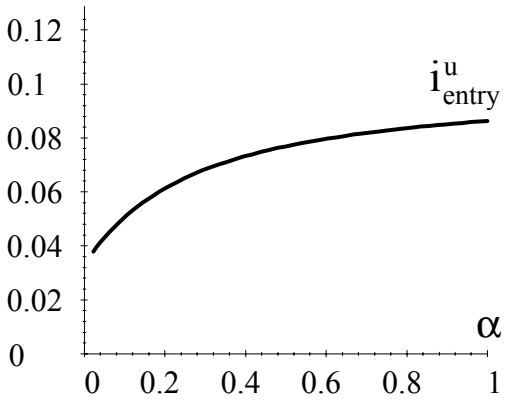
[Comment: the lower the short-term interest rate i and the lower uncertainty ε is,
the lower is the profit e which leads to an entry/investment.]

Fig. 4: Interest rate entry trigger $i^{u}_{,entry}$ *dependent on gross profit e and uncertainty* ε
[first scenario ($\alpha = 0.5$*)]*



[Comment: in a situation with high uncertainty and low gross profits,
interest rates have to be very low in order to induce an entry/investment.
Grey area: combinations of ε and e, where a non-negative short term interest rate is not compatible with an investment, i.e. monetary policy is not effective in a situation with uncertainty and low profits]

Fig. 5: Interest rate entry trigger $i^{u}_{,entry}$ *dependent on pass-through parameter* α
[except α*: first scenario and revenue* $e = 0.25$ *, uncertainty* $\varepsilon = 0.2$ *]*



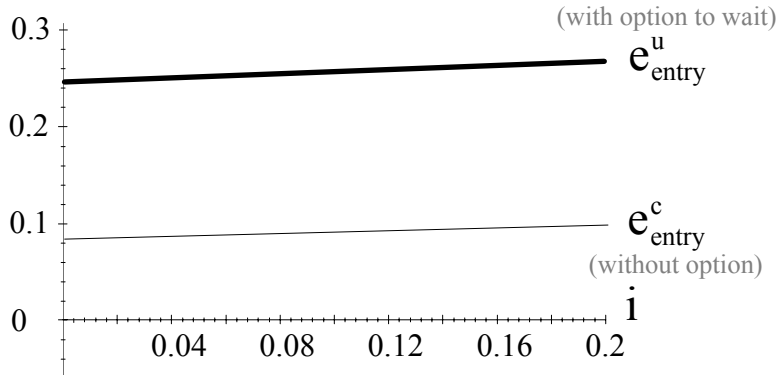
[Comment: the higher the pass-through parameter α of short-term to long-term interest rate is, the lower is a necessary reduction of the short term interest rate i resulting in an entry/investment. I.e. the higher α, the more effective is an interest rate reduction.]

Second scenario: $\alpha = 0$ (other: see first scenario)

$e^{c}_{,entry} = 0.08485856905$; $e^{u}_{,entry} = 0.07975460122 + 0.8435582822\ \varepsilon$

$\varepsilon_{min} = 0.006050521857 < \varepsilon$

Fig. 6: Entry trigger profit under uncertainty $e^{u}_{,entry}$ *dependent on short-term interest rate i [second scenario (*$\alpha = 0$*), and uncertainty* $\varepsilon = 0.2$ *]*



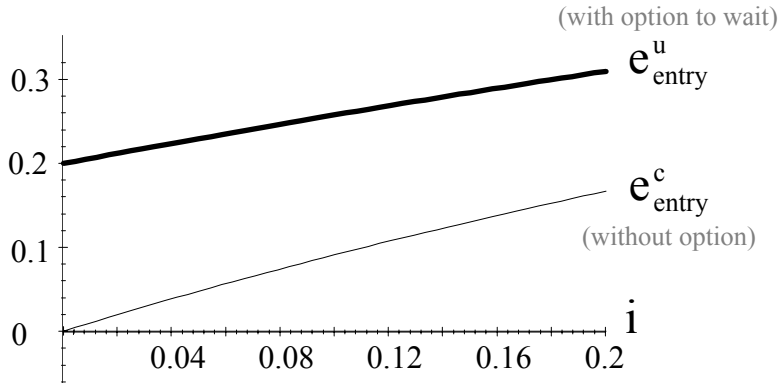
[Comment: in a situation without any spillover of short-term interest rates i on expected long-term interest rates, the impact of short-term interest rates is very weak,
i.e. monetary policy is very ineffective.]

Third scenario: $\alpha = 1$ (other: see first scenario)

$e^{c}_{,entry} = 0.01960784314$; $e^{u}_{,entry} = 0.01960784314 + 0.9615384615\ \varepsilon$

$\varepsilon_{min} = 0 < \varepsilon$

Fig. 7: Entry trigger profit under uncertainty $e^{u}_{,entry}$ *dependent on short-term interest rate i [third scenario (*$\alpha = 1$*), and* $\varepsilon = 0.2$ *]*



[Comment: in a situation with a complete pass-through of short-term rates to long-term interest expectations, we have a strong impact of i on the entry-trigger profit.
However, this effectiveness is again weakened by uncertainty in a situation with the option to wait.]

Taking into account the option values induced by revenue uncertainty implies an amplification of hysteresis effects. Our theoretical results are compatible with recent empirical stud-

ies, which show that option values can be large. Hence, monetary policy actions which rely on investment rules that do not take the latter into account can be very misguided.[27]

3.4. Conclusions

How do the theoretical results gained in this chapter fit with our last report? It gives an answer to one important question we explicitly addressed in our last report: did the ECB systematically follow the US Federal Reserve in setting interest rates? We argued that if we find evidence in favour of this hypothesis, it would imply improvements of interest rate forecasts. However, it was difficult to document "conventional wisdom" because it seems so obvious to everybody that few bother to actually provide evidence for it. While many seem to be convinced that the ECB does follow the Fed, few seem to ask the obvious question: why should the ECB follow the Fed? The simplest explanation would be that moves by the Fed provide the ECB with an important signal (about the state of the US economy and financial markets). One implication of this explanation would be that the ECB should follow the Fed almost immediately because it would not have any reason to delay its move once the signal has been given. One could thus account for the episode related above (e.g., Begg et al. 2002, p. 42). The problem with this argument is that it implies that then the Fed should also follow the ECB because the euro area is of a similar size to the US economy. However, nobody seems to suggest that the Fed might also follow the ECB.

Another explanation might be that the US cycle precedes that of the euro area so that the ECB might appear to follow the Fed, but in reality it just reacts to the evolution of the euro area's cycle, which happens to lag that of the US. The problem with this explanation is that leads and lags in macroeconomic variables like output and employment are usually measured in months or quarters (Begg et al. (2002), pp. 41 ff., estimate the lag at 3-5 months), whereas the ECB is usually assumed to follow the Fed within a much shorter time frame (see, e.g., the events after September 11th, 2001). Moreover, the business cycle effect should be accounted for by the autoregressive element that is present in standard causality tests. Lastly, recent research clearly demonstrated that the impact of the US business cycle has become significantly weaker throughout the nineties as compared to the seventies and eighties. This is mainly due to the emergence of multinational firms, which can afford to stick to longer-term strategies independent of business cycle troughs (Schroeder et al. 2002). Hence, this approach is also not well-suited as an explanation for the "leader-follower" pattern.

Perhaps the most popular explanation why the ECB might follow the Fed is that the ECB is simply slow and inefficient. This explanation would roughly run as follows: the world's financial markets were buffeted over the past years by the emergence and then the bursting of an asset price bubble. The leadership of the Fed (Mr. Greenspan in particular) is simply smarter and was quicker to spot the problems. After the Fed's surprise half-point rate cut on 3 January 2001, the markets have clamoured for a cut by the ECB, providing numerous unfavourable comparisons between the Fed chairman and his European counterpart. By contrast, so the story seems to go, the ECB is a new institution that still has to find its ways, and its decision making body is too large to come to quick decisions, especially given that it usually tries to forge a consensus before moving (Belke, 2003a, Wyplosz 2001).

Another explanation which is heavily stressed in this chapter of the report could be grounded in a fundamental difference between the US and the euro area economies: namely that the US economy is more flexible. This has important implications especially in times of

[27] See e.g. the studies cited by Dixit and Pindyck (1994), p. 7.

heightened uncertainty. This can be seen most easily through the concept of the "option value of waiting". This concept formalises a common sense decision rule: if a decision involves some sunk costs, or any other element of irreversibility, it makes sense to postpone the decision until the uncertainty has been resolved. The temptation to postpone investment decisions is particularly strong when sunk costs are high and when the uncertainty is likely to be resolved in the near future. One can imagine in particular enterprises that have to consider normal investment projects, i.e. projects that would be slightly profitable under current circumstances and even more profitable in case the uncertainty is resolved in a positive sense, but would lead to losses if the uncertainty is resolved in a negative sense. In this case the enterprise would loose little (in terms of foregone profits) if it waited with the decision. Once the uncertainty has been resolved it would still have the option to proceed if the outcome is positive.

The concept of the "option value of waiting" has relevance to ECB monetary policy. If, during times of unusual uncertainty, the ECB cuts rates today, it risks having to reverse its decision soon. The ECB should thus cut today only if it is convinced that such a move would make sense even if the uncertainty were resolved in a positive way. In this sense, monetary policy is not a game of "follow my leader", but of setting the right policy in the light of domestic inflation and growth prospects (Gros and Belke, 2003).

As transactions costs (which are effectively sunk costs) are more important in the euro area than in the US, it follows that for the ECB the option value of waiting for more information should be higher and might thus explain why the ECB is slower to react to signals than the Fed. However, the problem with this explanation is that it should hold only for periods when volatility is temporarily higher than usual because the option value argument is valid only if the uncertainty is resolved (diminished) after a certain period. The option value of waiting argument should thus apply only when financial markets are "excessively" turbulent. We find some evidence for this hypothesis in the sense that we find that it is mainly after September 2001 that the Fed seems to influence the ECB (and not vice versa).[28] Hence, the ECB was right and acted rationally in withstanding the pressure for an easier monetary policy for some time.

How did we model the impact of uncertainty on the effectiveness of monetary policy? This chapter of the report gives a clear answer on this where a model leading to a hesitant investment / employment decisions due to sunk investment-/ hiring-costs is proposed. This 'weak' relationship ('band of inaction') between investment / employment and the interest rate was augmented by revenue uncertainty. As a result of option value effects, the relationship between the interest rate and the investment is strongly weakened by uncertainty (as numerical examples demonstrate). Thus, monetary policy may be very ineffective in an uncertain economic environment.

The model proposed before was based on a *risk-neutral single-unit* (dis)employment decision under revenue uncertainty induced by revenue (step) volatility and fixed *sunk (i.e. irreversible)* investment and hiring costs. In principle, it can be compared with other models were an irreversible investment decision is analysed. In contrast to similar work in that area we did not rely on the asymmetry of adjustment costs (Caballero, 1991) and on scrapping values (Darby et. al., 1997), since we analysed also 'investments' in employment and did not focus only on real capital investments. Additionally, the degree of competition in the output market and economies of scale (Caballero, 1991) did not play a predominant role since we analyse a single-unit decision.

[28] See extensively Belke (2003).

As an example, we felt justified to ascribe revenue volatility solely to the events of September 11th and the Iraq conflict. However, since uncertainty ε was included additively in the revenue function it was straightforward to interpret ε as an all comprising expression of uncertain revenues like, e.g., disequilibria of the US economy since the turn-of-year 2000/01 (current account, consumer financial position, over-investment). Moreover, the relation (including the band-of-inaction-characteristic) between investment / employment and all its determinants (not only interest rates but also e.g. the wages and the oil prices) was affected by uncertainty. Thus, the impacts from sunk costs and uncertainty are manifold. We only calculated interest rate triggers, holding other determinants of investment / employment constant. To summarise, compared to the prediction of the majority of models of monetary policy transmission, real world investment / employment may appear less sensitive to changes in the interest rate, due to uncertainty.[29]

How do our formal considerations fit with the monetary policy strategy of the ECB in reality? According to its two-pillar strategy, the rationale for the ECB for taking investment / employment demand functions into account when deciding on interest rate cuts is to support general economic policy in times of low inflation. Moreover, empirical evidence as a stylised fact comes up with the result that Taylor-rule type monetary policy reaction functions describe the actual behaviour of the ECB quite well. Until the unforeseeable future, the ECB will be confronted with an unusually highly uncertain environment. First, many of the underlying causes of worldwide uncertainty do not seem to be resolved, although the Iraq conflict itself was terminated unexpectedly early. Second, it cannot be excluded that the effects of the quick termination of war actions in the Gulf region are more than compensated by an increase in uncertainty with respect to the shape of the post-war world order. As long as uncertainty stays relevant, the approach of the option value of waiting should be relevant for the monetary policy of the world's leading central banks.

In light of this chapter's results, the remarks on the ineffectiveness of monetary policy made in the introduction are corroborated in a subtle sense. Under the presumption of a net reduction of revenue uncertainty, the investment / employment impacts of a lower interest rate level continue to be twofold. A reduction of uncertainty, e.g. after the end of the Iraq conflict, will lead to a contraction of the band of inaction. Thus, the interest rates triggering investments need not to be as low as before. Hence, the effectiveness of expansionary monetary policy via cutting interest rates is increased (lowered) by a low (high) degree of uncertainty.

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[29] In order to derive macroeconomic implications which are empirically testable Belke and Goecke (1998) deal with the aggregation of the approach proposed in this paper. They assume that the firms have different exit ("disinvestment") and entry ("investment") triggers. Special attention is paid to the problem of aggregation under uncertainty. It is shown that under uncertainty bands of inaction have to be considered even at the macroeconomic level. Due to the similarities of the macro relations under uncertainty to the micro behaviour derived in this contribution our micro-approach can serve as a first base for empirical tests.

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Part 4: ECB policy review and outlook

CONTENT: *4.1 Monetary policy in the last 6 months. – 4.2 Digression I: The demand for bank credit in the euro area. – 4.3 Digression II: Deflation – a threat for the euro area? – 4.4 Inflation and ECB rate forecast.*

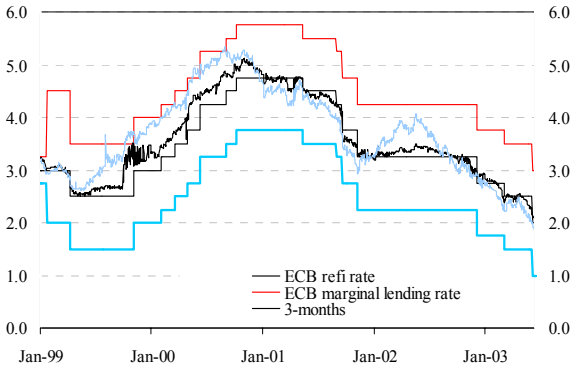
SUMMARY: *Since December 2002, the ECB's rate cuts appear to have been largely motivated by the decline in the HICP inflation and short-term business cycle considerations. The medium- to long-term inflation indicators, such as the "real money gap", did not play an important role in the bank's decisions. In the euro area, deflationary pressure is not discernible. Liquidity is very high with the "real money gap" having risen to more than 6%, representing a substantial inflation potential. Bank loan expansion, though having declined since 2000-Q3, does not suggest any supply side restrictions but seems to be in line with the cyclical position of the euro area. The ECB is most likely to lower rates further towards 1.5% until the end of this year. However, in view of the already very high money overhang and our inflation forecast of 1.8% for 2003 and 2.2% for 2004, such a policy might deteriorate the price stability outlook in the euro area. In the current economic environment, further monetary policy easing could run the risk of causing an "asset price inflation" and reducing the economic incentives to bring about structural reforms in the euro area.*

4.1 Monetary policy in the last 6 months

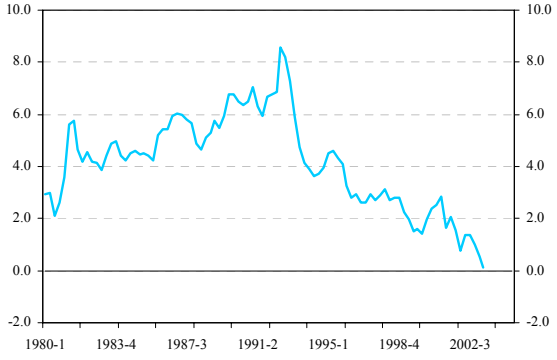
On 5 December 2002, the ECB lowered the main refinancing rate by 50bp to 2.75% (see Fig. 4.1.1 (a)). The deposit and marginal lending rates were lowered by the same amount to 3.75% and 1.75%, respectively. Since then, rates were reduced by a further 25bp on 6 March 2003 and another 50bp on 5 June 2003, bringing official central bank rates to an all-time low in the euro area. As of today, the ECB main refinancing rate stands at 2.0%, and the deposit and marginal lending rate at 3.0% and 1.0%, respectively. Real short-term rates in the euro area have hit the lowest level since the beginning of the 1980s (see fig. 4.1.1 (b)).

Fig. 4.1.1. – ECB official and money market rates in percent

(a) ECB official rates



(b) Real 3-months rates



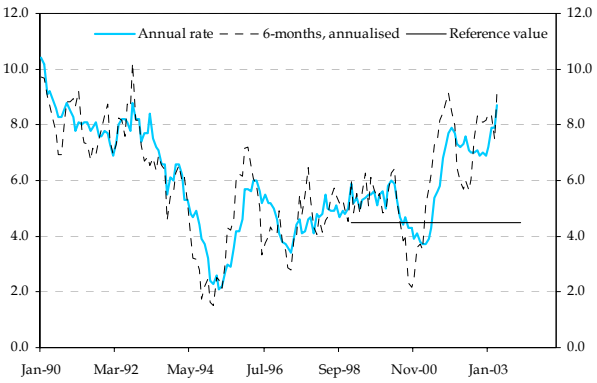
Data source: Bloomberg.

The ECB rate cut in March "reflected the Governing Council's assessment that the outlook for price stability over the medium term has improved in recent months, owing in particular to the subdued pace of economic growth and the appreciation of the exchange rate of

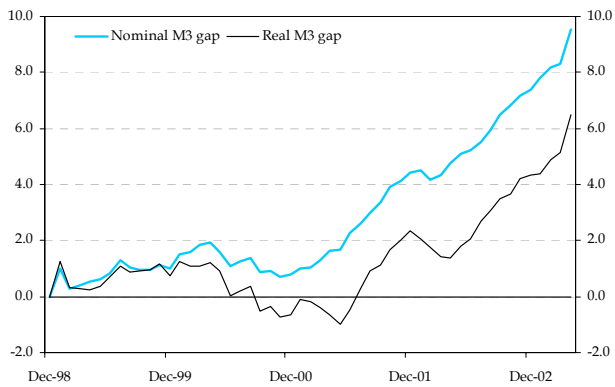
the euro."[30] A relatively similar rationale can be identified for the latest reduction in borrowing costs: it reflected "the Governing Council's assessment that the outlook for price stability over the medium term has improved significantly since interest rates were last lowered in March this year. The decision is in line with (…) the aim of maintaining inflation rates below, but close to, 2% over the medium term. At the same time, the interest rate reduction takes into account downside risks to economic growth."[31]

Fig. 4.1.2 – Monetary trends in the euro area

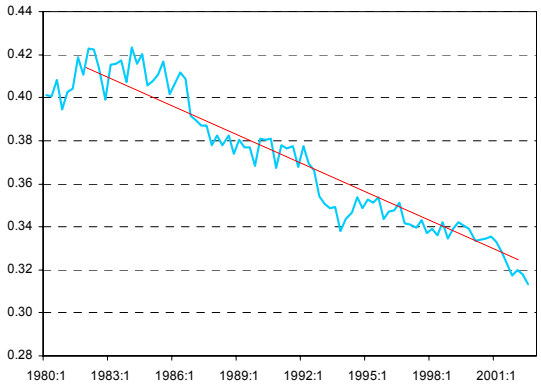
(a) M3 growth and reference value in percent



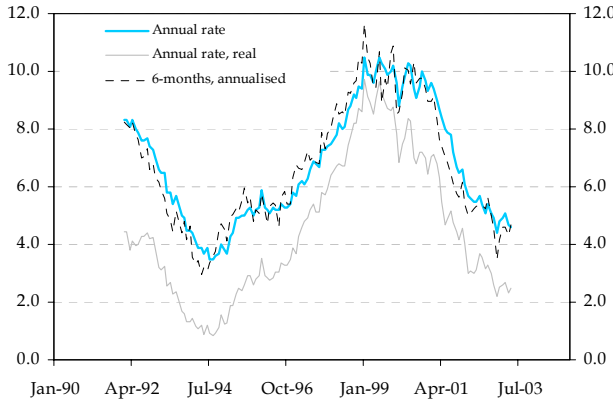
(b) "Nominal" and "real money gap" in percent



(c) Velocity of M3, 1980-Q1 to 2002-Q4



(d) Bank loan growth to non-banks in percent



Data source: ECB, Bloomberg, Thomson Financial; own calculations. – Real growth rates = nominal growth rates minus annual change of the consumer price index.

Current inflation and growth concerns can be largely held responsible for the ECB's rate cut decisions. Since the beginning of the year, the expansion of the stock of M3 and the "real money gap" has been remarkably strong (see Fig. 4.2 (a) and (b)). The ECB assigns the strong monetary expansion to an ongoing pronounced preference for holding liquid assets in an environment of high financial, economic and geopolitical uncertainty.[32] In view of weak economic activity and the bank's expectations that some of the portfolio shifts will be reversed once financial market uncertainty diminishes, the ECB does not consider the monetary overhang as a threat to future price stability. This assessment was supported by the ECB's interpretation that

30 ECB Monthly Bulletin, March 2003, p. 5.

31 ECB Monthly Bulletin, June 2003, p. 5.

32 As a rough indication, the ECB has estimated that annual M3 growth has been overstated by 2 ½% and 3 percent in 2003-Q1. See ECB Monthly Bulletin, May 2003, p. 14.

bank loan expansion to non-financial corporations has declined further in recent months, indicating a subdued money creation process.

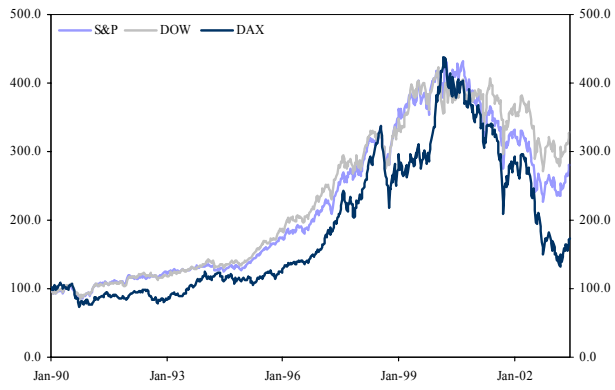
So far, the excess money has been "neutralized" by a decline of the velocity of M3 to below its medium- to long-term trend (see Fig. 4.2 (c)). However, given a trend-stable velocity of money, market agents can be expected to reduce their excessive money balances at some point in time. This would imply that the excess stock of M3 – even after making allowance for special factors – still bears substantial inflationary potential. Most importantly, the decline in bank loan growth to non-banks does not necessarily suggest supply-side restrictions, overly dampening money production (see the following paragraph). In fact, bank loan expansion could be interpreted as being in line with the cyclical developments in the euro area.

In view of the factors that might be held of dampening economic expansion – that is, for instance, ongoing geopolitical uncertainties, structural problems within numerous euro area economies and general doubts in the sustainability of social security systems and public sector finances – the question arises: is monetary policy actually in a position to bring the euro area economies back to a growth phase? Against the background of the factors mentioned above, it seems plausible that an adjustment of relative capital prices to new circumstances is required and inevitable. So lowering central bank rates further is hardly an adequate remedy for curing the euro area's economic malaise. In fact, a growing belief that necessary economic adjustments process of relative prices could be alleviated or even mitigated by monetary policy action bodes badly for future inflation.

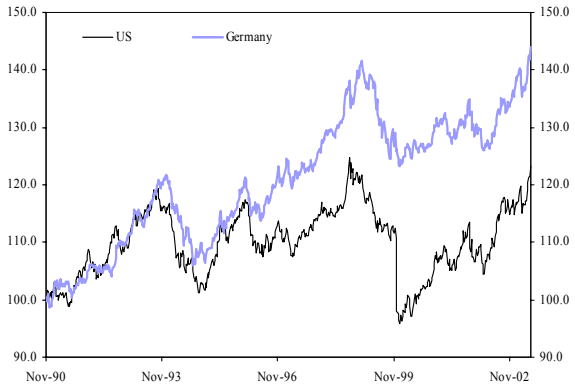
The expectation of an increased focus on immediate cyclical rather than medium- to long-term oriented inflation concerns is certainly supported by the ECB's monetary policy strategy revision on 8 May 2003. In particular, the de facto "shifting of the pillars" has increased the scope for discretionary policy action, especially so as the formerly "rule binding" represented by the first pillar has been diminished considerably. The stock of M3, which formerly played a prominent role, has been downgraded to an information variable: "The monetary analysis mainly serves as a means of cross-checking, from a medium to long-term perspective, the short to medium-term indications coming from economic analysis."[33] This change in weights assigned to the strategy pillars should certainly increase the claims for a business cycle oriented monetary policy.

Fig. 4.1.3. – Stock market and bond future prices

(a) Stock market prices



(b) Bond future prices



Data source: Bloomberg; own calculations. – January 1990 = 100.

33 ECB Press Release, The ECB's monetary policy strategy, 8 May 2003 (www.ecb.int).

Lastly, there might be the risk that excess money runs the risk of causing asset price inflation. This time presumably not in stock but in bond markets (see Fig. 4.1.3). Three interrelated factors might be held responsible for such a scenario. First, a heightened degree of risk aversion could induce market agents to place excess liquidity in relatively riskless assets, such as government bonds, rather than investing in new projects. Second, the expectation of further ECB monetary policy easing should suggest further gains from investing in the bond market from the point of view of the investor, bidding up asset, e.g. bond, prices. Third, the outlook of a further decline in central bank rates could foster expectations that the overall efficiency of the economy will be cemented rather than improved as an easier monetary policy could undermine the allocation function of the market.

4.2 *Digression I*: The demand for bank credit in the euro area

Declining growth rates of euro area bank loan growth (in nominal and real terms) extended to non-banks has attracted considerable attention (see Fig. 4.2 (a)). In public debate, this is occasionally interpreted as a looming "credit crunch" or "credit rationing" caused by supply-side restrictions, such as banks' increased risk aversion and shortage of equity capital.[34] However, the decline of bank loan growth might also be due to the underlying economic situation ("demand-side restrictions"): the decline in economic activity may have reduced the demand for bank loans, translating into lower bank loan growth. In the following, the results of a simple analysis are presented, which aims to find out whether the latest development of bank loan growth might be subject to any "irregularities", indicating problems in the banking sector that, in turn, require a heightened degree of monetary policy attention.

The analysis is based on a simple vector error correction model according to Engel-Granger (1969). First, a long-term equilibrium demand function for real bank loans (*lnLR*) is estimated. The explanatory variables are (i) real GDP (*lnGDPR*), (ii) the long-term interest rate (*lnIL*), and (iii) the annual change of the consumer price index (*d4lnCPI*) plus an error term, ε_t (*ln* represents logarithmic variables) for the period 1980-Q1 to 2003-Q1:

$$\ln LR_t = \beta_0 + \beta_1 \ln GDPR_t + \beta_2 \ln IL_t + \beta_3 d4 \ln CPI_t + \varepsilon_t$$

Tab. 4.2.2 shows the results, and Fig 4.3 (b) shows the stock of actual and estimated real bank loans and the residuals. In a second step, a difference equation was estimated, including the residuals of the long-term estimate lagged by one quarter (*d*1 (*d*4) represent first (fourth) differences):

$$d1d4 \ln LR_t = \underbrace{\beta_0 + \beta_1 d1d4 \ln LR_{t-1} + \ldots + \beta_2 d1d4 \ln CPI_t + \ldots + \beta_3 d1d4 \ln CPI_{t-1} + \ldots}_{Short-term\ dynamism}$$

$$\underbrace{\ldots \beta_4 d1d4 \ln GDP_t + \ldots + \beta_5 d1d4 \ln GDP_{t-1} + \ldots}_{Short-term\ dynamism}$$

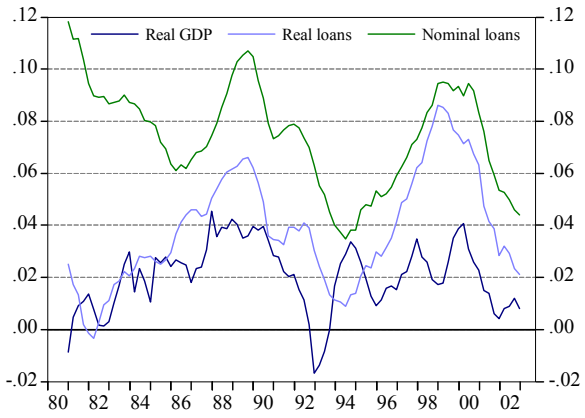
$$\underbrace{\ldots - c(\ln LR_{t-1} - \beta_0 - \beta_1 \ln GDPR_{t-1} - \beta_2 \ln IL_{t-1} - \beta_3 d4 \ln CPI_{t-1})}_{Error\ correction\ term} + \underbrace{\varepsilon_t}_{Shock} .$$

[34] For an analysis on German bank lending see, for instance, Deutsche Bundesbank, The development of bank lending to the private sector, Monthly Bulletin October 2002, pp. 31 – 46.

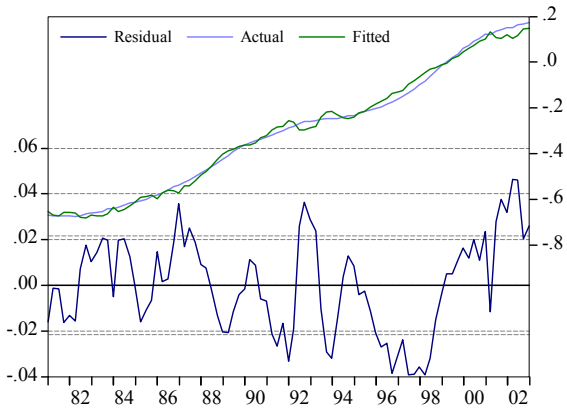
In addition, a dummy variable was included for 1990-Q2 (DUM902). If, for example, the credit volume is larger than postulated by this relationship, this produces a negative effect on current credit growth $(d1d4\ln LR_t < 0)$ of the order of the steep of adjustment (–c). The results are reported in Tab. 4.1 and Fig. 4.2 (c). The difference equation appears to be statistically reliable according to standard tests. The error correction term (ECT) exhibits a negative sign. The relative low coefficient of the ECT suggests that deviations from the equilibrium are being corrected only slowly over time.

Fig. 4.2. – Bank loan expansion in the euro area, 1980-Q1 to 2003-Q1

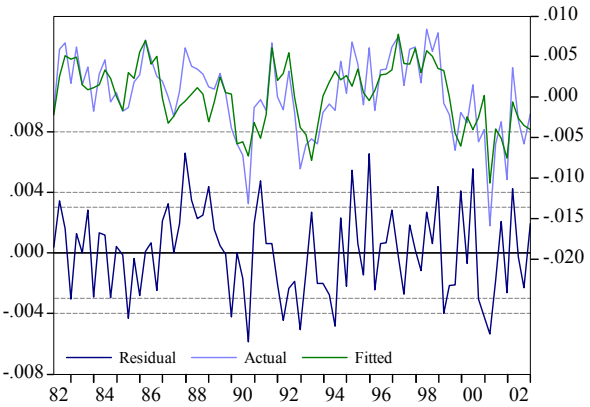
(a) Real GDP growth and nominal and real bank loan growth



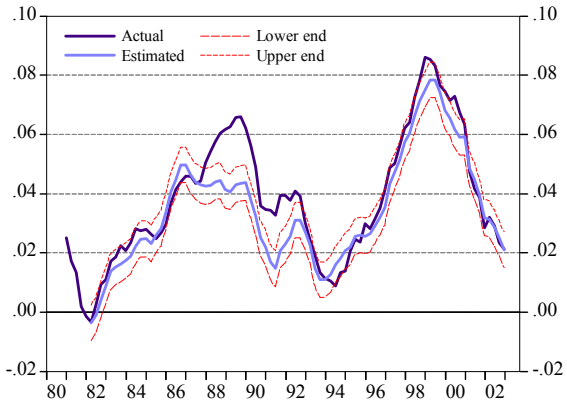
(b) Real bank loans, actual, fitted (RS) and residual (LS)



(c) Change in real bank loan growth, actual, fitted and residual



(d) Real bank loan growth, actual and estimated



Data source: ECB, Thomson Financial; own calculations.

Fig 4.2 (d) shows the actual and estimated real bank loan growth according to the error correction model and, in addition, the upper and lower two-times standard error. As can be seen, the model fits the actual development relatively well. Two factors stand out. First, in the second half of the 1990s ("New Economy Boom"), actual loan expansion tended to exceed slightly the estimated rates (but remained more or less within the standard error of the model). This might suggest that loan expansion could have been ascribed to factors which cannot be explained by real GDP, interest rates and inflation alone. Second, the decline of real bank loan growth starting around the beginning of 2000 can be relatively well explained by the model.

The findings could support the interpretation that demand side factors, e.g. a decline in loan demand, rather than supply side restrictions could be held responsible for this outcome.

Tab. 4.2.1. – Stationarity Tests (ADF-Test), 1981-Q1 to 2002-Q4

Variable	ADF-Test	Lags (number of quarters)
lnL	C, T, -0.619	4
lnLR	C, T, -2,887	4
lnGDP	C, T, -2.118	4
lnCPI	C, T, 2.774	4
Ln(1+I)	C, T, -2498	4
D4lnL	C, -1.831	4
D4lnLR	C, -2.430	4
D4lnGDP	C, 2.360	4
D4lnCPI	C, -3.476**	4
D4ln(1+I)	C, -3.227**	4
D1D4lnL	C, -3.421**	4
D1D4lnLR	C, -3.179**	4
D1D4lnGDP	C, -5.320***	4
D1D4lnCPI	C, -3.315**	4
D1D4ln(1+I)	C, -5.923***	4

Legend: *L* = nominal loans, *LR* = real loans (deflated with the consumer price index (*CPI*)), *GDP* = real gross domestic product, *I* = long-term interest rate, *D*1 (*D*4) first (fourth) difference, *ln* = logarithmic value, *T* = trend. – *** / ** / * = significance at the 1%, 5% and 10% level.

Tab. 4.2.2. – Long-term demand function for real bank loan in the euro area

Dependent Variable: LNLR
Sample(adjusted): 1981:1 2003:1
Included observations: 89 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDPR	1.652119	0.035156	46.99445	0.0000
LNI	-3.038035	0.259917	-11.68846	0.0000
D4LNCPI	2.987482	0.222590	13.42146	0.0000
C	-11.90266	0.264428	-45.01279	0.0000

R-squared	0.993614	Mean dependent var	-0.305904
Adjusted R-squared	0.993388	S.D. dependent var	0.266021
S.E. of regression	0.021631	Akaike info criterion	-4.785502
Sum squared resid	0.039770	Schwarz criterion	-4.673653
Log likelihood	216.9548	F-statistic	4408.286
Durbin-Watson stat	0.412894	Prob(F-statistic)	0.000000

Legend: see Tab. 4.2.1 – *C* = constant.

Tab. 4.2.3. – Difference equation for real bank loan demand in the euro area

Dependent Variable: D1D4LNLR
Sample(adjusted): 1982:2 2003:1
Included observations: 84 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D1D4LNLR(-1)	0.354274	0.080469	4.402608	0.0000
D1D4LNLR(-2)	0.289967	0.084748	3.421528	0.0010
D1D4LNLR(-4)	-0.178326	0.080866	-2.205216	0.0305
D1D4LNINFL	-0.607204	0.104150	-5.830091	0.0000
D(D4IL1(-1))	0.140537	0.055715	2.522440	0.0137
ECT(-1)	-0.054862	0.016388	-3.347628	0.0013
DUM902	-0.007218	0.003090	-2.336115	0.0221
C	-0.000250	0.000345	-0.724813	0.4708

R-squared	0.643110	Mean dependent var	0.000270
Adjusted R-squared	0.610238	S.D. dependent var	0.004829
S.E. of regression	0.003015	Akaike info criterion	-8.680203
Sum squared resid	0.000691	Schwarz criterion	-8.448696
Log likelihood	372.5685	F-statistic	19.56438
Durbin-Watson stat	1.859367	Prob(F-statistic)	0.000000

Legend: see Tab. 4.2.1. – *ECT* = error correction term, *DUM*902 = dummy variable for 1990-Q2.

Breusch-Godfrey Serial Correlation LM Test:			
Lag = 2			
F-statistic	0.973032	Probability	0.382718
Obs*R-squared	2.152440	Probability	0.340882
Lag = 4			
F-statistic	1.266494	Probability	0.291132
Obs*R-squared	5.521789	Probability	0.237821

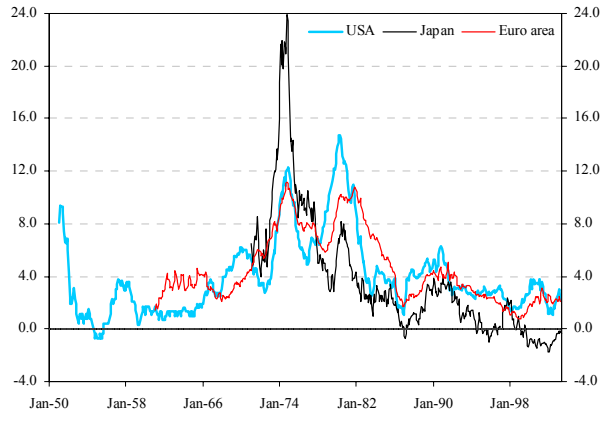
ARCH Test			
Lag = 2			
F-statistic	1.363345	Probability	0.261755
Obs*R-squared	2.735809	Probability	0.254640
Lag = 4			
F-statistic	1.408750	Probability	0.239301
Obs*R-squared	5.590625	Probability	0.231878

4.3 *Digression II*: Deflation – a threat for the euro area?

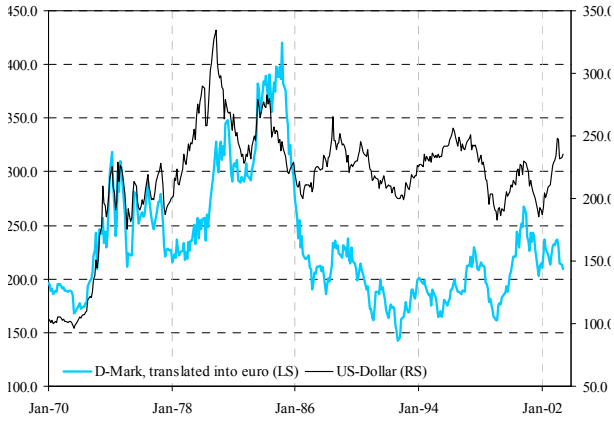
Deflation has become a major concern among central banks and the public at large. The term deflation implies a persistent decline in the economy's overall price level, consisting of prices of current production and prices of the already existing stock of wealth (housing, real estate, equities etc.). So far, the annual rise in consumer prices, representing central banks' target variable, in the euro area as well as in the US, has reached levels which have been seen last in the 1950s and 1960s (see Fig. 4.3.1 (a)). However, it seems to be the concurrence of relatively low inflation and subdued economic activity that might have provoked deflationary fears. Whereas deflation concerns are certainly gaining ground among many market commentators, it seems worthwhile to take a look at price action in financial market as this might provide a relatively "objective" assessment of prevailing inflation expectations.

Fig. 4.3.1. – Inflation in the Triade and CRB-future prices

(a) Inflation in the US, Japan and the euro area



(b) CRB-futures prices



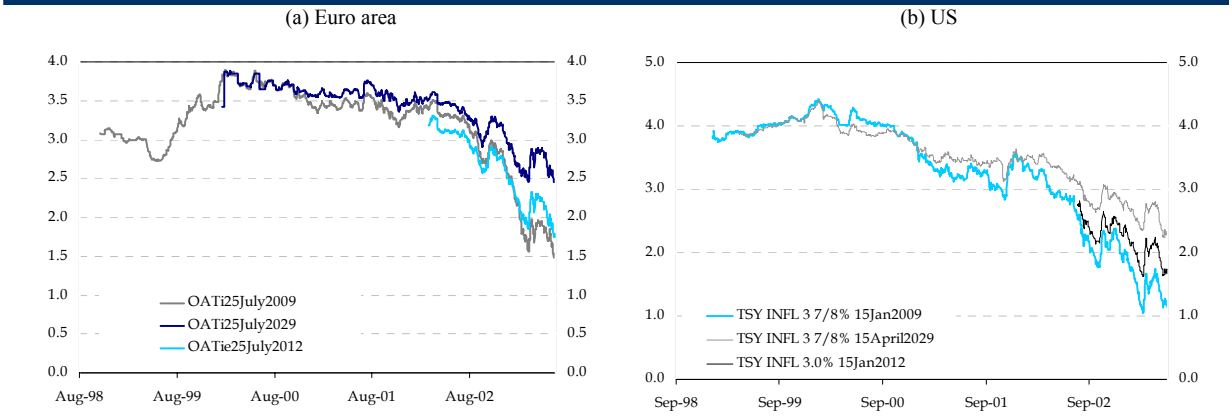
Data source: Thomson Financial, Bloomberg; own calculations.

To start with, market agents' inflation expectations as measured, for instance, by the "Break-Even" inflation have remained positive and relatively closely linked to central banks' (implied) price stability promises (see part 1 of this report). So in contrast to the widely expressed deflation concerns, markets still expect average inflation over the coming years to

remain positive, e.g. to follow central bank's envisaged inflation targets. In addition, the developments of price action in the commodity markets, which can also be assumed to be priced on a forward-looking basis, do not indicate any signs of expected falling prices (see Fig. 4.3.1 (b)). For instance, the CRB-future prices have risen markedly since the beginning of 2002, a development which could suggest that inflation rather deflation concerns might currently be on market agents' minds.

The marked decline in long-term nominal interest rates in the euro area and the US to historical lows might suggest an approaching deflation. However, the latest decline of nominal interest rates can be more or less be explained by a decline in real interest rates rather than inflation expectations (see Fig. 4.3.2 (a) and (b)). This suggests that market agents appear to have lowered their long-term growth expectations rather than having lost confidence in average future inflation following the path promised by central banks. This remarkable confidence certainly rests on the generally held believe that central banks have the ability and willingness to expand money supply at will, thereby preventing any unwanted downward movement in the price level. It is no surprise, therefore, that the ECB and the US Fed have started explaining this power of monetary policy to the public at large.[35]

Fig. 4.3.2. – Real interest rates of long-term government bonds



Data source: Bloomberg; own calculations.

The discussion about potential deflation concerns is, of course, to a large extent driven by conflicting theories of what actually determines an economy's price level. On the one hand, there is the notion that the output gap can be held responsible for determining the price level. This line of theoretical reasoning rests on a more Keynesian thinking. On the other hand, there is the school of thought in which the price level is ultimately explained by money supply, taking reference to Milton Friedman's Monetarist theory. As far as the euro area is concerned, however, there appears to be convincing empirical evidence that inflation, e.g. changes in the price level, is driven by money supply as measured by the "real money gap" on the basis of the stock of money M3. In view of the latest monetary developments, a money supply shortage, or an obvious bank loan growth restraint, which argues for downward pressure on the euro area price level in the periods to come, is certainly not discernible.

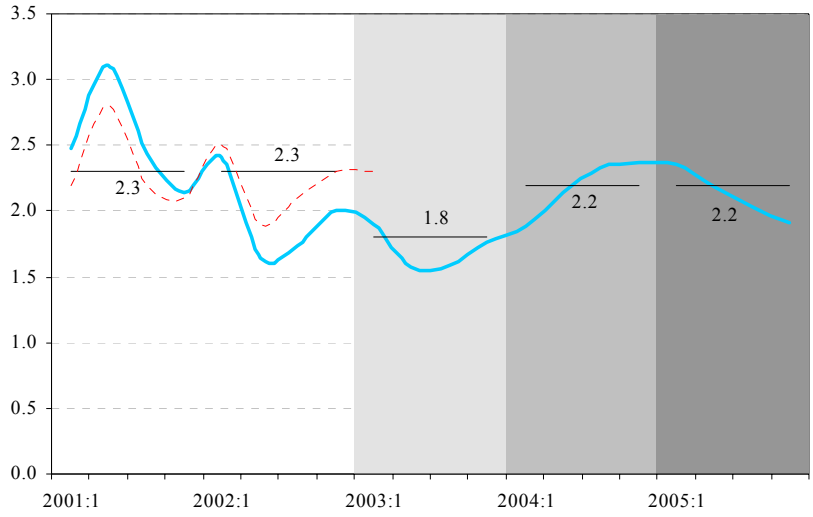
[35] See, for instance, the interview with the ECB Chief Economist Otmar Issing with the German news magazine Der Spiegel, "Wir nehmen Risiken Ernst", Nr. 25, 16.6.2003, pp. 82.

4.4 Inflation and ECB rate forecast

To estimate euro area inflation we took advantage of the "price gap" presented in part 2 of this report. Here, we regressed quarterly changes to the annual change in the euro area consumer price index (*DDLNCPI*) onto (i) quarterly changes to the annual change in the price gap of M3 (*DDLN4PLM3*, gliding four-quarter average), (ii) quarterly changes to the annual change in the output gap (*DDLN4OG*, gliding four-quarter average), (iii) quarterly changes to the annual change in oil prices (*DDLNOIL*), (iv) quarterly changes to the annual change in the euro/US dollar exchange rate (*DDLN4EUROUSD*, gliding four-quarter average), and (v) lagged quarterly changes to the annual change in the price level (*DDLNCPI*).

Figure 4.4 shows actual inflation for the euro area for the period 2001-Q1 to 2003-Q1 and forecast inflation for the period 2003-Q2 to 2005-Q4. The forecast rests on the following assumptions: (i) potential euro area output growth is 2.0%; (ii) oil price US$26.0, (iii) EUR/USD 1.1, (iv) annual output growth is assumed to be 1.0% in 2003 and 1.8% in 2004; (v) annual M3 growth declining towards 6.0% until 2004-Q1. On the basis of these assumptions, the model predicts inflation to amount to 1.8% in 2003 and 2.2% in 2004. It should be noted that the strong appreciation of the euro versus the US-dollar can largely be held responsible for the decline in inflation in the remainder of this year. This actually explains why inflation in 2003 will be 0.4% below the rate of 2.2% estimated for the current year in December 2002 (see ECB OBSERVER, International coordination of monetary policies, 19 December 2002).

Fig. 4.4. – Euro area inflation for the period 2001-Q1 to 2005-Q4



Data source: See the explanations in part 2 of this report. – Grey shaded area: forecast period. – The dotted red (solid blue) line shows the actual (estimated) annual increase in the HICP. – Numbers represent the average annual increase in the HICP.

The likely continuation of relatively subdued economic expansion, unsatisfactory performance of the labour markets in numerous euro area countries, deteriorating public finances and a "cost push" driven slowdown in current inflation – which could all too easily be misinterpreted as an inevitable path to deflation – will pose a challenging environment for ECB monetary policy in the quarters to come. Moreover, the widely expected real economic recov-

ery is most likely to remain vulnerable for quite some time. The potential emerge of negative shocks, such as growing geopolitical tensions and an unexpected sharp upward movement in the oil price, could easily put into question the sustainability of improving economic conditions. All this will continue to produce public calls for an easier ECB monetary policy. In view of the environment outlined above and the ECB's hitherto pursued interest rate setting policy, further interest rate cuts seem likely with the ECB's bringing its main refinancing rate to around 1.5 % until the end of this year. In view of the already very high monetary expansion, however, such a policy would not be required and should lead to a deterioration of the inflation outlook in the euro area.

The case for a more short-term-oriented monetary policy can hardly be backed by sufficient theoretical or empirical evidence. First, money policy actions are accompanied by de facto unknown "time-lags". Thus, interest rate cuts in response to current business cycle and inflation fluctuations could run the risk of destabilising the economy going forward. Second, experience suggests that the effectiveness of monetary policy on real output is presumably via an increase in (unexpected) inflation. In view of the costs associated with inflation, such a policy is hardly recommendable. Moreover, a continuation of an expansionary monetary policy might entail two unwanted (side-)effects, which do not seem to have enjoyed a great awareness: a bidding up asset prices and eroding economic incentives for speeding up economic reforms.

Given the high degree of uncertainty and the generally held view of relative low economic future growth, excess liquidity – which can be expected to be boosted by further rate cuts – could increasingly be used to bid up prices of already existing wealth, such as real estate, housing and, most importantly, stocks and bonds. Such a scenario seems all the more plausible as central banks are keeping market agents' interest rate cut expectations alive, presumably making investments in existing liquid assets more attractive relative to new real economic investment projects. A potential increase in asset prices to levels well above "fundamental value" might cause destabilizing effects going forward once a price correction ensues, which, in turn, could affect the financial sector stability negatively.

Lastly, an easy monetary policy might reduce the economic incentives to bring about structural reform in both the private and public sector. A lowering of the economy's costs of capital as a result of lower central bank rates might reduce the economic incentives for firms to bring about product and process innovation rather inducing additional spending. Moreover, declining yields could lead to lower funding costs, making it less pressing for governments' budget policies to reduce spending and step up reform efforts. This, in turn, could lead to "cementing" rather than solving inefficiencies. The outlook of a potential lack of structural reform could be detrimental to generating positive growth expectations, translating into a continuation of weak growth and, as a result, further pressure on the ECB to lower rates even further.

APPENDIX

A.1. – Schedules for the meetings of the Governing Council and General Council of the ECB and related press conferences 2003

Governing Council	General Council	Press Conferences
9 January		9 January
23 January		
6 February		6 February
20 February		
6 March		6 March
20 March	20 March	
3 April (Rome)		3 April
24 April		
8 May		8 May
22 May		
5 June		5 June
26 June	26 June	
10 July		10 July
31 July		
21 August		
4 September		4 September
18 September	18 September	
2 October (Lisbon)		2 October
23 October		
6 November		6 November
20 November		
4 December		4 December
18 December	18 December	

A.2. – ECB OBSERVER – *recent publications*

Number	Title and content	Date of publication
No. 5	**Challenges to ECB credibility** Content*: 1. Fundamentals of ECB credibility. – 2. ECB strategy review – increasing the bank's open flank. – 3. Uncertainty – pressure for easier monetary policy. – 4. ECB policy review and outlook.*	8 July 2003
No. 4	**International coordination of monetary policies – challenges, concepts and consequences** *Content: 1. International coordination of monetary policies. – 2. Does the ECB follow the Fed? – 3. Stock prices – a special challenge for monetary policy. – 4. ECB monetary policy review and outlook.*	19 December 2002
No. 3	**The Fed and the ECB – why and how policies differ** Content*: 1. The US Federal Reserve System and the European System of Central Banks – selected issues under review. – 2. The reaction functions of the US Fed and ECB. – 3. The influence of monetary policy on consumer prices. – 4. ECB rate policy and euro area inflation perspectives.*	24 June 2002
No. 2	**Can the ECB do more for growth?** Content: *1. Should the ECB assign a greater role to growth? – 2. Government finances and ECB policy – a discussion of the European Stability and Growth Pact. – 3. "Price gap" versus reference value concept. – 4. Assessment of current ECB policy and outlook.*	19 November 2001
No. 1	**Inflationsperspektiven im Euro-Raum** Content: *1. Warum die EZB-Geldpolitik glaubwürdig ist. – 2. EZB-Strategie – Stabilitätsgarant oder überkommenes Regelwerk? – 3. Stabilitätsrisiken der Osterweiterung. – 4. Zinspolitik der EZB in 2001 und 2002.*	17 April 2001

A.3. – ECB OBSERVER – *objectives and approach*

The objective of ECB OBSERVER is to analyse and comment on the conceptual and operational monetary policy of the European System of Central Banks (ESCB). ECB OBSERVER analyses focus on the potential consequences of past and current monetary policy actions for the future real and monetary environment in the euro area. The analyses aim to take into account insights from monetary policy theory, institutional economics and capital market theory and are supplemented by quantitative methods. The results of the analyses are made public to a broad audience with the aim of strengthening and improving interest in and understanding of ECB monetary policy. ECB publishes its analyses in written form on a semi-annual basis.

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