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Editorial

by Carsten Detken and Philipp Hartmann, Monetary Policy and Financial Research Divisions, DG Research, ECB

Uncertainty about future, and often about current, economic developments is perhaps the greatest challenge in the exercise of monetary policy. Central bankers have to constantly assess and monitor extremely complex economic systems. They also need to understand how the economy may respond to their own policy actions.

The second issue of DG-R's ***Research bulletin*** *reports about recent research designed to support central bankers in their role as decision-makers under uncertainty. The lead article "Monetary Policy and Imperfect Knowledge" focuses on issues of key policy relevance for central banks, such as how to efficiently use prior judgement in an uncertain world and how to ensure that decisions are "robust", i.e. produce acceptable outcomes, when there is ambiguity which is the best model to describe economic reality. The second article – "The Central Banker as a Risk Manager" – presents a new tool that monetary policy makers can use to assess upside and downside risks to inflation.*

The third article of the ***bulletin*** *asks the question: "Securities Settlement and Financial Integration: Why Do We Care?". It illustrates the importance of settlement infrastructures for the efficiency of financial markets and discusses the merits and limitations of various options for a greater integration of them in Europe.*

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- Workshop on "What Effects is EMU Having on the Euro Area and Its Member Countries?", Frankfurt, 16-17 June, 2005.
- Labour Market Workshop on "What Would Raise Employment?", ECB and CEPR, Frankfurt, 20-21 June, 2005.
- Fourth Joint Central Bank Research Conference on "Risk Measurement and Systemic Risk", ECB, Federal Reserve Board, Bank of Japan, Committee on the Global Financial System/BIS, Frankfurt, 8-9 November, 2005.
- Conference on "European Economic Integration: Financial Development, Integration and Stability in Central, Eastern and South-Eastern Europe", ECB-CFS Research Network and Austrian National Bank, Vienna, 14-15 November, 2005.

Monetary Policy and Imperfect Knowledge

by Frank Smets, Monetary Policy Research Division, Directorate General Research, ECB

How should stability-oriented central banks respond to monetary and economic developments when there is no consensus on how shocks and the associated policy actions are transmitted to the economy and on how the perceptions of economic agents change in response? This short essay reports on recent research findings regarding the policy implications of model uncertainty. It focuses on the robustness of simple policy rules in various models of the euro area economy that have been developed in the Eurosystem over the past five years and puts those results in the context of related research[1].

Three findings are worth highlighting. First, optimal policy behaviour depends crucially on assumptions about how expectations are formed. While until recently only models without explicit expectations formation or with rational (or model-consistent) expectations were analysed, an increasing body of research has been investigating the implications of private sector learning. This literature generally supports the case in favour of focusing on price stability and anchoring inflation expectations. Second, most robustness exercises conclude that central banks should respond more aggressively towards undesired fluctuations of inflation when model misspecification is taken into account. This further undermines Brainard's gradualism principle, which states that policy makers may want to act cautiously when faced with uncertainty about the effects of their policies[2]. Third, while it is of utmost importance that policies are robust to various types of model misspecification, it has become evident that the features of robust policy rules are often dominated by the model that is least fault tolerant, i.e. the model in which small deviations from the optimal rule are most costly. This suggests that when allowing for model uncertainty, it is even more important to be very thoughtful about which models to consider. It also underlines the importance of further improving the Eurosystem's macro-economic models.

Model uncertainty in the euro area

In the last five years, researchers in the Eurosystem have spent considerable effort on developing macro models for the euro area economy[3]. One of the findings of these modelling efforts is that from a macroeconomic perspective the euro area economy behaves in many dimensions in a surprisingly similar way to the US economy as, for example, illustrated in Agresti and Mojon (2003), Peersman and Smets (2003) and Smets and Wouters (2005). However, differences across the various modelling strategies remain quite important. Adalid, Coenen, McAdam and Siviero (2004) analyse the performance of simple Taylor-type policy rules in stabilizing inflation, the output gap and interest rate changes across four of those euro area models. The findings are broadly consistent with the results documented for models of the US economy. First, **rules that work well in the more forward-looking models typically exhibit a high degree of interest rate smoothing**. In other words, policy is very inertial. The reason is as follows: when economic agents are largely forward-looking and the policy is credible, it is optimal for the central bank to respond in a delayed but persistent fashion to inflation shocks as this stabilizes inflation expectations, while avoiding excessive fluctuations in output and interest rates. **However, such policy behaviour works less well in mostly backward-looking models, where the optimal degree of interest rate smoothing is much lower**. When the economy responds very persistently to shocks, it is important to respond strongly and preemptively, in order to avoid that the dynamics of inflation give rise to large deviations between objectives and outcomes. In those models, an inertial policy suffers from "too little, too late" and has destabilizing effects on the economy. It turns out this cost is much higher than the cost of being too

1 *Most of the research discussed in this essay was presented at a conference on "Monetary Policy and Imperfect Knowledge", which took place in Wurzburg during the fall of 2004. The conference programme, papers presented and discussions can be found on the ECB's web site. See also Gaspar, Goodhart, Kashyap and Smets (forthcoming).*

2 *In his dinner speech at an earlier ECB conference on the topic of "Monetary Policy under Uncertainty" back in 1999, Alan Blinder already noted that he was "surprised at how little support Brainard's conservatism principle has received". See Angeloni, Smets and Weber (2000).*

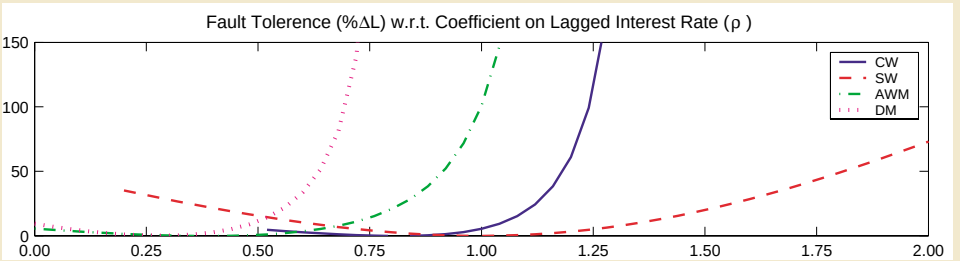
3 *Examples are the Area Wide Model (AWM) of Fagan, Henry and Mestre (2001), the Coenen-Wieland (CW) model, the Smets-Wouters (SW) model, the Credit, Money and Real sector (CMR) model developed by Christiano, Motto and Rostagno (2004) and the Dis-aggregate Euro Area Model (DEAM) of Monteforte and Siviero (2002).*

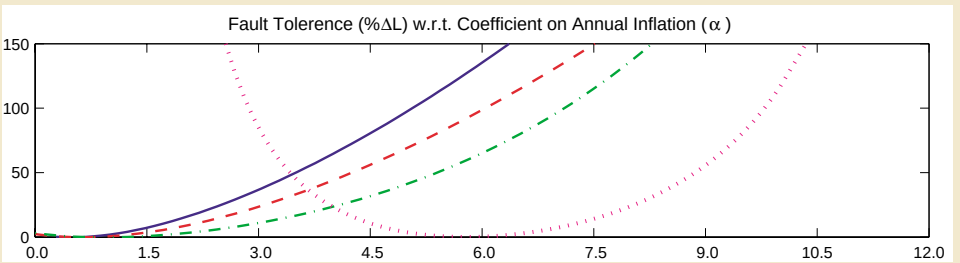
Box: A Fault-Tolerance Analysis of Taylor-Type Policy Rules in Models of the Euro Area Economy

Fault-tolerance analysis is a concept borrowed from engineering that aims at identifying how sensitive outcomes are with respect to small changes in optimal control rules. In the context of analysing monetary policy in macro-economic models, a highly *fault intolerant* model is a model in which small deviations from the optimal policy rule imply large stabilisation costs. Fault-tolerance analysis is of interest for analysing the robustness of policy rules, as the chance of finding a robust policy rule, i.e. a rule that works relatively well in all models considered, is smaller the more intolerant the set of models is.

In the figure below, fault-tolerance with respect to two reaction coefficients in a standard three-parameter Taylor-type policy rule is examined in four models of the euro area economy[1]. α represents the policy-maker's short-term reaction to deviations of inflation from target, while ρ determines the inertia of the interest-rate response or the desired degree of policy *smoothing*[2]. Each line in the figure indicates the percentage point change in the loss function as one of those coefficients is varied, holding the other coefficients fixed at their optimised values[3].

Several findings are worth mentioning. First, while any single coefficient may be varied over a relatively broad range of values without deteriorating dramatically the performance of the individual model concerned, there are no obvious overlapping regions of high *mutual* fault tolerance for all four models under examination and for all policy-rule coefficients at the same time. Second, as discussed in the main text, the two forward-looking models, CW and SW, perform best when ρ is close to unity, while the predominantly backward-looking models, AWM and DM, lead to instability in this region. In contrast, the AWM and the DM prefer a ρ coefficient of below 0.5. Values of ρ in this region tend to yield indeterminate equilibria in the forward-looking models, unless the degree of aggressiveness in response to inflation is sufficiently increased. Regarding the response coefficient to inflation α (depicted in the lower panel), the forward-looking models and the AWM seem mutually tolerant to variations in α in the region of close to 0 to 2.5. The DM, however, behaves very differently in its optimal prescription for α, demanding a significantly higher value of about 6.





Note: For each of the four models (CW, SW, AWM, DM), the figure indicates the percentage-point change in the policy-maker's loss function (%ΔL) under the optimised interest-rate rule, as a single coefficient – either ρ or α – of the optimised rules is varied holding the other two coefficients in the Taylor rule fixed at their respective optimised values. For space reasons the fault tolerance with respect to the coefficient on the output gap is not shown.

1 See footnote 3 for a list of the models considered.
2 For details see Adalid et al. (2004).
3 The loss function is a quadratic form in deviations of inflation from a target, the output gap and interest rate changes. In this illustration, the relative weight on the output gap and interest rate changes is 1/3 and 0.1, respectively. The qualitative results remain true as long as there is a noticeable weight on those two terms.

aggressive in an economy with largely forward-looking agents. As a result, **the policy rule which appears to work relatively well in all models exhibits a modest degree of interest rate smoothing, and a relatively aggressive response to inflation and output developments**. The box on page 3 summarises some of these results based on a fault-tolerance analysis.

These results are confirmed in a companion paper by Küster and Wieland (2004). In a somewhat different set-up these authors find that the maximum loss of a similar policy rule in terms of the inflation premium is in the range of 30 basis points. As in the analysis of Adalid et al. (2004), this rule is also quite fault tolerant, meaning that small deviations from the rule do not dramatically increase losses in any of the models considered. Interestingly, the policy which minimizes the maximum loss and implies a somewhat higher degree of interest rate smoothing, is less fault tolerant, in the sense that it may lead to instability in one of the models (the AWM).

Overall, these results echo the findings in related work by Angeloni, Coenen and Smets (2003) and Coenen (2003). These authors find that in the presence of uncertainty about the degree of inflation persistence, it is more robust to assume a high degree of inflation persistence, which results in a more aggressive policy response to inflation and the output gap. Recently, Walsh (2004) has challenged some of those results, arguing that uncertainty about the degree of inflation persistence also implies uncertainty about the associated loss function. He shows that the bias towards a more aggressive policy is attenuated when the central bank takes into account that higher inflation indexation (one possible source of inflation persistence) reduces the cost of inflation variability.

The robustness of robust policy rules

One of the shortcomings of the policy analysis discussed above is that often the features of the robust policy rule are determined by the model that is least fault tolerant (e.g. Sims, 2003). This model may, however, not be the most likely or the most reasonable model. These pitfalls are illustrated in Cogley and Sargent (forthcoming), who analyse the Great Inflation period and the subsequent conquest of inflation in the United States by applying some of the control techniques under model uncertainty in a counterfactual exercise. The paper considers three different types of models: a Samuelson-Solow model which incorporates a possible long-run trade-off between inflation and unemployment; a Solow-Tobin model which features an exploitable short-term trade-off; and a Lucas-Sargent model that features no exploitable trade-off over any horizon. Using actual inflation and unemployment data, they estimate each of these three models recursively over time and ask themselves: What inflation rate would the Fed have aimed for if it minimised an expected loss function featuring inflation and unemployment variability and took into account the empirical probabilities of each of these three models? The main findings are twofold. First, although policy makers started off with a high prior on the Samuelson-Solow model, the estimated probability of this model falls very quickly in the early 1970s, while the probability of the Lucas-Sargent model increases to almost one. Inflation and output developments in the early 1970s clearly invalidate the predictions of the Samuelson-Solow model. Secondly, however, **model uncertainty prevents the Fed from rigorously implementing the optimal zero inflation policy** suggested by the Lucas-Sargent model. The outcomes of such a zero inflation policy would lead to instability in the Solow-Tobin and Samuelson-Solow model, generating a huge cost if these models were true. Even with a low estimated probability of that being the case, the policy maker wants to guard against such extreme outcomes and therefore implements a gradual disinflation policy, thereby prolonging the Great Inflation episode. One finding is therefore that **in the case of low probability, but high-cost scenarios, policies will be dominated by the desire to avoid the disastrous outcomes.**

The research discussed above explicitly specifies the alternative models that the policy maker considers. This has the advantage that the impact of each of the

models on the optimal policy rule can be analysed. An alternative approach is to investigate the robustness of policies with respect to deviations from a benchmark model (e.g. Hansen and Sargent, 2000, and Giannoni, 2002). Del Negro and Schorfheide (2004) present new techniques to empirically characterize the degree of model misspecification. Using a VAR approximation to the model developed in Del Negro, Schorfheide, Smets and Wouters (2004), they show that the optimal interest rate response to deviations of inflation from a target may depend quite a lot on what the policy maker assumes about the nature of the model misspecification and its invariance to policy interventions.

Private sector learning and price stability

One of the robust findings in the above-mentioned literature is that the optimal policy rule will depend quite a lot on the assumed nature of the expectations formation process. Most of the optimal policy analysis in this literature is performed either in models without explicit expectations formation (so-called backward-looking models) and/or in models with rational expectations, i.e. expectations are formed consistent with the underlying structural model. In practice neither of these extreme assumptions is likely to be fully satisfactory. On the one hand, it is not very reasonable to assume that the high reduced-form inflation persistence observed in the past is completely invariant to changes in the monetary policy regime. On the other hand, the assumption that private agents perfectly know the structure of the economy, monetary policy is perfectly credible and that agents form their expectations accordingly is also not very realistic.

Over the past five years, an increasing number of papers have considered more realistic ways of modelling expectations formation based on the idea that agents use reduced-form regressions to forecast future monetary and economic developments (e.g. Honkapohja and Evans, 2001). Orphanides and Williams (2004) show that in an estimated macroeconomic model in which the economy undergoes structural change and where private agents and the central bank possess imperfect knowledge about the true structure of the economy, the scope for economic stabilisation is significantly reduced relative to an economy under rational expectations with perfect knowledge. Furthermore, policies that would be optimal under perfect knowledge can perform very poorly when knowledge is imperfect. **Efficient policies that take account of private learning and misperceptions of natural rates call for more aggressive responses to inflation than would be optimal under perfect knowledge**. Such policies not only improve performance in the baseline model, but are also quite robust to potential misspecification of private sector learning and the magnitude of variation in natural rates. As in the work of Gaspar and Smets (2002) and Gaspar, Smets and Vestin (forthcoming), the intuition for this result is quite clear. With learning, a series of consecutive inflation shocks (like oil price shocks) can easily feed through into the estimated degree of perceived inflation persistence by the private sector. As a result, private agents extrapolate higher inflation in the future, which complicates the stabilisation efforts of the central bank. In such circumstances, **a firm anti-inflationary policy response geared at anchoring inflation expectations not only avoids persistent inflation dynamics, but also reduces the risk that the central bank needs to create a recession to stabilise inflation in the future**.

The risk that the wide-spread use of judgmental adjustments of forecasts may lead to the possibility of self-fulfilling fluctuations is formally analysed in Bullard, Evans and Honkapohja (2004). They show that so-called exuberance equilibria, in which it is individually rational for agents to include judgment in the forecast when all other agents do so, may arise quite easily. In the context of a New Keynesian model, they show that such exuberance equilibria exhibit considerable excess volatility relative to the underlying fundamentals and that a policy that is designed to avoid the danger of such exuberance will be more aggressive against inflation and output fluctuations.

The Central Banker as a Risk Manager

By Lutz Kilian, University of Michigan, and Simone Manganelli, Financial Research Division, DG Research, ECB

We present a risk management tool for monetary policy. We argue that two necessary elements for analysing risk in this context are: 1) The forecast distribution of the inflation rate; and 2) a measure of the attitude of the central banker towards inflation risk relative to deflation risk. The relevant information in the forecast distribution of inflation can be summarised by a simple analytical tool that we refer to as the "balance of risks". The balance of risks indicates the extent to which upward risk to inflation outweighs the downward risk[1].

Risk management for monetary policy

In deciding the monetary policy stance, central bankers need to evaluate carefully the risks that the current economic situation poses to price stability. As statements by central bankers indicate, **risk management is an integral part of the art of central banking**. However, while risk management is a well understood and widely used technique in the financial industry, its links with monetary policy have yet to be explored.

To understand how risk management and monetary policy relate, it is best to start from the more familiar idea of financial risk management. A fund manager collects savings from clients and invests them in financial assets. These are typically risky assets in that their value can go up or down over the period of investment. The higher the risk borne by these assets, the higher on average their returns. Given the attitude of the client towards risk, a good fund manager will ensure the maximum expected return compatible with the client's preferences.

The key insight of this example is that the risk management problem has two essential components: 1) An economic variable (in this case the portfolio return) **whose future values are uncertain; 2) the preferences of the decision-maker about this economic variable** (in our example, the risk attitude of the client).

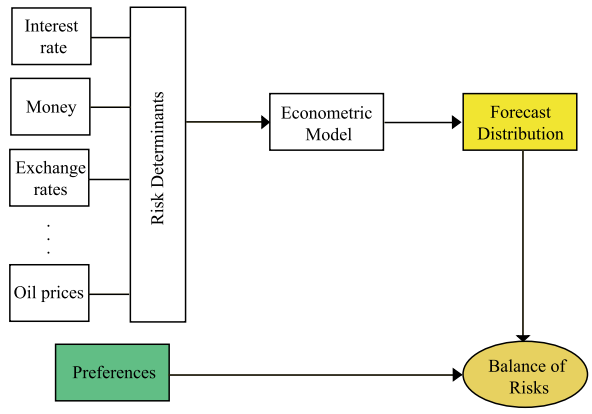
This framework can be adapted to the monetary policy decision problem. From a central banker's point of view, the economic variable of interest is the inflation rate over a medium-term horizon. A convenient way of representing inflation uncertainty is through a probability distribution. From a purely statistical standpoint, knowledge of this distribution provides a complete and exhaustive description of the underlying uncertainty.

The second element of risk management in monetary policy is the preferences of the central banker over this inflation rate. A central banker dislikes both excessively high and excessively low inflation. The possibility that inflation exceeds a certain threshold generates inflation risk (or upside risk to price stability). Similarly, deflation risk (or downside risk to price stability) is commonly associated with inflation below a certain threshold.

Thus it is natural to frame the problem of managing the risks to price stability in terms of keeping the inflation rate within a well-defined band. A central banker will balance these two risks in an optimal way. The optimal balance will depend on the characteristics of the probability distribution of the inflation rate and on how much the central banker dislikes inflation risk relative to deflation risk.

A framework for inflation risk management

The two key elements used in risk management are the forecast distribution of inflation and the preferences of the central banker. The basic framework for inflation risk management can be summarised as follows:



1 *This article is based on ECB Working Paper no. 226, "The Central Banker as a Risk Manager: Quantifying and Forecasting Inflation Risks", by Lutz Kilian and Simone Manganelli, April 2003.*

As this diagram illustrates, the forecast distribution crucially depends on the econometric model underlying it. Since inaccurate or biased estimates of risks may ultimately mislead, rather than help the decision maker, any econometric model used to generate such forecasts should be carefully evaluated.

It is important not to lose sight of the fact that the control of the central banker over medium-term inflation is not complete. Many factors – such as oil prices or exchange rates – may affect inflation. Incorporating these risk determinants into the analysis may help us to gain a better understanding of the true underlying risks.

A simple illustration

To illustrate how different attitudes towards risk may affect the results, we estimated a simple autoregressive model to forecast one-year ahead HICP inflation for the euro area. Suppose that the central banker aims to keep inflation below but close to 2%. Now consider two different sets of preferences:

1) **Strong Inflation Aversion** – The central banker is much more concerned about inflation risk than deflation risk.
2) **Strong Deflation Aversion** – The central banker is much more concerned about deflation risk than inflation risk.

Figures 1 and 2 illustrate the outcome of this simple exercise. In each figure, we report the estimated deflation risk (the blue dashed line), the inflation risk (the red dotted line) and the overall balance of risk (the black solid line) for the period from January 1999 to June 2003. **The deflation risk is by definition always negative**[2]. More negative values signal higher risks of deflation. Analogously, **inflation risk is always positive** and higher values indicate a greater risk of excessive inflation[3]. The magnitude of both inflation and deflation risk will depend on the variability of inflation and on the risk preferences of the central banker. **The balance of risk is the sum of inflation and deflation risks**. It provides a convenient way of summarising which way risks are tilted overall. It can be positive or negative. **Positive values of the balance of risk signal the predominance of upside risks to inflation. Negative values of the balance of risk alert to the preponderance of downside risks to inflation.** The two charts convey a very different assessment of the historical risks in the euro area. Figure 1 shows that for a central banker with a strong aversion to inflation relative to deflation, the balance of risks would have sent a very loud warning about significant upward risk from 2000 onwards. Figure 2, instead, depicts the situation of a central banker strongly averse to deflation. Since 2000 the balance of risks hovered around zero, without indicating substantial risk in either direction. **This partly confirms that the numerous concerns of the general public about deflation risks in the euro area in 2002 were largely unfounded.**

Figure 1 - Strong Inflation Aversion

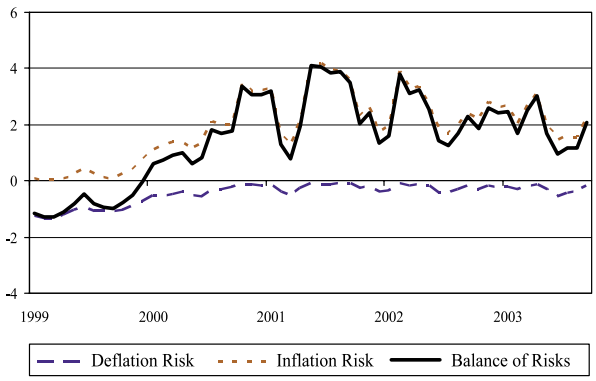
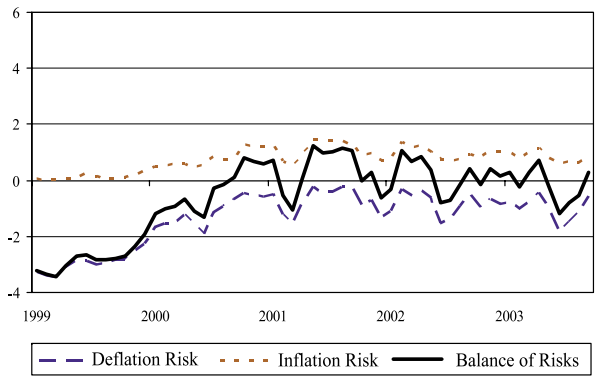


Figure 2 - Strong Deflation Aversion



2 *Deflation risk is defined as* $DR_\alpha \equiv -\int_{-\infty}^{1.5}(1.5-\pi)^\alpha dF(\pi)$. *Greater values of* α *imply stronger aversion to deflation.*

3 *Inflation risk is defined as* $EIR_\beta \equiv \int_{2}^{\infty}(\pi-2)^\beta dF(\pi)$. *Greater values of* β *imply stronger aversion to inflation.*

Securities Settlement and Financial Integration: Why Do We Care?

By Cornelia Holthausen and Cyril Monnet, Financial Research Division, DG Research, ECB

This article sheds light on the question why the securities settlement infrastructure is an important factor in European financial integration, as e.g. illustrated by the recent takeover battle for the London Stock Exchange. We analyse consequences of the recent merger activity in the securities settlement industry, discuss advisable forms of consolidation as well as obstacles to further concentration.

Fifty years from now, how will the European financial landscape have evolved? Will the recent consolidation of trading platforms and settlement systems continue? How far should the concentration process go? Perhaps the recent battles around the takeover of the London Stock Exchange will lead the way? These questions are currently at the heart of the debate on financial integration in Europe, bringing the securities clearing and settlement industry to the forefront of public policy interest.

The securities clearing and settlement industry is generally composed of a central security depository (CSD) and a central clearing counterparty (CCP). A CSD is an institution that holds securities electronically, enabling securities transactions to be processed by means of book entries. This reduces the cost of securities transactions by eliminating the need to transport securities from sellers to buyers. A CCP is an entity that interposes itself between the contracting parties, becoming the buyer to every seller and the seller to every buyer (see Russo et al., 2004). As a result, a CCP takes on default risks that buyers and sellers would otherwise face. **By reducing transaction costs and default risks, the settlement industry greatly facilitates securities trading.** However, a failure of a major player in the clearing and settlement industry could jeopardise the functioning of modern securities trading. This risk to stability is reinforced by the extreme concentration of the business: In each country, settlement of domestic transactions is usually concentrated in one CSD while clearing is often operated through a single CCP.

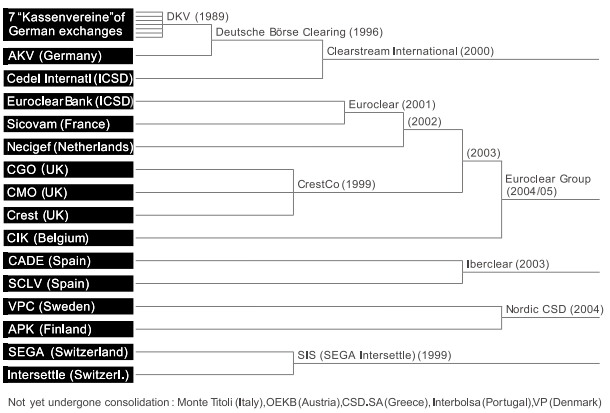
Fragmentation creates inefficiencies

Still, the European settlement and clearing industry is far from being efficient: European settlement systems are very much organised along national borders. On top of national CSDs, two international central securities depositories (ICSDs) are operating. These settle a large fraction of (mainly cross-border) trades. Indeed, Malkamäki, Schmiedel and Tarkka (2002) report that **settlement is 33% more costly in Europe** (average fee of $3.9) **than in the US** ($2.9). This is explained by the fees charged by ICSDs (average close to $40 per transaction) but also by the segmentation of the European market. This confirmed the conclusion of the first Giovannini Report (2001) regarding the existence of sizeable transaction costs in the current infrastructure.

Consolidation reduces inefficiencies

Over the last few years, many of the European CSDs have merged (see the figure below). Further consolidation is considered the main solution to the above inefficiencies.

However, **the best form of consolidation has yet to be determined**. Some actors argue in favour of vertical integration (where exchanges and settlement systems are merged), whereas others see the future in horizontal integration, involving mergers of settlement systems across countries. Tapking and Yang (2004) find a trade-off between the cost of setting up links between two CSDs and the frequency of cross-border trades. It is desirable to consolidate CSDs horizontally only if (i) cross border transactions are frequent and (ii) the resulting cost of operating the link between the two systems is low. Otherwise, to benefit from scope economies, it is optimal to integrate the securities exchange with the CSD in each country – and therefore create a "silo".



Source: Deutsche Börse Group

How far can consolidation go?

A look at the recent merger activity between European trading platforms is instructive to foresee potential limits to further consolidation.

In the last few years, many forms of mergers have taken place. For instance, the Amsterdam, Brussels and Paris stock exchanges merged horizontally into one trading platform Euronext, whilst their clearing infrastructures horizontally merged into Euroclear, a clearing system legally independent from Euronext. On the other hand, Deutsche Börse integrated vertically with Clearstream – a CSD – to form a silo.

Is it possible that system structures have an impact on further consolidation? Can Euronext and Deutsche Börse's structures influence the outcome of their battle to acquire the London Stock Exchange? According to Köppl and Monnet (2004), Deutsche Börse's silo structure is problematic in its quest to grow larger. The price charged by a silo reflects the costs of trading, clearing and settlement. Hence it is very difficult to extract information about a silo's exact cost structure; this imposes further costs onto a merger. Put differently, Deutsche Börse would not succeed in acquiring the LSE, unless it allowed traders of the LSE to choose where to clear and settle, rather than imposing Clearstream as the unique option for clearing and settlement of trades. This view has recently received support from a former chairman of the LSE itself.

> "The best approach, however, would be to ... oblige the winner to tackle some of the other efficiency failings. Deutsche Börse should have to dismantle its clearing and settlement silo, sending a clear signal to closed markets in Europe. If Euronext, the Paris-based exchange, were to be the preferred suitor, completion of its withdrawal from clearing and settlement would bring benefits to outweigh the added costs of regulatory scrutiny of a new dominant exchange." (Don Cruickshank, Financial Times, January 19, 2005).

However, Köppl and Monnet (2004) argue that **exchanges may achieve an efficient merger by outsourcing their own settlement operation, as long as each settlement system competes for settling all trades of the merged exchange**. As Cruickshank argues, fostering competition and open access to securities settlement systems could therefore be key to achieving efficient consolidation in the industry.

How far should consolidation go?

The specific structure of the securities infrastructure, characterised by the presence of strong economies of scale, leans toward an outcome with a single provider. **If such a monopoly position is reached, the pricing strategy of the single provider should be closely monitored**.

This is a conclusion of Holthausen and Tapking (2004), who analyse the pricing strategy of a CSD relative to a custodian banks. Custodian banks hold securities in custody for those customers who do not have direct access to a CSD, and typically also provide clearing and other services. Importantly, to achieve final settlement, they need to resort to the services of a CSD. Holthausen and Tapking show that CSDs can increase the fees levied upon custodian banks by appropriately modifying their price schedule, even when the CSD is not allowed to price discriminate between its customers. As a result, the CSD's market share is quite high, but not necessarily higher than the socially optimal one. Because of this ambiguity, Holthausen and Tapking conclude that **regulatory interventions favouring custodian banks should not be encouraged**.

Further research is needed

Many questions remain: what form of corporate governance should be chosen to minimise settlement risk and ensure the highest level of efficiency and customer satisfaction? Preliminary results from Köppl, Monnet and Polenghi (2004) indicate that user-owned and for-profit ownership structures have the same risk of settlement failure. Would an anti-trust policy be needed to ensure competition? Would it be necessary to set up a watchdog – possibly the ECB – to ensure good practices? These are important questions that deserve non-partisan answers.

Financial Integration – ECB-CFS Research Network Reports on Main Results and Future Activities

by Philipp Hartmann and Cyril Monnet, Financial Research Division, DG Research, ECB

The euro enhanced the liquidity and efficiency of European financial markets, and it contributed to a reduction in the cost of capital. These are two of the main conclusions of the major research network the ECB and the Center for Financial Studies (CFS) set up three years ago. While illustrating the significant progress made in financial integration over recent years, the recently published report by the Network also pinpoints two important industries that are still lagging behind. First, the fragmentation of the securities clearing and settlement industry is a major obstacle to further integration and to the cross-border trading of bonds and stocks. Second, the integration of retail banking markets only advances slowly and there should not be an illusion that this can be changed quickly.

The results suggest three key areas for policy: (i) The identification of measures that are able to remove structural obstacles to integration in clearing and settlement systems; (ii) the active use of competition policy to prevent practices that discriminate against foreign providers of financial services; and (iii) the removal of remaining differences in national financial regulations that make the pan-European provision of financial services more costly than necessary.

The ECB and the CFS decided to keep the Network active until 2007. Its main priorities were broadened to also include: (i) The relationship between financial integration and financial stability; (ii) EU accession, financial development and financial integration; and (iii) financial system modernisation and economic growth in Europe. To address these priorities the Network is preparing two conferences in 2005. The first event covers "Competition, Stability and Integration in European Banking" and the second event addresses "Financial Development, Integration and Stability in Central, Eastern and South-Eastern Europe" (see forthcoming conferences/workshops above).

Detailed summaries of the Network results produced between 2002 and 2004 are contained in the ECB-CFS report "Research Network on Capital Markets and Financial Integration in Europe: Results and Experience after Two Years" and in a special issue on "European Financial Integration" published by the *Oxford Review of Economic Policy* (vol. 19, issue 4, December 2004).

Selected Recent Journal Publications by ECB Staff

1. Coenen, G., Levin, A. and Wieland, V. (2005), "Data Uncertainty and the Role of Money as an Information Variable for Monetary Policy", *European Economic Review*, 49(4), pp. 975-1006.
2. Dedola, L. and Lippi, F. (2005), "The Monetary Transmission Mechanism: Evidence from the Industries of Five OECD Countries", *European Economic Review*, 49(6), pp. 1543-1569.
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Conference on "Inflation Persistence in the Euro Area"

by Michael Ehrmann, Monetary Policy Research Division, Directorate General Research, ECB

On 10 and 11 December 2004, the ECB hosted a conference on "Inflation Persistence in the Euro Area", to discuss intermediate results of the Eurosystem Inflation Persistence Network (IPN). The IPN is a group of around 50 Eurosystem researchers analysing the euro area inflation process, with special focus on the patterns and determinants of price setting and inflation persistence. After having existed for two years, during which 45 research papers had been produced, the IPN was seeking feedback from the academic community. For this purpose, a large number of renowned experts in the field were invited to present and discuss the material. The feedback will be taken on board to complete the project in 2005, the IPN's final year, when it will also analyse the policy implications of its findings.

The conference material, including the discussants' contributions, is available at http://www.ecb.int/events/conferences/html/inflationpersistence.en.html. Several results have already emerged from the various IPN research groups. A large set of stylised facts on price setting in the euro area has been assembled, based on individual price records underlying the construction of consumer and producer price indices, as well as on qualitative data obtained from surveys. Here it suffices to mention only a few. Prices change on average once every year, significantly less often than in the United States, where retail prices change every two quarters. There are large differences across sectors, with service prices changing least often. When price adjustments occur, they are quite large, with around 8-10% in the retail sector and 5% in the producer sector. Finally, price increases and decreases are almost equally frequent and sizeable. For aggregated price indices, the IPN has found that estimated inflation persistence falls considerably when controlling for occasional changes in the average level of inflation. This implies that changes in monetary policy regimes need to be taken into account in such analyses.

Model Development in New EU Member States: Challenges and Responses

by Gerhard Rünstler, Economic Modelling Division, DG Research, ECB

Building structural macroeconomic models for forecasting and policy analysis in euro area countries is never a simple or easy task. For the central banks of the new Member States (NMS), however, the challenges of model-building are formidable. In these countries, modellers face two additional critical constraints which are typically not present in "old Europe". First, there is an acute general shortage of long and reliable data series. Indeed, in most cases official national accounts data do not exist prior to 1995. Second, many NMS economies are still in a process of transition from centrally planned to market economies and are also undergoing a process of convergence with the euro area. These countries are thus subject to significant ongoing structural change. Finally, changes in policy regimes are another source of parameter instability. Together these specific features create a good deal of uncertainty. For instance: how should model-builders identify the long-run equilibrium of the economy and separate long-run growth from short-run dynamics? How should they model inflation, given the difficulties of measuring output gaps and equilibrium unemployment and the important role special factors such as price deregulation and Balassa-Samuelson effects? To tackle these problems, modellers in NMS central banks have to employ a number of non-standard approaches. For example, the parameters of their models are often calibrated rather than estimated by statistical techniques. The calibrated values are based on various sources including analysis of microdata and results from models of more developed European economies.

These challenges will persist for some time to come. In order to help face them, there is an ongoing process of intensive exchange of ideas between modellers both from the Eurosystem and the NMS central banks, especially in the framework of the Working Group on Econometric Modelling. This interaction is a two-way street. While NMS modellers can learn a lot from the long experience of their Eurosystem colleagues, the latter also have much to learn from the innovative approaches that are being adopted in the new Member States.

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