Sveriges Riksbank Economic Review

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◼ Assessment of the Riksbank's Work on Financial Stability Issues

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1. Introduction

The Riksbank has been an innovator among central banks with regard to financial stability issues. It was the first to publish a separate financial stability review in 1997. Many other central banks have now followed this lead. Its financial stability group pioneered much of the analysis that goes into such reports. In addition, the Riksbank has been at the forefront of conducting crisis management exercises and putting in place procedures to deal with a crisis in the event that one should occur. Now that these innovations are well established, it seems an opportune time to step back and ask how the Riksbank's financial stability work should develop going forward. The purpose of this report is to help with this process.

The committee has been asked to focus on the Financial Stability Reports (FSRs). The assessment is mainly based on FSR (2003:1 and 2003:2). We have also been asked to comment on the analytical framework for financial stability (which we do as part of our discussion of the FSR), and consider other aspects of the Riksbank's work on financial stability such as crisis management.

The report starts with a brief discussion about what a central bank and regulators should be doing about financial stability. We then go on to consider what the Riksbank is currently doing and make suggestions for changes. Our group consists of an academic, a banker and a representative from the IMF. We hope to bring all of our perspectives to bear in this report.

2. What Should the Public Authorities Do about Financial Stability?

Financial stability has become an important explicit goal for the public authorities such as the central bank, the Financial Supervisory Authority,

and other regulatory bodies. The financial system is the central nervous system of the economy. Recent experiences in developed countries such as those in Scandinavia and Japan as well as in emerging economies such as those hit by the Asian crisis show that disruption of the financial system can impose heavy costs on an economy. This can be through direct effects in terms of lost wealth and indirect spillovers to the real economy. Many financial crises are associated with severe recessions.

There are numerous forms that a financial crisis can take. As a result there are many actions that the public authorities should take. The actions include the following.

1. ENSURE THE INTEGRITY OF THE PAYMENT SYSTEM

The Riksbank has a specific mandate to promote a safe and efficient payment system.[1] A significant part of this responsibility is to ensure that the technology of the payment system is as reliable and effective as possible. The protocols of the system should be such that problems similar to those that occurred when the Herstatt bank failed in 1974 are avoided. In that case many banks made payments in foreign exchange transactions expecting a return payment from Herstatt. The return payment did not come, however, because Herstatt went bankrupt. Problems from operational risk should be minimized. Guarantees within the payment system need to be such that there are no incentives for parties to game the system.

2. AVOID DISRUPTION OR COLLAPSE OF THE BANKING SYSTEM

In many crises the pace of developments is such that a number of banks go bankrupt together. This can happen as a result of asset price bubbles where stock and real estate prices rise above their "fundamentals". It can also happen when a problem in one financial institution spreads by contagion through the interbank or other markets to other financial institutions. The possibility of this kind of contagion often leads to a "too big to fail" problem. A large bank may feel that it will always be bailed out because a collapse would bring down the entire system. As a result it is often argued there is a moral hazard problem and the bank may be willing to take excessive risks.

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[1] Our understanding is that this is a narrow translation of the Swedish term used in the relevant legislation. A fuller translation would involve not just the payment system but a more comprehensive coverage of the financial system as a whole.

3. ENSURE THE STABILITY OF OTHER FINANCIAL INTERMEDIARIES SUCH AS INSURANCE COMPANIES

Banks and other financial institutions are linked through a whole web of transactions. A disruption in one part of the financial system can quickly spread to other parts. As a result the central bank and regulators need to also monitor other intermediaries such as insurance companies, pension funds, mutual funds, and hedge funds.

4. MITIGATE THE EFFECTS OF INTERNATIONAL SPILLOVERS

In many instances a crisis spreads from overseas. For example in Asia, the crisis in 1997 started in Thailand and spread around the whole region. One important issue is how countries can prevent this type of contagion. In Sweden the main risk from international spillovers may come from the fact that Swedish banks are heavily involved in other Nordic countries, Germany and the Baltic nations.

5. MINIMIZE ASSET PRICE COLLAPSES IN ILLIQUID MARKETS

Financial systems can be fragile if markets are illiquid. One classic illustration is provided by the Long Term Capital Management (LTCM) episode in 1998. The Federal Reserve Bank of New York became concerned about LTCM posing a systemic risk. LTCM was a hedge fund that was large in absolute terms but small relative to the US economy. When it became overextended the Fed became worried about its positions, particularly those in illiquid markets. They felt that if these were liquidated quickly there might be a meltdown in asset prices which would cause more bankruptcies, further liquidations, and prices would fall even further. To avoid this scenario, the New York Fed helped coordinate a private takeover of LTCM.

6. MONITOR NEW RISKS

Innovations in the financial system and other new developments mean that the source of crises is constantly changing. When the structure of a financial system is relatively simple, central banks can potentially pump liquidity into an economy to mitigate the effects of an asset price collapse. The actions of the Fed after the 1987 stock market crash are one illustration. However, as the number of markets has increased and because the participation in each is limited, it is more difficult for a central bank to ensure that any liquidity it pumps in reaches the right market. With

LTCM, for example, this would probably not have been an effective way to intervene if it had gone bankrupt. This is just one illustration. Central banks and regulators must be constantly vigilant for new ways in which crises can arise. Currently, one potential threat would be the transfer of risks from one sector to another through the use of credit risk transfers. This may help to diversify risk but alternatively, it may concentrate risk through regulatory arbitrage and increase the probability of a crisis.

7. CRISIS MANAGEMENT

Although crises are typically quite costly this does not mean that they should be avoided at all costs. Crises can be prevented by making sure that banks and other financial institutions take very little risk. This is effectively what happened in the period of heavy regulation after the Second World War. There was only one banking crisis in the world (Brazil 1962) between 1945 and 1971.[2] However, the regulation was so severe that it prevented the financial system from performing its proper function of allocating investment. This led to financial liberalization and deregulation and crises returned. If restrictions like those in the postwar period are regarded as undesirable and are removed, crises will sometimes occur. Once a crisis has occurred there is the short run issue of how to minimize its damage. This is the issue of crisis management. It is important that central banks and regulators have some understanding of how to react in crisis situations. This should involve crisis exercises and procedures that have been previously thought out so that the limited time available during a crisis can be focused on managing the crisis itself.

8. ENSURE THE ROBUSTNESS OF THE FINANCIAL SECTOR AND THE ECONOMY WHEN CRISES OCCUR

Given that crises are likely to occur at some time, another important objective is the more long-run one of trying to ensure that the financial and real sectors are robust enough to withstand such shocks with as little disruption and cost as possible. The policy framework must be structured to minimize damage. This includes the supervision of banks and other financial institutions. It also includes, for example, ensuring accounting standards provide sufficient transparency and bankruptcy procedures are structured to avoid large numbers of assets being liquidated at the same time and causing a sharp drop in prices. Ensuring firms have sufficient

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[2] See Bordo, M. & Eichengreen, B., (2000), "Is the Crisis Problem Growing More Severe?" working paper, Rutgers University.

financial buffers is another example of a strategy that may improve robustness.

3. What the Riksbank is Doing and Recommendations for Changes

We should start by saying that we think the Riksbank is doing a very good job in terms of fulfilling its responsibilities regarding financial stability. Our suggestions below are to improve the Riksbank's contribution from what is already a high level.

The three pillars of financial oversight in Sweden are:

- Regulatory framework for supervising individual banks
- Day-to-day oversight of systematic stability
- Oversight of the financial structure and crisis management

The first question that naturally arises with respect to this system is the precise division of responsibility for these three pillars between the Riksbank and the Finansinspektion (the Swedish Financial Supervisory Authority or FSA). The first pillar would naturally seem to be the responsibility of the Finansinspektion while the third falls under the Riksbank. The second is not so clear.

The official position on the relationship between the Finansinspektion and the Riksbank on the division of labor and co-operation with regard to financial stability and efficiency is laid out in an agreement that can be found at

www.riksbank.com/upload/Dokument_riksbank/Kat_AFS/overenskommelse_eng.pdf

This document points out that the Finansinspektion's "main objectives are to contribute to the stability and efficiency of the financial system by setting standards, issuing licenses and supervision, and to actively promote satisfactory consumer protection". The Riksbank has the task "of promoting a safe and efficient payment system. To carry out this task the Riksbank conducts a general oversight of the financial system as a whole but with the main focus on the largest banks and clearing organizations because of their central significance for the functioning of the payment system". The document goes on to describe the Riksbank's main tasks and responsibilities as oversight and emergency liquidity assistance. The Finansinspektion's are supervision, licenses and sanctions, and issuing regulations. The mechanisms for interaction such as consultation groups and for the exchange and collection of information are described.

The task of the Riksbank to promote a safe and efficient payment system is laid out in the Sveriges Riksbank Act 1998. Relative to current views of financial stability as discussed in Section 2 above, this is rather narrow.[3] Other central banks have a wider remit with regard to financial stability. For example, the Norges Bank has as its remit to "contribute to a robust and efficient financial system" (see p. 3 of the Norges Bank's June 2004 Financial Stability Report). However, in practice, it is not clear that they are that different. Financial instability can be triggered by a wide range of events. Ultimately, this instability will have an impact on the payment system. Thus the Riksbank needs to consider the full range of factors relevant for financial stability. In what follows we shall interpret it broadly so that in order to have a safe and efficient payment system it is necessary to have a stable financial system.

3.1 THE FINANCIAL STABILITY REPORT

One of the most important contributions of the Riksbank to fulfill its task with regard to stability is to publish the Financial Stability Report. As mentioned above, this was the first separate financial stability report and has been widely imitated. Other countries publishing an FSR include Austria, Belgium, Canada, Denmark, France, Hungary, Norway, Spain, and the UK. We think the Riksbank's FSR is already a very good publication. However, we have the following suggestions for improvements.

Objectives
Although it might be set out elsewhere, it is notable that the FSR does not explicitly lay out its own objectives. The Foreword to the FSR sets out and motivates the general structure of the publication, but otherwise refers only to the Riksbank's statutory responsibility to promote a safe and efficient payment system. This is appropriate for the starting point, but in the absence of more specific and explicit objectives for the publication itself, seems to imply that the FSR should be seen only as an instrument for the accountability process. By way of example, we note that in their equivalent FSR, the Bank of England highlights a concise summary of the publication's objectives on the inside front cover. They record the aims as:

- To encourage informed debate on financial stability issues
- To survey potential risks to financial stability

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[3] Part of this apparent narrowness may result from a poor English translation of the Swedish terminology used – see footnote 1 above.

- To analyze ways of promoting and maintaining a stable financial system

Our suggestion for the objectives of the Riksbank's FSRs are:

1. To inform stakeholders of the Riksbank's analysis of potential financial stability risks and ways to mitigate them.

2. To encourage informed debate on financial stability issues.

3. To serve as an accountability instrument.

4. To help provide information that major participants in the Swedish financial industry and elsewhere may use as part of the input into their own risk assessment procedures.

The first objective combines the second and third statement in the Bank of England's list. We have put "informed debate" next. In our view, the key objective for a body with a general financial stability responsibility should be to identify possible risks and the ways to mitigate them. The publication aspect, promoting informed debate, goes more to the important but logically second order consideration of how to bring about a consensus on the need to take the identified mitigation measures, most of which will not be under the direct or sole control of the central bank.

The third objective reflects the belief there should be an explicit acknowledgement that the FSR also serves as an accountability instrument. More specifically, we think that the FSR could serve as a vehicle to allow stakeholders (in a broad sense, including the industry and the general public) to form a view about how effectively the Riksbank is undertaking its broader financial stability responsibilities, which are anchored in the statutory, payment-related responsibility.

Finally, we have also added the fourth objective. We think it is inevitable that what the Riksbank includes in the FSRs will have an impact on how the banks and other financial institutions look at things. This seems to us a positive benefit and the FSRs might benefit from the editor's awareness of such an impact.

Recommendation 1: The FSR should make explicit its objectives, either in the Foreword or in a similar high-visibility location. These should be broader than to simply promote a safe and efficient payment system.

The Analytical Framework

Beginning with the 2003 issues, the FSR includes a standard text box at the end of the Summary and Conclusions overview, essentially laying out the Riksbank's broad analytical framework for "financial system oversight".[4] This is an excellent idea that, together with the Foreword, helps readers understand the context and the nature of the FSR series.

However, in linking the oversight of system stability back to the Riksbank's statutory payment system responsibility, we do feel this standard box tends to understate and even implicitly dismiss the potential for systemically important problems originating outside the main banks and the payment system. Comments such as "Systemic risk exists primarily in the payment system", "The first pillar is the supervision of *individual banks*" and "the Riksbank focuses on the four major banks … partly because a default by one of these is the primary threat to system stability," may not be incorrect in themselves. But they risk unduly focusing attention only on what might be the last step in a chain of consequences from a risk or vulnerability elsewhere in the system, rather than on the vulnerability itself. Furthermore the short paragraph on life insurance in the 2003:2 Issue comes over as quite dismissive, especially given the referenced "increasingly lively debate".[5] We would not question the bottom line, but given that the detailed analysis was a year previously, in 2002:2, it would have been helpful to at least reiterate (if not update) some more of the main points of the analysis.

As also noted in Martin Andersson's s internal memorandum of September 24, 2003 on the strategy for future financial stability work this apparent focus may also make it hard for the Riksbank to get "a seat at the table," or even to be taken very seriously, with respect to potentially important issues that appear to fall outside the ambit of the major banks and payment system.

This is not quite the same as saying that the definition of "financial system" or "financial system stability" should be necessarily broader and taken to include other sectors like smaller banks, life insurance firms, securities firms, pension funds, or collective investment vehicles, and the like. Nor, more specifically, is it to say that the FSR should automatically cover these sectors in each and every issue, alongside the major banks. Rather, it is more a matter of what could be thought of as an appropriate level of due diligence, given that the ultimate concern is still the main banks and what can happen through the payment system.

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4   Or financial system "surveillance", as the IMF would call it.
5   The fact that the paragraph also seems rather oddly placed in the Macroeconomic Developments Section adds to this impression. Possibly there was an intended link with the previous paragraph on equity prices, but that is unstated.

The operative question is: in order to properly assess stability of the core institutions, how much attention needs to be paid to other players, and how regularly? It is interesting to note that in many other countries' FSRs the insurance sector and other parts of the financial system are reviewed in every issue. There is also, of course, the issue of increased resource usage if coverage is increased. A minimal strategy is to include intermittently analyses of problems and topics in other sectors as they arise, e.g. in boxes supplementing the main text or in a special topic article, which both analyze the primary issue and discuss the ultimate linkages and implications for the main banks. This appears to be essentially the Riksbank's current approach. For example, the 2003:1 FSR includes a box discussing company pension fund issues. Also, the 2002:2 Issue (though not reviewed in detail for this exercise) includes boxes on WorldCom as a supplier to the financial system, as well as the one already noted on the relationships between insurance companies and banks.

Even under this minimal strategy, however, we would recommend reformulating parts of the box on the analytical framework so that it sounds less dismissive of broader stability related issues and risks. It should make it clear that the Riksbank also needs to analyze vulnerabilities in sectors outside the core banks, at least intermittently, in order to ascertain the potential risks to the system as a whole (or to confirm the lack thereof).

This minimal strategy carries some risks, even with the above clarification of the analytical framework. Namely, with this approach, the Riksbank risks being, or being seen to be, too reactive, i.e., it will analyze problems outside the banks when they are already obvious, but may not be good at picking potential problems or risks before they fully develop.

An option that would still fall short of more intensive and regular published analysis of nonbank financial sectors would be to buttress the above approach by devoting some resources to regular *internal* analysis and review of (the more important) nonbank sectors, and possibly also including some more ongoing analysis in the FSR but on a less frequent basis than for the core institutions (e.g. annually). We are inclined to the view that something along these lines would be a preferable strategy, provided the needed resources can be made available without compromising the analysis of core sectors. Just how much additional resources would be needed to implement it would depend in part on what other analyses and information can be readily drawn on, as opposed to what would need to be built up from scratch. For instance, if the Finansinspektion already undertakes a similar analysis for insurance companies, or intends to, the Riksbank analysis could draw on that and only supplement it in areas particularly needed for the systemic stability assessment.

Conversely, if the additional resources needed for this approach could not be provided, then decision makers should explicitly recognize the concomitant risk that Riksbank staff may not have the capacity to recognize potential risks as early as might otherwise be the case.

The discussion of the role of the Finansinspektion in providing information to the Riksbank raises another issue alluded to at the start of this section. This is where the boundaries between the Finansinspektion and the Riksbank with regard to day-to-day systemic stability lie. As far practitioners in Sweden are concerned, our understanding is that the perception would be that the Finansinspektion is quite proactive when it comes to day-to-day surveillance of stability issues in the banking and insurance industries. On the other side, the practitioner perception would be that the Riksbank's day-to-day activities are focused on macroeconomic analysis as part of their price stability role and their interest rate management. We think that it would be an important achievement if (i) a close cooperation between the Riksbank and Finansinspektion could develop so that the Finansinspektion – within the limits that confidentiality sets – would provide information and conclusions to be integrated into FSR articles and (ii) the border between the Riksbank and Finansinspektion responsibilities could be made much clearer to all stakeholders, in which process the FSR could play a material role.

Recommendation 2: The Riksbank's FSR should contain regular coverage of the insurance industry and other important sectors of the financial system. It would be preferable if this was done in conjunction with the Finansinspektion.

Recommendation 3: The precise boundary between the Finansinspektion and the Riksbank should be made clearer to all stakeholders.

Structure and Overall Coverage of the Analysis
In addition to the more basic question of the breadth of the analytical framework considered above, there is a second area where the analyses presented in the FSRs need to be rounded out in our view. This concerns the coverage of the financial stability policy framework. We turn to this next.

As a refinement and clarification on preceding issues, the FSRs for 2003 have adopted an apparently standard structure for the main text consisting of the following aspects:

- Macroeconomic Developments
- Swedish Banks' Borrowers
- Developments in the Banks
- The Financial Infrastructure
- Special Topics (two, more thematic, articles in recent FSRs)

This is a common structure for FSRs – most other countries' FSRs have a similar structure.[6] More importantly, it appears to us to be a useful way of reflecting the broad analytical framework for financial stability analysis – except perhaps in two respects elaborated further below. Essentially, the FSR structure represents the analytical distinction between the risks in the broader environment that may have an impact on the banking system (first two chapters), and the vulnerability of the system to those risks (alternatively, their impact) should they eventuate (third and fourth chapters).

There are three main aspects relating to the structure of the FSRs which we would recommend receive some further attention in subsequent editions.

- First, there is an issue about how broad the coverage of macroeconomic conditions should be. The main criterion for inclusion should be relevance to the Swedish economy. A comparison with other countries' FSRs is instructive. The larger countries such as the UK, France, Spain and Canada are obviously able to devote more resources to their FSRs. They can therefore provide greater international coverage of macroeconomic conditions. For example, The Bank of England's financial stability report is able to provide a macroeconomic roundup of the UK, the Eurozone, the US, Japan, non-Asia Japan and the emerging markets. This would clearly not be feasible for the Riksbank given the relatively limited number of staff available. The FSRs of the smaller countries such as Austria, Belgium, Denmark, and Norway are more comparable. In the case of the Austrian FSR, for example, an analysis of Central and Eastern Europe is regularly included in the macroeconomic analysis. In the case of the Swedish FSR it may be desirable to have a broader discussion of regional economic conditions in the Nordic countries, and the Baltic nations. The key point in choosing what should be included in the coverage of macroeconomic conditions is to maintain focus on relevant events. For example, although regular coverage of China would be inappro-

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6   It is outlined, e.g., in Bowen, O'Brien & Steigum's 2003 review of the Norges Bank's FSR. See the Norges Bank's Financial Stability Report 2003:1, pp. 35–44.

priate, in recent months many have argued that whether China has a "soft" or "hard" landing will be crucial for determining whether the global recovery continues. Some brief discussion of this might be appropriate even though there are no direct links between China and Swedish banks. It might be useful in the context of briefly describing the current global situation to include a link, or at least a reference, to one of the many other published global analyses such as the IMF's Global Financial Stability Report.

- Second, although the more-or-less standard foreword to the FSR does a generally good job motivating the above structure, we felt that it could do more to explain to readers the motivation for the financial infrastructure chapter specifically. It currently gives the impression that the chapter is simply something of an add-on, reflecting the Riksbank's statutory responsibility in this area, rather than something that is in fact an integral part of any overall financial stability analysis. Thus, an additional sentence or two could explicitly convey that the infrastructure may be critical in determining the system wide impact / vulnerability of any particular risk that crystallizes (a potential transmission channel for contagion), as well as being a potential source of risk in its own right (business continuity aspects).

- Third, and more fundamentally, the FSR should explicitly recognize, through the structure of its analysis and the forward motivating it, that the vulnerability of the system also depends critically on the public policy framework for financial stability. System stability in our view is not only a matter of the strength or otherwise of the financial intermediaries themselves, but also how the policy framework affects institutions' behavior over time and how policymakers are placed to deal with a threat to system stability if it develops. Supervision / regulation, systemic "surveillance" and risk monitoring, liquidity support and other safety net aspects, failure / crisis management, and aspects of the underlying legal, governance and accounting / auditing framework, are all aspects of what we would think of as the financial stability policy framework. The Box on the Riksbank's view of financial stability recognizes this at a general level, but the implications for the FSR analysis do not come through clearly. What is needed to complete the stability analysis in our view, is a chapter that pulls together significant issues in the policy framework – things that are either happening, or in the Riksbank's view should happen with respect to any of the aspects of the policy framework. Such a chapter would be somewhat analogous to the Infrastructure chapter and could, e.g.,

extract, summarize and integrate the main messages from applicable special topics papers the Riksbank has been working on, or from relevant publications of other bodies. The Foreword to the FSR could explicitly motivate such a chapter in a fashion similar to what we have described above.[7]

With regard to the third point, it is of course true that the policy framework generally moves rather slowly compared to the more conjunctural aspects of risks and vulnerabilities, so that there could in principle be periods when there is very little new to say on policy framework issues. In practice, however, we would not see this as likely to be a major problem for a six-monthly FSR. Our guess is that there would be very few periods in the foreseeable future when there was not a sufficient number of interesting and important policy issues under consideration or implementation, and on which the Riksbank could desirably report or express an opinion, from the perspective of how the evolution of the policy framework is likely to affect the overall resilience of the system over time. But even if there were such periods in the foreseeable future, it would in a sense be fine to say that there is little new to report, because what really matters here is to convey clearly and repeatedly the perspective that overall system stability depends on the policy framework as well as on the positions and risk management abilities of the financial institutions.

While this broader perspective on analyzing system stability that includes policy is lacking (in explicit form at least) from the Riksbank's FSR analysis, we would hasten to add that the Riksbank FSR does not compare poorly with most other FSRs in this regard. We are not aware of an example of an FSR elsewhere that explicitly integrates the policy framework into the framework for stability analysis in exactly the way we are suggesting.[8] Policy issues tend to be treated instead as, e.g., ad hoc special topic articles, and the possibility of presenting them in a more integrated and synthesized fashion is foregone. Perhaps this is an opportunity for the Riksbank to innovate a little further, in the same way that it was the innovator for the much larger challenge of developing FSRs in the first place.

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[7] We appreciate that there could be some inter-institutional issues to be kept in mind in designing such a policy framework chapter – not least in respect of commentaries on the supervision framework. However, we feel that an appropriate formulation should be able to find a reasonable balance between the differing roles and responsibilities of respective institutions and the underlying need (in our view) for an integrated analysis that fully reflects all the key aspects of the financial stability environment.

[8] An example which comes close, however, is the chapter on "Strengthening financial infrastructure" in the December 2003 Bank of England *Financial Stability Review*. Despite the title and opening summary box, this article discusses a range of policy framework issues in addition to those related to the payments and settlements infrastructure.

Recommendation 4: A more comprehensive regional analysis of macro-economic conditions in the Nordic countries, and the Baltic nations could be given. Discussion of global macroeconomic conditions should focus on relevant events.

Recommendation 5: The financial infrastructure chapter could be better motivated for readers.

Recommendation 6: A chapter on policy developments could be added since public policy is so critical to financial stability.

Tools and Indicators used in the Analysis

The FSRs contain a wealth of data on indicators relevant to financial sector stability, generally presented in an easily accessible and understandable graphical fashion. Although some further thought could be given to facilitating clearer interpretation of charts when the FSR is downloaded and printed in black and white, color versions are generally very clear. Only one chart is, we feel, too "busy" for many readers and a bit difficult to interpret – the chart dealing with the interbank contagion simulations (figure 3.20 in the 2003: 2 Issue). Some simplification of this chart would be helpful for readers.

For an FSR, we believe it is important that there be a core of key financial sector indicators that are presented continuously and more or less consistently in successive FSR editions. This is so that readers can more easily track for themselves the evolution of financial risks and vulnerabilities over time, and compare it against the evolution of the Riksbank's own stability analysis. The Riksbank FSR does a good job in this respect, judging at least from the two 2003 issues under review. Especially for the chapter on Developments in the Banks, most of the financial indicators are presented in both issues, even if in some cases there may be variations in the form in which they are presented. Between the FSR issues, there is somewhat more variation in the indicators used (and their presentation) in the first two chapters of the main text. But this is not unreasonable given that, as the economic environment affecting banks evolves, some of the indicators that are most useful to look at will also change. Without of course discouraging further development and innovation in this area, we would encourage the Riksbank to continue to ensure a strong thread of consistency over time in the key financial indicators presented, especially in the critical chapter concerning banking sector developments.

In terms of additional indicators, one thing that occurs to us is that

the discussion of strategic risks for banks would benefit from a wider international comparison of key bank profitability, income and cost ratios. Currently the comparison is limited to other Nordic area banks. A wider international coverage would help give a further, longer-term gloss to the analysis for Swedish banks, given continuing globalization and consolidation trends.

It is important for FSRs to analyze financial stability indicators at a disaggregated level as well as at the aggregate or average level, using appropriate peer groups where applicable. Indeed, in general, an aggregate level analysis alone risks being quite misleading in the absence of information about the distribution of strengths or vulnerabilities across the system. How far the analysis can go in any particular case will depend importantly on national circumstances – the structure of the financial system, what individual institution information is already published or publishable, and so on. Leaving aside the broader question of what types of institutions to focus on in the stability analysis (see above), the Riksbank's FSR achieves a good balance here, with a number of the key bank soundness indicators being analyzed at the level of the individual large banking groups.

One of the important indicators of the likelihood of a crisis is the extent to which asset prices are experiencing a "bubble". The recent experience of the technology bubble in the late 1990's suggests that valuations done by investment banks and other private sector analysts are not very reliable in such circumstances. A number of FSRs include simple measures of whether stock markets are overvalued by looking at Price/Earnings ratios. The relationship between real estate prices and rents is also sometimes given. Although these are useful in assessing the extent to which there is a bubble, more sophisticated indicators based on better valuation techniques could be developed. For example, each firm on the stock exchange could be valued using standard discounted cash flow techniques. It would not be desirable to release individual valuations for firms but an index comparable to the standard stock market index based on these valuations could be developed. Similarly, real estate can be valued using discounted rents. These calculated indexes can then be compared with actual prices to give people a sense of whether there is an over- or undervaluation of assets.

Use of explicit "what-if" analysis in the FSRs is currently quite limited. Only the analysis of large corporate and interbank exposures (which is certainly useful analysis) falls into this category, along with the simulations undertaken in the context of the analysis of payments and settlement infrastructure (in the 2003:02 Issue). According to the internal memo of September 23, 2003 on "Strategy for the Riksbank's financial stability

work over the coming years," the intention is to devote more effort to developing the tools for sensitivity analyses of banks' credit risks in particular.

Such work can shed more light on the quantitative relevance of macroeconomic, sectoral and macro-financial linkages; and can likewise provide useful information on the distribution of vulnerabilities as well as the simple aggregate or average picture (akin to the usefulness of disaggregated financial indicators noted above). By specifying and applying the same basic parameters defining a shock, this type of work can also facilitate the leveraging of individual banks' own specific stress testing models as part of a broader financial stability analysis (rather than simply bank-specific analyses) – assuming of course that the banks are willing to contribute to such an exercise.

Nevertheless, there will remain a range of different caveats on the interpretation of such work. Obtaining comparable results from individual bank models, for example, often may not be straightforward, even with the specification of identical shocks. Thus, "over-analysis" of such work, or over-reliance on specific numerical outcomes (to the extent of spurious accuracy), would need to be avoided.

Recommendation 7:
(i) Ensure a strong thread of consistency over time in the key financial indicators presented, especially in the critical chapter concerning banking sector developments.

(ii) The discussion of strategic risks for banks would benefit from a wider international comparison of key bank profitability, income and cost ratios.

(iii) Consider developing more sophisticated valuation indicators based on discounted cash flow techniques for stocks and real estate.

(iv) Expand the use of "what-if" analysis by, for example, developing tools for sensitivity analyses of banks' credit risks.

Focus and Transparency of the Analysis
Aside from the broader points noted above about the analytical framework and coverage, the focus and transparency of the Riksbank's FSR are amongst its strong points. The macroeconomic and sectoral (bank counterparty) analyses are well focused on what seems most important for financial stability, and the links to local financial stability are generally well captured. It is notable for example that discussion of the international macro and financial market conjuncture is concise, well targeted and gen-

erally well integrated into the stability analysis. It is also explicitly linked to the macro appraisal in the Riksbank's previously published Inflation Report, which is an important signal of Bank-wide consistency. A couple of exceptions we noted, and possible areas for further elaboration:

- There are a few examples where a phrase such as "In Sweden, as in the US" or similar comparison is used (e.g. in respect of consumption and investment, near the bottom of p.15 of the 2003:2 Issue). While such formulation may be a convenient way to keep the discussion concise while still bringing in the international macro aspect, it may also be read to imply a direct causal link from the US or international variable to the Swedish one, which may not be intended. It is not clear in these cases what the information content is from the US or international reference.

- In the same edition, the section on the management of Resona sits awkwardly where it is in the Macroeconomic Developments chapter. This impression is not reduced by the text clearly acknowledging that the issue is of no consequence for the Swedish banking sector. It would have been better in a box elsewhere in the report (perhaps the LoLR chapter). Indeed, if the FSR incorporated a chapter relating to the financial stability policy framework (as suggested above), that would have been a perfect place for it.

- In the discussion of international interest rate trends in the 2003:2 Issue, one risk element that might have been mentioned additionally was the potential link between the sustainability or otherwise of the current pattern of global capital flows, and bond or other rates in the US and globally.

Communication Style and Target Audience
Overall, the reports seem to strike a reasonable balance between depth of analysis for more professional readers and accessibility for less professional readers. For the latter group in particular, the FSRs are easy to read, and the style generally crisp. The use of internal section summaries (especially those in bullet point form in the 2003:02 Issue) is a helpful device to ensure the conclusions of different stages of the analysis are clear.

Together with the use of ample charts and boxes, the use of half-page columns (except in boxes) even when there are no accompanying charts, gives an uncluttered feel to the document. The length overall is not particularly short, but is kept relatively moderate by limiting the addi-

tional thematic articles to two, in each of the 2003 issues. It will be helpful, if the recommendations above are accepted, to try not to increase the overall length by too much – always a challenge that is easier said than done.

One of our committee members surveyed 26 of his senior colleagues at Svenska Handelsbanken to obtain their reactions to the Riksbank's FSR. These are presumably an important part of the target audience for the reports. About one third of them were regular readers. Some of the others said it was the first time they had seen it. Most of them said it was ("surprisingly") rewarding to read it.

Regular readers feel the content in the reports is relevant and interesting to them. Said one: "It is easy to grasp for people who are involved in financial markets." And another regular reader: "It's good but it could be even better if headlining were better thought through and if particularly important paragraphs were extracted and concluded separately." This reader made a specific reference to the SNS Reports (well-known yearly reports on Swedish economy) which he perceives as very well laid out. He also judges the business cycle comments in the Riksbank's reports as especially interesting just because they come from the Riksbank. A first-time reader said: "It is well written and interesting; before reading the report I actually thought it would be more difficult to understand." Another first-time reader especially appreciates the many short briefings, which make it easier for time-pressed executives to consume.

Senior executives were also asked in what situations they would typically make use of the stability reports. One of the regular readers said he uses information in the reports for competition intelligence purposes and to help him understand what's on the central bank's mind for the time being. It is also obvious that from time to time information from the stability reports is used in investor and analyst presentations, mostly as a background for what is happening in the bank in terms of business volume growth and operating profit development. The head of one of the regional banking units pointed out that an analysis of the drivers behind price increases in the Swedish real estate market caught his interest while he was struggling to get a feel for whether the present higher price level would be sustainable. Another regional unit head said more generally that he can make good use of practically all the information in a Riksbank report since all of the subjects that are covered there have connections to banking operations. In addition to that, he said the macro analysis in the report saves him from going through the flood of such information from many other sources. Several of the respondents mention the special articles on various subjects as an important source of valuable knowledge. Said one of the EVPs at central head-quarters: "What interests me most

are the parts that deal with risks in current infrastructure routines hinting on what kind of changes as to ruling we have to expect." One of the business area heads said he takes a particular interest in the Riksbank's macro forecasts on investment, private consumption, credit market volume growth and households' capacity to withstand financial strain.

Finally, colleagues were asked in what areas the Riksbank's FSRs could be further improved. One thing that was mentioned was the possibility of getting access to graphs and tables easily, preferably over the internet and then not only the graphs as such but also the numerical foundation for diagrams. The head of the bank's UK operations pointed out that the Bank of England stability report takes its readers one step further by inviting external observers to present their views on particular issues, which he sometimes finds rewarding. He also gives a concrete example of an article in a UK report that he thought was especially interesting to read, covering the issue of how at a very early stage to recognize a corporate borrower that is on its way into serious financial problems. Another colleague would wish to see more on Scandinavian banks' current funding situation. Other suggestions: The present situation in the life and pension industry; how do solvency and consolidation problem impact insurance companies? And how do downward revised expectations as to return on capital investments impact future consumption and financial stability? What will be the impact on stability of the change in banking laws that will allow other companies than banks to accept current deposits that will or will not be covered by the deposit guarantee system? What are the experiences from "bank runs" in various countries? Will the new IAS accounting rules have an impact on corporate borrowers' ability to withstand financial strain?

Recommendation 8: Make the charts in the FSR easily downloadable over the internet and make the data underlying them available.

Recommendation 9: Consider inviting outside experts to contribute to the review. If this is done it should be made clear that such articles contain the views of an outside expert and these are not necessarily the views of the Riksbank.

3.2 CRISIS MANAGEMENT

One area where the Riksbank has particular expertise is in crisis management. It has been among the pioneers in developing crisis management. In an excellent article, Göran Lind outlines how live exercises provide

hands-on experience to the Riksbank staff on how to deal with crises.[9] The weaknesses identified in such exercises have led to the development of protocols for communications and checklists on what to do. Crisis routines permit the swift initiation of analyses of the unfolding crises. Crisis binders allow key information to be quickly located. A joint exercise with the Finansinspektion in the summer of 2002 and one with an ECB working group in September 2003 were particularly valuable.

Recommendation 10: Continue to conduct exercises on crisis management. Exercises with other EU countries may be particularly helpful in eliminating any ambiguities in the Eurozone and EU's structure for dealing with crises.

3.3 THE EFFICIENCY OF THE FINANCIAL SYSTEM

As discussed in Section 2, the mandate of the Riksbank is to promote a safe and efficient payment system. We have so far focused mainly on the stability aspect of the Riksbank's activities and not discussed the efficiency aspects. The financial stability group at the Riksbank has conducted studies on the efficiency of the Swedish payment system.[10] These are very useful and should definitely be continued. In most countries the pricing of payment services to customers is very different from the private costs the banks bear. The Riksbank's work in this area and the development of policy based on it again has the potential to be path breaking.

The more difficult question is how much farther work on the efficiency objective should be pursued. One aspect of this is whether anything other than the payment system should be considered. As we have argued above, there is some argument for taking a broader view than just the payment system. The Riksbank's stability group could undertake occasional studies on more general efficiency aspects of the financial system. For example, a study on how efficient is the bankruptcy system and its implications for stability might be useful. Similarly the accounting requirements for financial institutions and firms could be reviewed. Obviously resources are limited and this task is potentially large. We would therefore suggest that such studies, if undertaken at all, should be very occasional.

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[9] See Lind, G., (2003), "Crisis Exercises Make for Crisis Readiness," *Sveriges Riksbank Economic Review*, no. 4.
[10] See, e.g., Guiborg, G. & Segendorff, B., (2004), "Do Prices Reflect Costs? A study of the price- and cost structure in the Swedish Retail Payment System 2002," working paper, Sveriges Riksbank.

The Riksbank, like many central banks, has a separate monetary policy
group and financial stability group. An important issue is how much inter-
action there should be between the groups. Underlying this, and more
fundamentally, there is the extent to which financial stability issues should
impact monetary policy. One current example is the debate about
whether central banks should focus solely on consumer price inflation
when conducting monetary policy or whether they should also target
asset prices. We do not have any particular recommendations on this.
However, we think it is important that the issue of the degree of interac-
tion between the monetary policy and financial stability groups be consid-
ered within the Riksbank on an ongoing basis.

4. Concluding Remarks

In conclusion, we think that the Riksbank is doing a very good job in ful-
filling its financial stability responsibilities. As the analysis in the Financial
Stability Reports indicates, it is constantly monitoring the payment system
and the banking system. We have suggested that in conjunction with the
Finansinspektion it also monitor other parts of the financial system. It also
considers overseas developments to try to minimize the risk of contagion
from other countries. The Riksbank's activities with regard to crisis man-
agement are exemplary. The discussion in the Financial Stability report
analyzes the robustness of the financial system and real economy to
shocks. This covers items 1–4 and 7–8 in Section 2 concerning what the
public authorities should be doing with regard to financial stability.

The remaining items 5 and 6 are to minimize asset price collapses in
illiquid markets and to monitor new risks. The LTCM episode illustrates
concerns about the possible financial fragility of markets due to illiquidity.
Any potential problem was avoided by the New York Fed arranging the
private bailout of the company. Another way in which the problem could
have been mitigated would have been to try to alter the clearing arrange-
ments or market microstructure so that liquidity is improved and such
problems are likely to be avoided. Yet another would have been to allow
LTCM to go bankrupt and then if any collapse of prices occurred to man-
age the crisis by injecting liquidity into the appropriate markets. We be-
lieve that this would have been difficult, however. The LTCM example
also illustrates how important it is to constantly monitor new risks. As the
financial system changes through financial innovation, new systemic risks
are constantly arising. The analysis in the first few chapters of the

Financial Stability Reports does discuss new potential threats to stability and it is important that this be maintained.

We have made a number of recommendations in this report for improvements. Perhaps the most important of these is the inclusion of a chapter on policy developments in the Financial Stability Report. We hope that this and the other changes we have recommended will help to maintain the Riksbank's financial stability activities as an example for other countries to follow.

■ Cash-supply efficiency

BY SONJA DALTUNG AND MITHRA ERICSON

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*Since the 1980s the structure of the cash supply in Sweden has changed
in several respects. Early in 2004 the Riksbank gave a project group the
task of drafting principles for the nature of the Riksbank's role in supply-
ing cash and proposing how the Bank can influence other aspects of the
cash market's efficiency. The authors of this article have participated in
the project group and here they set out the principles for supplying cash
on which the group's proposals are based.*

The discussion in this article concerns how the supply of cash ought to be
organised and the role of the Riksbank in an efficient cash supply. To
assist readers who are not familiar with these matters, we begin by con-
sidering the role of cash as a means of payment. Then we outline the
administration of cash that is needed in practice to enable cash to func-
tion in this respect. This is followed by a look at the recent changes in the
structure of the cash supply. After that, the principles for achieving an
efficient organisation of the cash supply are discussed and we conclude
with an account of the Riksbank's recent decisions on these matters.

The role of cash in society

Cash is an umbrella term for bank notes and coins. The primary social role
of both notes and coins is to function as generally accepted means of
payment. Cash also serves as a store of value. Cash is of value mainly
because it can be exchanged for other goods.[1] A bank note may therefore
be worth much more than the paper of which it is made. Coins, on the
other hand, have sometimes been worth less than the metal they are
made of, with the result that they have been melted down for the sake of
the metal.[2]

The role of cash in society is to facilitate transactions by functioning as a generally accepted means of payment.

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[1] The exchange value of cash is time-dependent on the development of prices. Maintaining the value of
    money by promoting price stability is one of the Riksbank's primary functions.
[2] This happened, for example, in the 1970s and 1980s.

The social benefits of generally accepted means of payment can hardly be overrated. Without them, transaction costs would be extremely high because it would then be necessary to arrange a multiple exchange of goods and services or spend a lot of time locating potential buyers. Over the years, various payment *instruments* have been developed so that they function as alternatives to cash as a *means* of payment. Examples of such instruments are giro transfers, various types of card, cheques and money orders. Credit cards, for instance, are an instrument for making payments with money or credit in an account. Payment instruments are also provided by non-financial companies; some retail companies issue cards that can be used when purchasing their products. To be universal, however, transactions via a payment instrument have to involve an intermediary. Various universal payment instruments are provided above all by banks – acting as an intermediary for payments is a time-honoured practice in commercial banking. Like other banking activities, general acceptance of a payment instrument issued by a bank presupposes confidence in the bank's ability to pay.

The development of various payment instruments has diminished the economic importance of cash. The number of transactions involving different types of card has grown, as shown in Figure 1. Since the 1950s, the amount of notes and coins in circulation has been declining relative to GDP; from about 10 per cent in 1950, it had fallen to about 4 per cent in 1990.

There is often talk of a "cashless society" and the notion that Sweden, like many other countries, is approaching that state. Today, notes and coins in circulation in Sweden have a total face value of about SEK 100 billion; but although there has been a falling trend relative to GDP, in recent years the level has been relatively stable (see Figure 2). Studies from other countries show similar trends, though cash levels do differ. While Sweden lags behind the other Nordic countries in the use of cards, we are ahead of many other countries in Europe.[3]

Banks clearly exert a considerable influence on the use of cash through the fees they charge for payment services. All else equal, the use of cash would probably decline if a charge were to be imposed on withdrawals via ATMs.[4] However, different payment instruments are not perfect substitutes for the user. Cash is transactionally efficient in that payment is made by transferring it physically. Cash payments therefore do not require an intermediary. Payments via a payment instrument, on the

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[3] See Nyberg & Guibourg (2003).

[4] In a study by Temo in 2000 on behalf of the Riksbank, half of those interviewed using cards stated they would use cards to a greater extent if cash withdrawals were subject to a fee.

Figure 1. Annual number of card payments per capita
No. of transactions

Sweden — Finland — Norway ---- Denmark
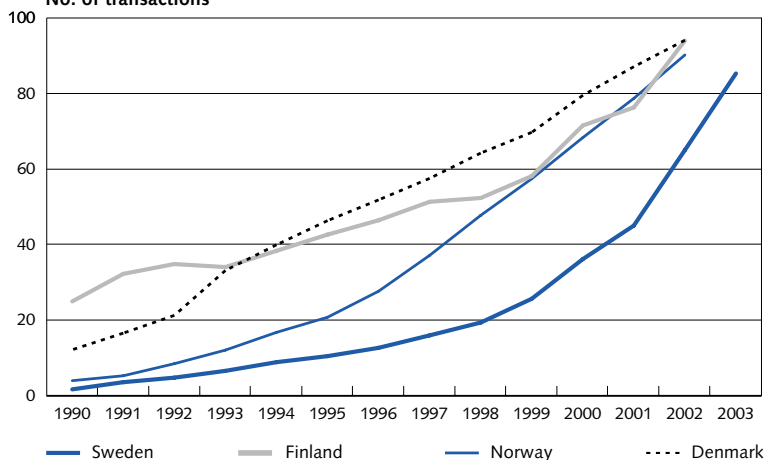
Sources: ECB and Norges Bank.

Figure 2. Value of notes and coins in circulation (M0) relative to GDP
Per cent
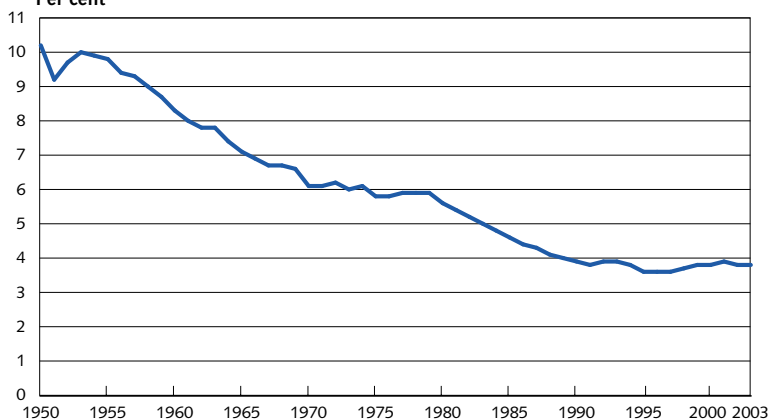
Source: The Riksbank.

other hand, often require an intermediary for their completion and this introduces a time lag between initiation and completion.[5] Moreover, the seller needs to be confident that payment will be made. So most payment instruments presuppose an efficient banking system. But cash does involve a greater risk of theft and that is particularly troublesome in the case of large transactions.

For users, an important characteristic of cash seems to be that, unlike payment instruments, it confers anonymity. For cash payments, in con-

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trast to card payments, for example, neither the buyer nor the seller has to be registered. Studies have found that a large proportion of notes and coins in circulation is used for transactions in unregistered activities where those concerned want to be untraceable, for instance for tax reasons. In Sweden's case, a study estimated that between 45 and 65 per cent of the cash in circulation is used for such unregistered activities.[6] A study in Norway gave a similar result.[7]

Administering cash in practice

From the supply side, a characteristic of cash is the large-scale physical handling that is needed if cash is to function as a means of payment: notes and coins must be produced, distributed, counted, sorted and stored. Instruments of payment can be said to be aimed at avoiding this physical handling. Their development has progressed from cheques, which also involve a good deal of physical handling, to electronic payments, which eliminate such handling altogether. A brief general description is given below of the apparatus that has been required up to now for cash to function as a means of payment.

The demand for bank notes and coins is predicted by the Riksbank, which also orders new notes and coins annually from the producers. The cash is then stored in several places in Sweden, pending demand from the banks. The latter's demand is determined in turn by the amount of cash that their customers, for example retailers and the general public, request.

The continuous flow of cash between agents in society means that notes and coins have to be handled unceasingly. When cash changes hands, it has to be transported, checked, sorted and counted. The extent of this handling obviously depends on the amount of cash involved. Among other things, the flow of cash has to do with the reluctance of individuals and firms to hold unduly large amounts of cash. The risk of theft is one reason for this, another is that cash does not attract interest. For the same reasons, banks likewise prefer to avoid excessively large stocks of cash and therefore transfer a surplus to the Riksbank. It is only the banks that have accounts with the Riksbank and having such an account is a condition for borrowing cash from the Riksbank. A bank that collects cash from the Riksbank is debited on its Riksbank account, which then shows a reduced surplus or a deficit. The terms for these accounts also include a deposit and a borrowing rate. As in the case of individuals who withdraw money from their bank, when a bank collects cash from

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6   See Andersson & Guibourg (2001).
7   See Humphrey, Kaloudis & Öwre (2000).

the Riksbank, it loses interest (or has to pay interest if its account shows a deficit).[8] So cash entails a cost to the holder in the form of lost interest. Banks (and other firms) carry an interest cost for the cash on their balance sheets and households have an interest cost for the cash in their wallets. Consequently the banks aim for the cash they do not need to be returned to the Riksbank. When cash is delivered to the Riksbank, the banks' Riksbank accounts are credited, a procedure known as value-dating.

Value-dating requires that cash is actually delivered to one of the Riksbank's branches. Besides accepting cash and crediting the banks' accounts, these branches supply cash. The Riksbank's stock of cash is also stored there to enable the Bank to cope with market demand for cash.[9]

Value-dating requires that cash is actually delivered to one of the Riksbank's branches.

The branches also receive unfit notes that are to be destroyed. The Riksbank has laid down certain standards for the quality of bank notes, for example how torn and how soiled they can be and still be classified as fit for circulation. In general, the life of a note varies with its denomination; large denominations last longest, small denominations are subject to most wear and tear and have the shortest life. Notes classified as unfit are authenticated in a thorough and qualified inspection before being destroyed by the Riksbank. Approximately 90 million bank notes are destroyed annually. Coins last longer than notes; those that are worn out are also handed in to the branches and then transported to a facility for melting them down and recovering the metals.

Unfit notes are thoroughly authenticated before being destroyed by the Riksbank.

Counterfeit notes are to be withdrawn from circulation as soon as they are detected. It is illegal for a person who detects a counterfeit note to use it; they have a liability to report it to the police.[10] Notes are authenticated not only by the Riksbank prior to their destruction but also by other professional administrators of cash, for example banks, cash-in-transit (CiT) companies[11] and retailers. Counterfeit notes that are detected under the Riksbank's administration are likewise handed over to the police for investigation. Swedish currency is forged to a lesser extent than many other currencies. Some CiT companies use ink cartridges in security devices to discourage thieves; if an unauthorised person opens a container, the ink automatically discolours the notes. To support the concept of security dying and ensure that thieves cannot use notes that have been dyed, the Riksbank does not in principle redeem notes that are discoloured in this way.

Counterfeit notes are to be withdrawn from circulation as soon as they are detected.

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[8] In practice the banks lose/pay interest at the repo rate because their account balances are regulated by the Riksbank with so-called monetary policy repos, see Mitlid & Vesterlund (2001).
[9] The notes in the Riksbank's stock are not included in the amount in circulation.
[10] See Brottsbalk (the Swedish Criminal Code) (1962:700), Ch. 14, §§ 6, 9 and 10.
[11] This refers to companies that specialise in the transportation and administration of cash.

Cash administration up to August 2004

Cash is an ancient means of payment. Coins antedate notes in Sweden but an instrument in the form of an interest-free note for a specified amount of credit was issued by a private banker as early as the mid 17th century.[12] The Riksbank has issued bank notes since the early 18th century and has had the sole right to issue notes and coins valid in Sweden since the beginning of the 20th century.[13] The supply of bank notes and coins in Sweden is also the Riksbank's responsibility.[14]

As we have seen, notes and coins have to be handled on a large scale if they are to function as a means of payment. Over the years, the parts played by the Riksbank and other agents in this administration have changed.

Prior to the 1980s the Riksbank had a branch office for the operational administration of cash in virtually every county.

Prior to the 1980s there was a Riksbank branch office for the operational administration of cash in virtually every county; these branches held the Riksbank's stock of cash, supplied banks with cash and received cash from them, value-dated, counted and examined cash for its quality and authenticity. During the 1980s the branch offices developed commercial activities related to their existing operations, for example sorting coins and counting retailers' daily takings. The commercial activities, which were intended to utilise surplus capacity at the branches and thereby enhance their efficiency, were performed for a fee; similar services were also provided by purely commercial agents in the market for cash.

The number of branches was reduced in the 1980s and 1990s.

Branch closures in the 1980s and 1990s meant that by 1993 the Riksbank had eleven branches in Sweden. This meant that there were fewer points where value-dating could be arranged.

In 1998 the Riksbank decided to corporatise the operational component of the cash supply; PSAB was formed.

In 1998 the Governing Board of the Riksbank decided that in order to enhance the efficiency of cash handling services and refine the Riksbank's role as an overseer, the operational component of the Cashiers' Department would be transferred to a subsidiary company.[15] On behalf of the Riksbank, the new company, PSAB or Pengar i Sverige AB ("Money in Sweden ltd"), performed such tasks as ensuring that notes and coins are available for further distribution at a number of places in Sweden, holding and value-dating the Riksbank's stock of notes and coins and examining their quality and authenticity. The company was also to develop the commercial operations in the market for cash. PSAB had 13 branch offices. The transfer of the practical operations to a company underscored the role of the Riksbank as an overseer in that in the field of cash supply the

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[12] Johan Palmstruch in 1661; for further information, see www.riksbank.se.
[13] See Sveriges Riksbank Act (1998:1385), Ch. 5, § 1.
[14] See Sveriges Riksbank Act (1988:1385), Ch. 5, § 3.
[15] See also Sveriges Riksbank (2003).

Bank now focused on promoting a safe and efficient payments mecha-
nism in more general terms. However, the destruction of banks notes was
not transferred to the new company; it continued to be an operational
function of the Riksbank.

Partly in the light of criticism from competitors of PSAB, in spring
2002 the Riksbank decided to separate PSAB's commercial operations
from its work on behalf of the Riksbank. This process was initiated that
autumn: the operations undertaken for the Riksbank – supplying new
notes and coins, holding stocks of cash and examining and destroying
unfit cash – were assigned to another subsidiary company, SKAB or
Svensk Kontantförsörjning AB ("Swedish Cash Supply ltd"), with premises
at four locations in Sweden.[16] SKAB had no competitive operations; it
functioned solely as a supplier to and collector from private CiT compa-
nies and banks. By reducing the number of branch offices with a value-
dating facility to four and adjusting the structure of fees for supplying and
receiving cash in February 2003; the market's share of the responsibility
for distribution increased and the recirculation of cash was stimulated. The
flows of notes and coins to and from the Riksbank's stock in PSAB's/
SKAB's offices are shown in Figure 3. Compared with the flows to and
from PSAB's premises before the change in February 2003, the subse-
quent flows to and from SKAB's premises were clearly very much smaller.
After the change, those concerned chose to handle cash in other ways
than transporting it to and from SKAB.

In spring 2002 the Riksbank decided to separate PSAB's commercial operations from its work on behalf of the Riksbank.

Figure 3. In- and outflows to/from PSAB/SKAB 1 August 2002-31 August 2003
SEK billion

■ Inflow   ■ Outflow
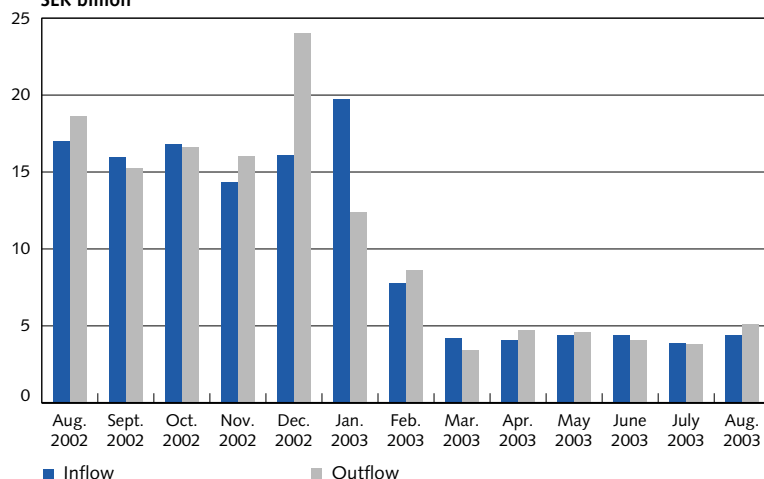
Source: The Riksbank.

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[16]   Härnösand, Tumba, Mölndal and Malmö.

When SKAB was formed, the commercial operations were assigned to a new Pengar i Sverige AB, known as PiS, which operated on the same footing as other CiT companies in the market. As the Riksbank had no reason to own a company that was entirely devoted to competitive operations, during 2003 the Bank began a search for a new owner. In the absence of a tenable agreement, however, PiS ceased to operate in the summer of 2004.

Private CiT companies have played an important role in cash administration, particularly since SKAB was set up and the recirculation of cash began to grow. The banks purchased services to a greater extent from CiT companies, which besides transporting cash have centres for handling notes and coins. As the equipment for counting and checking notes and coins mechanically is advanced and expensive, there are economies of scale to be had by handling the cash from a number of banks at a single centre. Since SKAB came in place, it has been the CiT companies that in practice have received or collected the banks' surplus cash and carried out the mechanical operations of checking quality and authenticity, counting and packaging. A net surplus has then been transported onwards on the banks' behalf to SKAB för value-dating. The same procedure has applied to unfit notes earmarked for destruction. As SKAB only accepted notes that had been authenticated, sorted and packaged, these operations were performed by the private companies prior to delivery. The CiT companies have also collected any new cash the banks required.

In an international perspective, the traditional model for supplying cash is for the central bank to undertake cash management at a large number of branch offices. That is the case in many euro countries, for instance. During the 1980s and 1990s, however, a start was made in other countries on altering the structure of the cash supply. The reason has often been to heighten efficiency and/or concentrate on the core objectives of the central bank. In many cases the emphasis on core objectives has entailed efforts to disengage from practical cash management and make private agents more responsible for this. Some central banks have chosen to decentralise cash management by adopting a system of notes held in trust/order (Canada and the UK, for example), where notes are stored at private cash centres without charging interest. In other countries the central bank provides interest-free loans (Denmark, for example) or compensation for interest lost (Australia and New Zealand, for example) on the notes in private cash centres. The private agents are then responsible for the distribution of cash and retain ownership of it, at the same time as they avoid having to transport it to the central bank's premises for value-dating.

An efficient supply of cash

As outlined above, in recent decades the structure of the Swedish market for managing cash has changed a good deal. The changes have been driven by technology and the development of demand for cash, as well as by the Riksbank's altered appraisal of its role in the supply of cash.

Conducting a large variety of operations has a dissipating effect that is bad for efficiency.[17] For a considerable time the Riksbank has therefore been working to concentrate on its primary objectives: maintaining price stability and promoting a safe and efficient payments system. The developments in the payments mechanism have enabled the Riksbank to disengage from the operational aspects and heighten the importance of its role as overseer of this field.

As the Riksbank's costs for parts of the cash management operations that have been discontinued were not covered in full, costs have shifted to other agents in the market for cash. That has given them an incentive to find solutions that cut costs, leading, for instance, to a more efficient circulation of notes. But cash now carries an interest cost to a greater extent in that there are fewer value-dating centres.

Cash-supply efficiency is dependent on the actions of everyone in the market for cash. The Riksbank sets the framework by its actions. The first step towards achieving an efficient cash supply is therefore to consider two matters of principle: what part is the Riksbank to play in supplying cash (that is, which cash-supply operations are to be undertaken by the Riksbank) and which costs should be carried by the Riksbank as a central bank? As the answers to these questions depend on the view of seignorage, that will be considered first.

Cash-supply efficiency is dependent on the actions of everyone in the market for cash.

VALUE-DATING AND SEIGNORAGE

In the present system, value-dating can be achieved only by actually delivering cash to the Riksbank and the Bank requires the cash to have been counted, sorted and authenticated prior to delivery. Thus, notes are transported to and from the Riksbank so that banks can value-date and thereby avoid losing interest without any processing.[18] In other words, economic resources are spent on simply redistributing value between the Riksbank and the banks. Economic costs also arise from transport hold-ups. With fewer value-dating centres, the number of deliveries for this

In the present system, economic resources are spent on simply redistributing value between the Riksbank and the banks.

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[17] For an analysis of central bank efficiency, see Blix et al. (2003).
[18] The Riksbank does check authenticity to some extent but accepts notes only if they have already been checked.

purpose has decreased but the distances involved are longer and the value of the loads has risen.

Minimising the resources that are used solely to redistribute value is economically desirable. But prohibiting value-dating in order to avoid deliveries that entail a real economic cost would be unreasonable. Banks should be entitled to use notes – given that these are valid means of payment – as payment for their loans from the Riksbank. Moreover, as explained below, the Riksbank has no cause to increase its interest income.

In that central banks carry costs associated with the administration of cash, the notion that cash is a subsidised means of payment is not uncommon in the central bank world. However, it ignores the fact that cash also generates income for the central bank and thereby the State since holding cash amounts to providing the central bank with an interest-free loan. This is because notes and coins can be said to be debt instruments with an infinite lifetime issued by the central bank.[19] The income the Riksbank has obtained by investing these interest-free loans (seignorage) has exceeded the Bank's costs for handling cash. So Swedish cash has not been subsidised.

In that notes do not yield interest, the central bank generates State revenue. It is conceivable that this particular way of generating revenue is relatively efficient but that is very hard to tell. Neither is it a matter for the Riksbank, whose function is to promote a safe and efficient payments system, not maximise or minimise seignorage with reference to an optimal tax structure. Moreover, compared with the level of interest rates, for instance, the structure of the cash-supply system is relatively unimportant for the amount of seignorage.[20]

On the other hand, the structure of the cash-supply system is of importance for the efficiency of the payment system. Subsidising cash would be liable to hamper the development of new, efficient means of payment. For payment system efficiency, however, it may be just as important that cash is not taxed because that might favour the use of means of payment that are untaxed but less efficient. The use of cash can be distorted by taxes as well as subsidies.[21]

As holders of cash cannot be identified, it would not be possible in

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[19] In the days of the gold standard, cash could be exchanged in the central bank for a certain amount of gold.

[20] The Riksbank is required to maintain price stability. In the simplest textbook approach it is sometimes held that the central bank influences inflation by controlling the amount of interest-free money in the economy; see Mitlid & Vesterlund (2001). In practice, however, this variable (M0) is of importance only as an indicator of future inflation. Neither does the Riksbank take seignorage into account in monetary policy decisions. Monetary policy can therefore be disregarded in the present context.

[21] This depends, however, on who pockets the subsidies for cash-management costs and who pays the seignorage. As perfect competition does not hold in the market for cash management, not all the costs/income will be paid/pocketed by the users of cash. So it does not necessarily follow that an efficient payment system would result if cash were neither subsidised nor taxed by the State.

practice for the Riksbank to pay interest on cash in circulation. Neither is it feasible entirely to avoid burdening cash with an interest cost by allowing the banks to obtain cash without debiting their accounts in the Riksbank; that would make the banks' alternative cost unduly low and distort resource allocation in the economy. So anonymity, which is also one of cash's advantages, makes some form of taxation of cash unavoidable.

However, the interest cost for cash can be influenced via the Riksbank's loan terms and value-dating regulations. Today, banks can obtain interest-free intraday loans from the Riksbank and only pay interest on the cash they hold overnight. So if every household and firm were to deposit their cash in a bank overnight and every bank in turn were to transfer the cash to its Riksbank account, cash would not be burdened with an interest cost. Such an arrangement is ruled out in practice by the physical handling it would entail – the cash would have to be transported, authenticated and counted. Still, allowing cash to be value-dated in connection with private cash centres would reduce the interest cost for cash, besides limiting security transports. That is in fact the path that has been chosen in many other countries.

Allowing cash to be value-dated in connection with private cash centres would reduce the interest cost for cash and also limit security transports.

THE RIKSBANK'S ROLE IN AN EFFICIENT CASH SUPPLY

It is a general principle that the State ought not to intervene unless there are particular reasons in the form of market failure. So the Riksbank's responsibility for administering the supply of cash should be confined to activities that require State intervention to be efficient. The role of the Riksbank in supplying cash should therefore be modified as the financial system develops.

As the conversion of cash to deposits is one of banking's commercial ideas, it is not necessary for everyone who needs Swedish cash to have a Riksbank account – provided banks have an account in the Riksbank, others will also have access to cash. In places where banks do not consider it would pay to establish a presence, the Post Office is responsible for providing cash services. In that politicians have required the Post Office to ensure the availability of basic cash services, it can be said that the Riksbank's responsibility for supplying cash can be limited to providing the Post Office with cash.[22] It would therefore be sufficient in theory for the Post Office to have a Riksbank account. In practice, of course, this distri-

The Riksbank's responsibility for administering the supply of cash should be confined to activities that require State intervention to be efficient.

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[22] The Post Office's responsibility was considered recently in an enquiry (see SOU 2004:52). The report proposes that the Post Office shall cease to be responsible for cash services. Instead, the State is to be responsible for basic payment services, comprising payment mediation, cash withdrawal and handling the daily takings of retail traders and non-profit associations. The National Post & Telecom Agency is to be commissioned by the Government to procure these services in places where there is no commercial alternative. Thus, the proposals do not involve any reassessment of the Riksbank's role in the supply of cash.

bution of responsibility recognises the banks' major role in supplying cash. Moreover, banks need a Riksbank account for other reasons. The payment system is based on banks being able to settle their mutual payments via their Riksbank accounts. In addition, the banks function as channels for monetary policy. The Riksbank is able to influence liquidity in the economy by adjusting the banks' costs for borrowing from the Bank. Besides conferring the exclusive right to a Riksbank account, the central role of the banks in the payment system gives rise to special regulations and supervision.

In practice the Post Office has chosen to obtain cash from a bank. So as far as providing society with cash is concerned, the Riksbank can restrict its role to supplying the banks with genuine cash of an acceptable quality. It is up to the Riksbank to ensure that sufficient Swedish cash is produced and that enough cash is held in stock to cope with demand from the banks at any time. To be able to deal with extraordinary events, the Riksbank also needs to have reserve stocks. As the banks have no cause to hold reserve stocks of cash, the size and location of such stocks must be a matter for the Riksbank. The Riksbank should also be responsible for the development of cash that is difficult to forge. Confidence in cash as a means of payment may be eroded if cash is easy to forge.

In order to avoid the conservation of an inefficient logistic structure, the Riksbank's responsibility for a stock of cash should be limited to what is considered necessary to be able to deal with extraordinary events. Leaving the cash market agents to pay for other stocks of cash has the clear advantage that they can then weigh the benefits of an additional stock against the costs of holding it plus the effects on the relevant transportation costs. If such a solution is to be efficient, the Riksbank should also provide compensation for interest lost on cash in private cash centres.

Compensation from the Riksbank for lost interest is available only to banks because only they are entitled to borrow cash from the Riksbank. To obtain such compensation, a bank must be able to demonstrate that the cash in question is not in circulation; otherwise, as pointed out above, the bank's alternative cost would be too low. For the same reason it must be simple for the Riksbank to check the value. All this means that a bank should be entitled to the compensation only for counted and authenticated cash in a cash centre.

To avoid the Bank having to form an opinion about security, ownership of cash in a cash centre should not pass to the Riksbank. In that way the number of cash centres will be limited not only by economies of scale in authentication and sorting but also by access to secure premises and the level of insurance costs. Such an arrangement would also mean that, for reasons of security, the banks will prefer to deliver the cash they know

<div style="float:left; font-weight:bold; text-align:right;">

For universal access to cash it is sufficient if banks have a Riksbank account.

The Riksbank is responsible for cash being produced and stocked on an adequate scale.

In order to avoid an inefficient logistic structure, the Riksbank's responsibility for a stock of cash should be limited to what is considered necessary to be able to deal with extraordinary events.

Compensation for lost interest should be available to a bank only for counted and authenticated cash in a cash centre.

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will not be needed for some time to the Riksbank. The Riksbank's reserve stocks should be open for such deliveries. Banks should also be able to collect new cash as required from these stocks.[23]

In practice, banks will probably procure cash handling services from CiT companies, so it will presumably still be these companies that collect cash and run the cash centres. The Riksbank has no cause to voice an opinion about this arrangement unless it were to be detrimental to payment system efficiency and security. The Riksbank has the banks as its counterparties and it should be up to Finansinspektionen (the Swedish Financial Supervisory Authority) to ensure that the banks exercise adequate risk management.

Cash that is unfit for use must be destroyed. Today this is done by the Riksbank. When a bank hands in unfit notes, its account in the Riksbank is credited in the same way as with value-dating. In time, a conceivable solution would therefore be for destruction to be arranged at the cash centres; that would do away with the deliveries to the Riksbank. However, such an arrangement would require stricter controls by the Riksbank.

Unfit cash must be destroyed.

When notes are destroyed, it is not only their number that is important but also their authenticity. To maintain confidence in cash as a means of payment, the amount of counterfeit notes must be limited. Forgers are most likely to be traced if every recipient of a payment in cash checks that the cash is authentic. An incentive to do so is provided by the cost of accepting counterfeit notes. The Riksbank check of authenticity sets off a chain reaction where everyone has an incentive to do the same. The general level of authenticity checks is set by the level practiced by the Riksbank. Today, by checking the authenticity of fit notes sampled at random as well as of all notes prior to destruction, the Riksbank gives banks a financial incentive to make advanced checks. Moreover, when counterfeit notes have been handed in, the Riksbank imposes heavy penalties.

To maintain confidence in cash as a means of payment, the amount of counterfeit notes must be limited.

If the cash centres were permitted to destroy notes, the Riksbank could supervise this via a technical monitoring system that provides the Riksbank with information about every note the machines handle. The Riksbank already has such a technical system. However, the machines required for destruction are advanced and expensive because the Riksbank wants to be certain that only authentic notes are destroyed. For

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[23] Making active use of the reserve stock is an advantage because notes deteriorate if they are left lying for a long time. In cash management a distinction is usually made between strategic and logistic stocks; the former are for unforeseen events and the latter for normal use but in practice they are held in one and the same stock.

this the machines have to be equipped with special sensors. On the other hand, the turnover of notes is such that just a few of these machines would be needed. Technical developments in this field, leading for instance to cheaper machines, might make destruction at the cash centres feasible in the future. In the final analysis, the costs of transportation have to be weighed against the economies of scale in the destruction process.

WHICH COSTS SHOULD THE RIKSBANK CARRY?

In the allocation of costs between the Riksbank and other agents in the market for cash, it should be borne in mind that efficiency is enhanced both when costs can be influenced by those that carry them and when it is the operator that is responsible for the costs and reaps the surplus.

The Riksbank, like other agents, should carry the costs of its operations so as to have an incentive to operate efficiently.

There are those who are in a better position than the Riksbank to find efficient solutions to the logistic problems associated with the distribution of cash. To give them an incentive to search for efficient solutions, it is important that they carry the costs and can reap the benefit of any savings in this respect. The Riksbank in turn should carry the cost of its own operations. In the absence of competition, this is important to give the Riksbank an incentive to operate efficiently. Given seignorage income, the Riksbank has no cause to cover costs – by charging fees, for example – so as not to subsidise cash.

As an exception from this principle, the Riksbank could charge cash centres a fee for the Bank's work of checking that the deposited value is as reported. One purpose of making the centres carry this cost is that all socioeconomic costs should be taken into account when deciding whether or not to establish such facilities. A licensing procedure that entitles the Riksbank to withdraw a permit if the rules are not adhered to would also be appropriate. The private agents would then have an incentive to toe the line even if supervision by the Riksbank were to be relatively limited.

Conclusion

In August 2004 the Riksbank decided to transfer the operations of SKAB to the Riksbank and enable banks to establish private cash centres.

Cash still plays an important role as a means of payment in Swedish society and is likely to continue to do so for the foreseeable future. The function of cash as a means of payment requires large-scale physical handling of cash, as described in this article. In accordance with the principles outlined here for appropriate arrangements for supplying cash, in August 2004 the Executive Board of the Riksbank approved the objectives of transferring the operations of SKAB to the Riksbank and of enabling banks to establish private cash centres for the reception and distribution of cash. Compensation for lost interest is proposed for the cash that

banks hold in these centres. The arrangement can be likened to the current value-dating procedure. Destruction will, however, continue to be performed at two offices run by the Riksbank. Besides receiving unfit notes for destruction, the Riksbank will provide new cash at these offices.[24] The detailed structure of the cash centres is being discussed in the autumn of 2004 with representatives of the private agents in the market and the Riksbank hopes that they will be in place in the course of 2005.

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[24] In time it is intended to establish a more efficient flow of coins from the suppliers straight to the cash centres, bypassing the Riksbank's offices.

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Inflation and relative-price changes in the Swedish economy

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Shocks to diverse markets generate changes in relative prices – some nominal prices rise, others fall. If all prices were perfectly flexible, such price movements would largely cancel out and leave inflation unaffected. In practice, however, certain prices tend to be sticky because price adjustments are costly. In such cases, prices are adjusted quickly only in the event of large shocks, not when the shocks are small. The positively skewed distribution of relative-price changes then results in a temporary increase in inflation. This has been the case in Sweden and explains a large part of the short-run fluctuations in CPI inflation over the past quarter-century. The variance and skewness of relative-price changes also explain shortcomings in existing models of inflation.

Rigidities in connection with major and minor shocks

A familiar phenomenon in the analysis of price-setting and inflation is the sizeable rigidities that occur in price adjustments and the marked differences in this respect between firms. Due to these rigidities, various market conditions may change without leading to the price adjustment that should normally occur. A basic explanation for these rigidities is that the costs associated with altering prices may make it more profitable to abstain from or postpone an adjustment. The cost of price adjustment makes a price change more probable if the market shock is large than if it is small. If a few large shocks that motivate relative-price increases are countered by numerous small shocks that call for relative-price reductions, it may be mainly the increases that actually occur as nominal-price adjustments. Such a positively skewed distribution of relative-price changes implies increased inflation, while a distribution that is negatively skewed lowers inflation. When this theory was put forward and tested in the mid

1990s, it provided a better explanation of inflation's historical path in the United States[1].

I test whether the variance and skewness in the distribution of relative-price changes can improve traditional models of inflation.

In this article I describe the theory and apply it to data for the Swedish economy for the period 1980–2003. The aim is to study whether the variance and skewness in the distribution of relative-price changes can improve traditional models of inflation. For this purpose I extend traditional price equations or Phillips curves to include these new measures and examine the effects. I also use the data on variance and skewness in an attempt to explain residuals or forecasting errors, that is, unexplained inflation, in other models of inflation.

The empirical results show that variance and skewness in relative-price changes make an important contribution to the explanation of the development of inflation in Sweden during the period analysed here. The new measures improve conventional price equations and indicate that several models which have been used in the past are probably misspecified.

Relative-price changes and inflation

The larger the shock, the greater the probability of a nominal-price change.

If a shock (for example, a supply shock) occurs in a market and generates an increase in supply relative to demand, the relative price will tend to fall and an equilibrium with a lower price will be established. If no shocks occur in other markets and there are no price rigidities, the nominal price will then fall as well. But if the price is nominally rigid because an adjustment entails a cost for the firm, the shock will not necessarily lead to a nominal price fall; that will depend on whether or not the benefit of a lower price – of moving towards the optimal price – exceeds the cost of adjusting the price. The larger the shock, the greater the probability of a price adjustment. The full range of relative shocks includes a number of large positive and large negative shocks that result in a lower and a higher price, respectively, as well as numerous small shocks that do not generate price adjustments because in these cases the benefit of a price adjustment does not outweigh its cost.

Figure 1 presents a symmetric distribution of relative shocks that is matched by the distribution of firms' *desired* relative-price changes. The shaded segments of the distribution represent the shocks which are so large that they lead to price adjustments. These segments can be called *action ranges*. The unshaded segment contains the shocks in the distribution that do *not* generate any price changes; this can be called the *range*

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[1] See Ball & Mankiw (1994, 1995).

of inaction. Note that the mean value of the relative shocks is (by defini-
tion) zero.[2]

Figure 1. A symmetric distribution of relative shocks

Range of inaction
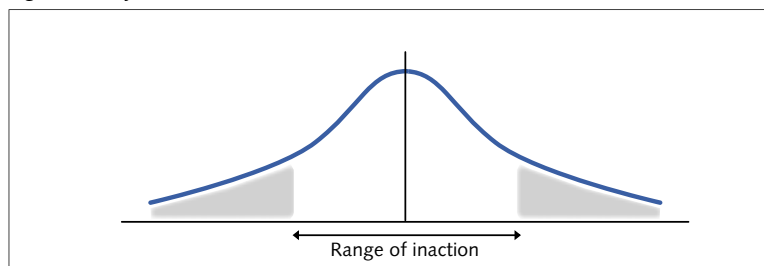
If the distribution is symmetric, as in Figure 1, there are equal numbers of large positive and large negative shocks. That is not the case in Figure 2, where the distribution is positively skewed. This means that the unusually large positive shocks outnumber the unusually large negative shocks in the action ranges. The positive skewness therefore leads to an increased rate of inflation. A negative skewness, as in Figure 3, has the opposite effect.

A positively skewed distribution means that the unusually large positive shocks outnumber the unusually large negative shocks, which can lead to an increased rate of inflation.

Figure 2. A positively skewed distribution of relative shocks

Range of inaction
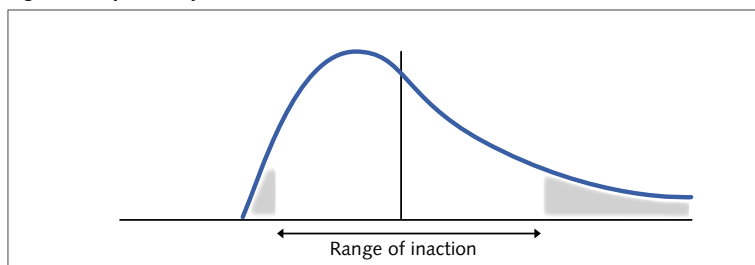
Figure 3. A negatively skewed distribution of relative shocks

Range of inaction

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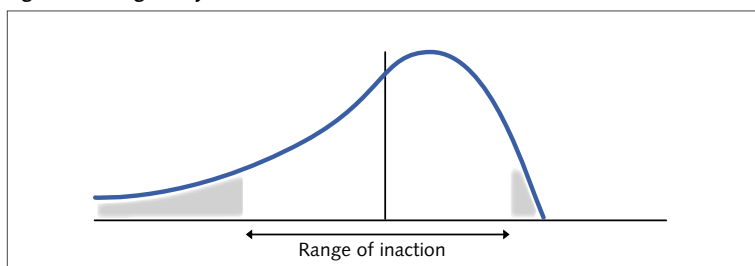
2   See the appendix, where inflation as well as the variance and skewness in relative-price changes are
    defined.

The distribution of relative shocks also represents firms' desired relative-price changes, which are not observable. Due to the cost of adjusting prices, the corresponding nominal-price changes will not all occur immediately. Using data simulations, Ball & Mankiw found a clear correlation between desired and actual relative-price changes, which means that the skewness of observed, actual relative-price changes can be used in the empirical analysis.[3]

The positive relationship between the skewness of relative-price changes and inflation is due to price rigidities whereby price adjustment to shocks is not complete in the short run. In time, however, the price adjustments will be made even if the shocks are small, making it reasonable to suppose that in the next period the skewness will affect inflation negatively instead of positively. So in a dynamic econometric model there should be a negative correlation between inflation and the lagged skewness.

Over a longer period, skewness has been found to be positive in a number of countries. Trend inflation can account for this, that is, inflation being positive in the long run. Relative-price reductions can then be achieved by keeping the nominal-price constant. This can be seen as a range of action to the left in the distribution (the negative tail) that is smaller than the range of action to the right (the positive tail).

It can be mentioned that the observed relationship between skewness and inflation also has some alternative explanations that are not necessarily based on price rigidities.[4]

Variance is a measure of the dispersion in a distribution. Variance and skewness can co-vary and affect inflation.[5] Figure 4 illustrates this: with the symmetric distribution in the upper figure, an increased variance extends the two tails equally; if the distribution is skewed to the right – as in the lower figure – on the other hand, an increased variance magnifies the positive skewness and thereby leads to a further increase in inflation.

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[3] See Ball & Mankiw (1995), where the distribution of price-adjustment costs was assumed to follow the exponential distribution and the distribution of relative shocks/desired price changes follows a normal distribution with skewness/symmetry. The assumptions were chosen so that the maximum deviation between desired and actual prices was 15 per cent. An inaction range of 15 per cent is consistent with empirical studies on the frequency of price adjustments: Apel, Friberg & Hallsten (2001), Assarsson (1989) and Blinder (1991). Ball & Mankiw's simulations demonstrated a monotonic positive relationship between the desired and the actual price changes.

[4] Productivity shocks can generate a positive relationship between skewness and inflation in some models: Aukrust (1970) and Balke & Wynne (1996). The business cycle can influence inflation and skewness in the same direction, see Assarsson (2003). The relationship may also have a purely statistical explanation, see Ball & Mankiw (1999), Bryan & Cecchetti (1999a) and Bryan & Cecchetti (1999b).

[5] See Ball & Mankiw (1995).

Figure 4. Relationship between variance and skewness in the distribution of relative shocks
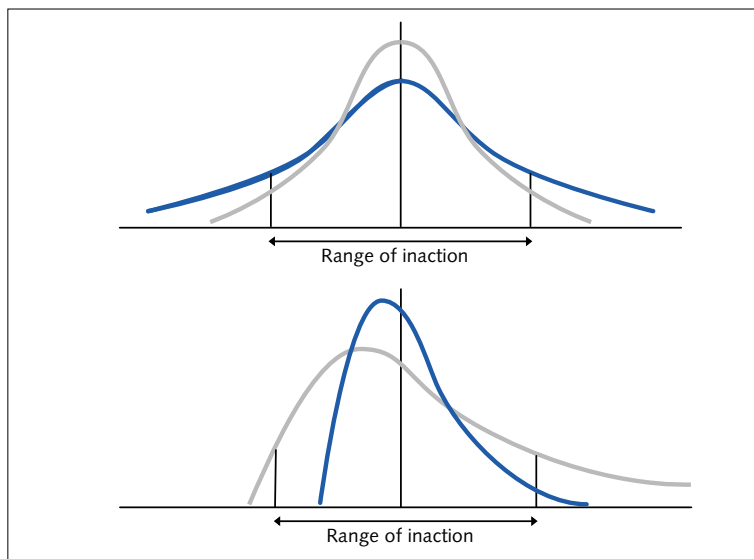
The positive relationship between inflation and the variance in relative-price changes has been thoroughly explored in the literature. The causal relationship goes from variance to inflation according to some theories and in the opposite direction or through a third variable according to other theories.[6]

Phillips-curves with measures of variance and skewness

Let us now see how the insights acquired so far can be incorporated in what is otherwise a traditional econometric analysis of price-setting and inflation. In a market with perfect competition, a firm is not in a position to set the price, which cannot deviate from the established market price. In a market with limited competition, a firm can chose a certain price and observe how it influences demand and thereby the firm's profit. The less competition there is, the higher will be the price that is set in the market. In this way, a price that is optimal for the firm in relation to demand and the competition is established and applies for the long run provided market conditions do not change.

A price that is optimal for the firm in relation to demand and the competition is established for the long run.

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[6]   Inflation affects the variance in relative-price changes in Assarsson (1986), Cukierman (1979), Cukierman (1982), Cukierman (1983), Cukierman & Wachtel (1982), Lucas (1973), Parks (1978) and Sheshinski & Weiss (1977). The variance in relative-price changes affects inflation due to asymmetric price adjustment in Tobin (1972).

The optimal price depends on the firm's marginal cost. Costs are determined by input prices on for instance raw materials, energy, wages and capital costs or rents. Costs are also related, of course, to the volume of output. The marginal cost (the cost of producing an additional unit) normally depends on the same factors.[7]

The cost of changing the price may cause the firm to refrain from a price adjustment despite a change in the marginal cost. But how can this be taken into account when explaining the path of inflation in price equations or Phillips curves? Doing so has proved difficult in practice. When a price adjustment is being considered on account of increased costs, the firm looks ahead and tries to assess what the marginal cost is likely to be in the future. If the cost increase is expected to persist, the price eventually will be raised more or less immediately. However, such forward-looking price equations (Keynesian Phillips curves) have proved difficult to handle empirically,[8] partly because the expected future marginal costs are not observable. Instead I shall test Ball & Mankiw's theory about the effect of variance and skewness in relative-price changes to explain the path of inflation in Sweden.

To this end, a number of alternative Phillips curves that include measures of variance and skewness are specified. In order to avoid unduly narrow specifications, I have chosen to present the results with a model that is so general that several alternative specifications can be derived as special cases. The calculations show that the effects of the measures of variance and skewness are robust for alternative specifications. The general model is:

$$\pi_t = \beta_0 + \beta_1 \Delta w_t + \beta_2 \Delta \rho_t + \beta_3 \pi_{t-1} + \beta_4 \left(U_t - \bar{U}_t \right) + \beta_5 \Delta p_t^{oil} +$$

$$\beta_6 \Delta p_t^{metals} + \beta_7 \Delta p_t^{food(a)} + \beta_8 \Delta p_t^{food(b)} + \beta_9 g_t$$

where inflation is dependent on wage changes w_t, capital costs ρ_t, lagged inflation[9] π_{t-1}, the output or unemployment gap $U_t - \bar{U}_t$ (where $\bar{U}_t$ is equilibrium unemployment) and supply or price shocks, which are price changes for oil (π^{oil}), metals (π^{metals}), food products from industrialised countries, ($\pi^{food(a)}$) and food products from developing countries ($\pi^{food(b)}$). g_t is a productivity shock measured as a Solow residual.[10] β_i are parameters to be estimated.

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[7] A mathematical description is given in the appendix to this article.

[8] See Bårdsen, Jansen & Nymoen (2002).

[9] Price inflation is dependent on wage inflation, which depends in turn on expected inflation. It follows that inflation in period t-1 can mirror wage inflation in period t.

[10] Inflation and the skewness in relative-price changes can both be driven by productivity shocks; Balke & Wynne (2000). By including productivity changes, one can obtain some indication of how they affect the equation compared with the skewness measure.

This equation is then augmented with measures of variance and skewness (VS in the following):

$$\beta_{10}\sigma_t^3 + \beta_{11}\sigma_{t-1}^3 + \beta_{12}\sigma_t^2 + \beta_{13}\sigma_t^3\sigma_t^2$$

which are thus intended to catch the effects of skewness, lagged skewness, variance and the interaction of variance and skewness. In accordance with the theory above, the coefficients are expected to have the following signs: $\beta_{10} > 0$, $\beta_{11} < 0$, $\sigma_t^2 > 0$, $\beta_{13} > 0$. Various special cases of Phillips curves can be derived as restrictions on the parameters and the effects of the VS measures can be studied on each of the curves. For example, the restrictions $(\beta_0, \beta_1, \beta_2, \beta_9, \beta_{10}, \beta_{11}, \beta_{12}, \beta_{13}) = 0$ and $\beta_3 = 1$ lead to the Phillips curve $\pi_t = \pi_{t-1} + \beta_4\left(U_t - \bar{U}_t\right) +$ price shocks which can be given a microeconomic foundation in terms of unsynchronised labour market contracts.[11]

One way of assessing the VS measures' ability to explain inflation's historical path is to analyse whether these measures can explain forecasting errors (residuals) generated by inflation models that are used in practice. I have therefore generated or obtained residuals from some models:

– an unrestricted vector autoregression (VAR) for short-run inflation with the variables CPI, wage costs, capital costs, productivity, import prices, GDP and the interest rate
– A Bayesian VAR model that is one of the models used in the Riksbank[12] and is a Bayesian variant of the so-called FOA-VAR model[13]
– actual residuals from predictions by the National Institute of Economic Research[14]

If the models are specified correctly, there should be no patterns in the residuals obtained with them. Thus, in a regression with the residuals as dependent variable, no independent variables should be significant and R^2 should be low. I attempt to explain the residuals with the VS variables. Significance and high R^2 suggest that it is just these variables which are lacking in the models from which the residuals come.

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[11] See Taylor (1980).
[12] See Andersson (2004); these residuals were provided by Michael K. Andersson.
[13] See Jacobson et al. (1999, 2001).
[14] Forecasting errors provided by Mårten Löf.

Inflation 1980–2003

Skewness contributed to the high rate of inflation 1993–94; after that the contribution from skewness decreased and lowered the rate of inflation in the late 1990s.

Ball & Mankiw (1995) studied the effects on price equations for American producer prices in the period 1949–89 on an annual basis, that is, for a total of 41 observations. As the analysis concerns price stickiness in the short run, it is perhaps more appropriate to use more frequent data. I therefore chose quarterly data based on a decomposition of the CPI into 71 items for the period 1980–2003.[15] Figure 5 illustrates the skewness in the relative-price changes. Price changes are measured as the logarithmic difference between quarters.[16] A smoothed measure (using an HP filter) is also shown in the figure.[17] An upward tendency can be noted in the second half of the 1980s. In the period 1994–2000, when Sweden had adopted the policy of inflation targeting, skewness decreased. So according to the theory, skewness contributed to the high rate of inflation 1993–94; after that the contribution from skewness decreased and lowered the rate of inflation in the late 1990s.

Figure 5. Skewness in relative-price changes 1980-2003
Per cent
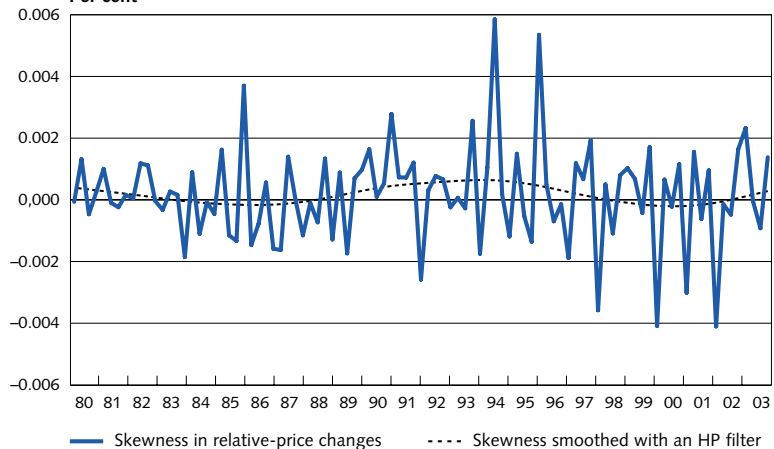
Note. Skewness is defined in the Appendix to this article.

Source: Statistics Sweden, consumer price index.

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[15] Analyses at Uppsala University show that a further decomposition into up to about 350 representative goods gives similar results; Pettersson & Wikström (2004).

[16] The logarithmic difference multiplied by 100 approximates the percentage change.

[17] The HP filter is a method for calculating the trend in a time series, see Hodrick & Prescott (1997). The smoothing was done simply to give a better illustration of developments in the period studied here. The smoothed series was not used in the regressions.

Can the VS variables explain inflation?

The econometric calculations were done to analyse the extent to which the skewness and variance in relative-price changes can explain the path of inflation. They can also be used to study whether the effects are those the theory predicts. Sweden abandoned the fixed exchange rate in November 1992 and then moved successively to an inflation-targeting monetary policy. Nominal prices are probably stickier when inflation is low than when it is high, since with low inflation, price adjustments are less beneficial (shocks bring the prices closer to the optimal levels). I therefore tested whether the equations changed between these two periods.

Column (i) in Table 1 presents results of estimations based on the general equation, which includes input prices, unemployment, some dummy variables for extreme values and the VS variables in accordance with the theory.[18] The other columns contain the results with different specifications, that is, excluding in turn input prices (ii), unemployment (iii), price shocks and productivity changes (iv) and the VS measures (v). The first thing to note is the positive correlation between inflation and skewness and the negative sign of the lagged effect, which agrees with the theoretical predictions.[19] The positive effect of variance on inflation is also in line with the theory, whereas the negative effect of the interaction of variance and skewness is not. However, this effect is only statistically significant in specification (ii) in Table 1. In specifications (ii) – (v) the exclusion of different variables reduces the general model and one can see how this affects the correlation coefficient R^2 or the standard error[20] in the equation. That provides an indication of each variable's importance in explaining the variation in the rate of inflation. The results show that the distributional measures are most important. The difference between the observed rate of inflation and the rate predicted by the model averages ±0.50 per cent (the standard error in the regression) but grows to ±0.76 per cent when the VS variables are excluded. When input prices, unemployment and price shocks together with productivity shocks, respectively, are excluded, the standard error grows considerably less, to around 0.56 per cent in each case. Thus, the VS variables are the most important factors for explaining the variation in the rate of inflation.

The VS variables are the most important factors for explaining the variation in the rate of inflation.

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[18] Since variables are in difference form, the long-term price level may not be determined in a reasonable manner in the equation. However, the results are qualitatively the same when the equation is estimated instead in error-correction form. The level term in such an equation comes out in accordance with the theory but is not statistically significant.

[19] This coefficient was falsely negative for American data, see Ball & Mankiw (1995).

[20] R^2 and the standard error in the regression are explained in the appendix to this article.

I have also estimated the equation with the best econometric fit – the general equation (i) including the VS variables – separately for two periods: 1980–93 when inflation was not targeted and 1994–2003 with inflation-targeting. The results are presented in Table 2. A Chow test (which compares the sum of the residuals in the total sample with the sum in each sub-sample) shows that the model is significantly different in the two periods; it will also be seen that certain parameters differ markedly between the two periods. The lower and less variable rate of inflation in the more recent period is evident in a standard error in the equation of only 0.34 per cent compared with 0.54 per cent for the period when inflation was not targeted. In the model without the VS variables the standard error for the more recent period is 0.48 per cent. This warrants the conclusion that on average, the error in the regression without the VS variables for the period with low inflation will be almost as large as for the high-inflation period with the VS variables included.

A comparison of the equations during the two sub-periods in Table 2 reveals some interesting differences. The effect of the VS variables is marked in both periods but relatively larger in the earlier one. The effects of the cost variables also differ and seem to be larger in the later period. All in all, the comparison suggests that it is prudent not to calculate parameters based on the entire period and that the characteristics of inflation have been altered by the changeover to targeting inflation. The higher coefficient for lagged inflation in the later period may be a sign that inflation expectations and the focus on the inflation target have strengthened the role of price expectations at the expense of other variables.

Table 3 shows whether the VS measures can explain the residual series for inflation that were obtained from calculations with alternative inflation models. In regression analyses a battery of tests is commonly used to determine whether or not the residual series are entirely random. In the analyses with the VAR model I used tests for autocorrelation and heteroscedasticity. Both tests indicated that the residual series for inflation was random. Even so, in Table 3 all the VS measures are statistically significant and explain 37 per cent of the variation in the residuals. That is a strong indication of errors in the specification of the VAR model. As Table 3 shows, an analysis of the residuals from the Bayesian VAR model gives much the same result: the VS variables explain 35 per cent of the variation in the residuals. The VAR models are estimated with quarterly data and evaluated with quarterly changes. I have also studied the characteristics of residuals from inflation predictions by the National Institute of Economic Research using monthly data for the period 1998–2004; the predictions, which are those with the most recent information (often the month before the forecast month), are for annual changes and the VS

TABLE 1. RESULTS OF ECONOMETRIC ESTIMATIONS WITH VARIANTS OF PHILLIPS CURVES

Dependent variable: CPI inflation (π)

Period: Q3 1980 – Q4 2003

No. of observations: 94

No. of price indexes: 71

Columns: *(i)* general equation, *(ii)* equation without cost variables, *(iii)* equation without unemployment gap, *(iv)* equation without price shocks and productivity variable, *(v)* equation without variance and skewness variables

Variable	Coefficient (p)				
	(i)	*(ii)*	*(iii)*	*(iv)*	*(v)*
Constant	−0.070146 (0.0002)	−0.093795 (0.0000)	−0.060754 (0.0024)	0.000551 (0.7318)	−0.067085 (0.0145)
ULC_t	0.181111 (0.0022)		0.274820 (0.0000)	0.212979 (0.0012)	0.035508 (0.6363)
ρ_t	0.039494 (0.0621)		0.052226 (0.0246)	0.052080 (0.0201)	0.063145 (0.0390)
π_{t-1}	0.21873 (0.0032)		0.380702 (0.0000)	0.293896 (0.0002)	0.136198 (0.1649)
$U-\bar{U}$	−0.001179 (0.0001)	−0.002099 (0.0000)		−0.000967 (0.0017)	−0.001791 (0.0000)
π_t^{oil}	0.008519 (0.0557)	0.005050 (0.2943)	0.010913 (0.0258)		0.003510 (0.5806)
π_t^{metals}	−0.002567 (0.7849)	−0.005405 (0.6033)	0.002001 (0.8462)		−0.013572 (0.3291)
$\pi_t^{food(a)}$	0.010434 (0.4755)	0.012673 (0.4271)	0.011767 (0.4661)		0.012282 (0.5778)
$\pi_t^{food(b)}$	0.015739 (0.0156)	0.017467 (0.0160)	0.012089 (0.0866)		0.022719 (0.0196)
σ_t^3	2.728386 (0.0002)	3.345240 (0.0000)	2.142734 (0.0058)	3.136132 (0.0001)	
σ_{t-1}^3	−0.886493 (0.0230)	−0.419452 (0.2989)	−1.363048 (0.0011)	−1.041088 (0.0150)	
σ_t^2	5.716703 (0.0000)	5.333165 (0.0000)	6.020147 (0.0000)	5.777538 (0.0000)	
$\sigma_t^3\,\sigma_t^2$	−452.7294 (0.2188)	−838.0001 (0.0316)	−137.9741 (0.7276)	−641.0698 (0.1145)	
g_t	−0.040923 (0.0001)	−0.057668 (0.0000)	−0.033187 (0.0036)		−0.043719 (0.0060)
DUMMY Q4 1980	0.017610 (0.0022)	0.022609 (0.0003)	0.016045 (0.0107)	0.018744 (0.0022)	0.021058 (0.0123)
DUMMY Q1 1996	−0.031116 (0.0000)	−0.022732 (0.0019)	−0.039896 (0.0000)	−0.028605 (0.0003)	−0.004628 (0.5611)
DUMMY Q3 1994	−0.020026 (0.0024)	−0.021749 (0.0028)	−0.019921 (0.0059)	−0.013486 (0.0447)	−0.008683 (0.3248)
DUMMY Q1 1986	−0.018733 (0.0018)	−0.016970 (0.0102)	−0.017939 (0.0064)	−0.018332 (0.0034)	−0.007755 (0.3676)
R^2	0.831227	0.778230	0.791509	0.772721	0.584179
Standard error in regression	0.005007	0.005617	0.005528	0.005628	0.007632
Mean: dependent variable	0.011111	0.011008	0.011111	0.011111	0.011193
Standard deviation: dependent variable	0.011017	0.011004	0.011017	0.011017	0.010987

R^2 is a multiple correlation coefficient that indicates the proportion of the variance in inflation that is explained in the equation. The standard error in the regression is the square root of the sum of the squared residuals divided by the number of observations. The table also shows inflation's mean value and standard deviation for the period covered by the data. The dummy variables = 1 during the indicated period, otherwise 0.

Dependent variable: CPI inflation: π		
Period: Q3 1980 to Q4 2003 subdivided into 1980–93 and 1994–2003		
No. of observations: 94, of which 54 and 40, respectively, in the sub-periods		
No. of price indexes: 71		
Variable	Coefficient (p)	
	1980:3–1993:3	1994:1–2003:4
Constant	−0.190133 (0.0550)	−0.002072 (0.9638)
ULC_t	0.136332 (0.0799)	0.494732 (0.0031)
ρ_t	0.048085 (0.1201)	0.029355 (0.4997)
π_{t-1}	0.208021 (0.0313)	0.290887 (0.0432)
$U-\bar{U}$	−0.002228 (0.0022)	0.000300 (0.7499)
π_t^{oil}	0.009077 (0.1726)	0.007637 (0.1875)
π_t^{metals}	−0.005505 (0.6817)	0.031363 (0.0349)
$\pi_t^{food(a)}$	−0.010053 (0.7085)	0.024934 (0.1214)
$\pi_t^{food(b)}$	0.031689 (0.0046)	−0.001621 (0.8248)
σ_t^3	3.448516 (0.0019)	3.169680 (0.0163)
σ_{t-1}^3	−1.081000 (0.1741)	−1.422743 (0.0010)
σ_t^2	6.661226 (0.0000)	3.508158 (0.0131)
$\sigma_t^3 \, \sigma_t^2$	−941.1715 (0.0572)	−1050.226 (0.1873)
g_t	−0.106758 (0.0527)	0.001502 (0.9582)
DUMMY Q4 1980	0.021330 (0.0025)	
DUMMY Q1 1996		−0.019821 (0.521)
DUMMY Q3 1994		−0.013409 (0.0424)
DUMMY Q1 1986	−0.021749 (0.0028)	
R^2	0.808037	0.770941
Standard error in regression	0.005405	0.003380
Mean: dependent variable	0.016938	0.003245
Standard deviation: dependent variable	0.010445	0.005540

measures have been calculated correspondingly. The results are somewhat weaker but here, too, the VS variables explain an appreciable part of the variance in the forecast errors. From this I conclude that the VS measures make a major contribution to explaining inflation's historical path and that without these variables there is probably a large risk of inflation equations being incorrectly specified.

TABLE 3. REGRESSIONS WITH MODEL RESIDUALS $-\varepsilon_t-$ AS DEPENDENT VARIABLE

	Model		
	VAR	Bayesian VAR	N. I. Economic Research
Variable	Coefficient (p)		
	Quarterly 1980–2003	Quarterly 1981–2003	Monthly 1998–2004
Constant	−0.005012 (0.000)	−0.403792 (0.000)	0.269104 (0.001)
ε_{t-1}	−0.010574 (0.908)	0.096325 (0.292)	0.130121 (0.281)
σ_t^3	2.812243 (0.000)	197.8204 (0.000)	70.25972 (0.062)
σ_{t-1}^3	−1.260631 (0.009)	−80.26362 (0.017)	−16.73187 (0.188)
σ_t^2	5.153802 (0.000)	331.5355 (0.000)	−100.0026 (0.002)
$\sigma_t^3 \sigma_t^2$	−1205.869 (0.003)	−74240.61 (0.007)	−7991.953 (0.474)
R^2	0.372	0.357	0,292

Note: Quarterly changes have been used for the VAR models, 12-month changes for the forecasts from the National Institute.

Monetary policy is forward-looking

Monetary policy in Sweden is based on a 2 per cent inflation target with a tolerance interval of ±1 percentage point. The monetary transmission mechanism – the time lag before the policy is effective – calls for a forward-looking perspective in which policy reacts to predictions of inflation about two years ahead. As nominal price rigidities play a decisive part in the transmission mechanism, it is important to capture them in specifications of price equations and Phillips curves.

Nominal price rigidities seem important and it is urgent to capture them in specifications of price equations and Phillips curves.

Producer as well as consumer prices are evidently sticky in a number of sectors but the part played by these rigidities in economic policy is less clear. Interview studies show that there may be rigidities in a number of sectors whereby full price adjustment to shocks can take several years. Econometric studies with time-series data have yielded similar findings. In the absence of reliable methods for incorporating these varying rigidities in macroeconomic models, the inclusion of VS measures in price equations seems to be a promising approach, partly because the historical path is then explained more satisfactorily.

Full price adjustment to shocks can take several years.

Monetary policy's perspective is forward-looking, however, and calls for reliable predictions of inflation about two years ahead. A model that explains history successfully will not necessarily provide good forecasts, just as models that are bad at explaining history may yield good forecasts. Against including the VS variables in price equations it might be argued that it is difficult or even impossible to predict the future development of variance and skewness but such an argument is faulty for several reasons. For one thing, excluding the VS variables means accepting a faulty specification of the price equations. That leads to erroneous estimates of the effects of other variables in the price equations, which can result in turn in poorer inflation forecasts.[21] For another thing, the VS variables are presumably not very much more difficult to predict than many other variables in macroeconomic models. Are the VS variables harder to predict than, for instance, asset prices, which are needed to forecast household consumption expenditure or corporate investment? Moreover, the *long-term* equilibrium level of skewness is unusually simple to predict in that in theory as well as empirically it is virtually zero.[22]

Inflation in Sweden was overestimated by most forecasters in the period 1993–2001.[23] Might the reason be that the variance and skewness in the distribution of relative-price changes were not taken into account, so that the forecasts failed to catch short-run rigidities in price-setting? Unusually high skewness in the period 1991–96 had an upward effect on the rate of inflation (see Figure 5) but in the period 1994–2001 skewness decreased successively and may thus have helped to explain the fall in inflation in those years.

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[21] Compare the coefficients in equations (i) and (v) in Table 1. A wage change has a short-run elasticity of 0.2 in the model with the higher moments as against about 0 in the incorrectly specified model without VS variables.

[22] Experiments with the basic macroeconomic model BASMOD (one of the models that are used for forecasting at the Riksbank) have shown that including the higher moments tends to improve forecasts of inflation and GDP growth. Those forecasts were made with a simple ARMA(1,1) time-series model. When the above equation is estimated up to the end of 2001 in order to predict the past three years and the actual variance and skewness measures are used for these three years, the forecasting errors are only a third of those that occur without variance and skewness measures. Work is in progress on improving and evaluating inflation forecasts that use the variance and skewness variables.

[23] See Blix, Friberg & Åkerlind (2002).

Conclusions

To sum up, it seems that including the variance and skewness in the distribution of relative-price changes can appreciably improve the estimation of Phillips curves for the Swedish economy. This can be seen as a way of catching price-setting differences between firms in a few aggregated index numbers. These indexes appear to mirror the fact that for certain firms, unusually large shocks are needed to induce a quick price adjustment. It also looks as though inflation forecasts can be improved with the aid of these variables, though further evaluations are needed. Time series with skewness are highly volatile (see Figure 1). Further improvements to analyses of this type could presumably be achieved by using robust measures (excluding extreme observations) of variance and skewness.[24]

Improving inflation forecasts with the aid of VS variables seems to be possible, though further evaluations are needed.

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[24] Such measures have been used by Aucremanne et al. (2003).

Appendix

Measures used in the calculations are defined below; they apply to a decomposition of the CPI into 71 indexed items.

Inflation: $\pi_t = \sum_{i=1}^{71} w_{it} \Delta \log p_{it}$

$$w_{it} = \frac{p_{it} q_{it}}{\Sigma_j p_{jt} q_{jt}}$$

is the budget share for good i in period t, p_{it} is the price, q_{it} is the volume and Δ is the difference operator.

Variance in relative-price changes: $\sigma_t^2 = \sum_{i=1}^{71} w_{it} (\Delta \log p_{it} - \pi_t)^2$

Skewness in relative-price changes: $\sigma_t^3 = \dfrac{\sum_{i=1}^{71} w_{it} (\Delta \log p_{it} - \pi_t)^3}{\sqrt{\sigma_t^2}}$

$0 \leq R^2 \leq 1$ is the multiple correlation coefficient, which measures how much of the variance in the dependent variable (in this case: inflation) that is explained in the model (by the independent variables).

The standard error in the regression is measured as $\dfrac{1}{n-1} \sqrt{\sum_{i=1}^{n} \varepsilon_{it}^2}$ where $\varepsilon_t = \pi_t - \hat{\pi}_t$ is the residual (unexpected inflation) in the inflation equation. It is a measure of the average error, taking into account that residuals are both positive and negative.

THE FIRM'S OPTIMAL PRICE

The firm's equilibrium condition is that mr = mc, that is, that the marginal revenue equals the marginal cost. This condition can be rewritten as:

$$p = \left[1 - \frac{H}{\varepsilon} \right]^{-1} mc$$

where p is the firm's price, $\varepsilon = \dfrac{\delta q}{\delta p} \dfrac{p}{q}$ is the price elasticity of demand and H is an index for the degree of competition (0=perfect competition, 1=monopoly). The marginal cost is derived from a cost function with input prices and the volume of production as arguments. Note that it is only in a special case of the cost function that the specification will include the output gap, that is, the difference between actual and potential output.[25] The optimal price would always apply if price-setting did not entail a cost for the firm.

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[25] See Sbordone (2002).

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Executive Board appoints new department heads

On 19 May 2004, the Executive Board of the Riksbank appointed Kai Barvèll as new head of the Market Operations Department. Mr Barvèll is managing director of the Riksbank's subsidiary Svensk Kontantförsörjning AB and has previously worked at the International Monetary Fund (IMF), where his tasks included evaluations and technical assistance in issues related to payment systems and exchange rate policy. Kai Barvèll will take up his appointment as head of department in autumn 2004.

The Executive Board also appointed Mats Galvenius as head of the new general secretariat. Mr Galvenius is a graduate of business administration and has previously served as adviser to Sirkka Hämäläinen on the ECB Executive Board. He took up his post as head of the general secretariat on 1 June.

New website for the Riksbank

On 19 May 2004, the Riksbank launched its new website, which has an altered information structure, updated content and changed graphic profile.

Reports, press releases, speeches and so on have been gathered under the heading *Published*. It is now possible to subscribe via e-mail to some of the information published on the website. In addition, you can set personal bookmarks for information/news that you wish to be shown on the start page. The address remains the same: www.riksbank.se.

Securitas Värde AB terminates agreement to take over Pengar i Sverige AB

On 2 June 2004, Securitas Värde AB gave notice to terminate the agreement to take over the assets and personnel in the Riksbank's wholly-owned subsidiary Pengar i Sverige AB, which the Riksbank accepted.

The reason was the decision on 19 May 2004 by the Swedish Competition Authority to carry out a special investigation of the transaction between Pengar i Sverige AB and Securitas Värde AB, which meant that approval of the deal could be delayed a further three months.

The work on winding up activities in Pengar i Sverige AB continues. Due to the cancellation of the transfer agreement, the costs of winding up Pengar i Sverige AB will be higher than previously estimated.

Riksbank decides to issue commemorative coins and commemorative banknote

On 9 June 2004, the Executive Board of the Riksbank decided that commemorative coins would be issued in connection with the 250th anniversary of the Royal Palace in Stockholm, and that a special banknote would be issued to commemorate the 250th anniversary of the founding of Tumba Bruk banknote paper mill.

The commemorative coin will be issued in two denominations; a gold coin with the denomination SEK 2,000 and a silver coin with the denomination SEK 200, with effect from 1 October. The prices are set at SEK 2,500 and SEK 250 respectively.

The commemorative banknote will be in the denomination SEK 100 and sales of the note will begin in spring 2005, in connection with the opening of the mill museum at Tumba. The proposed price of the note is SEK 150.

New capital injection to Pengar i Sverige AB prior to winding up

On 23 June 2004, the Executive Board of the Riksbank decided to make a capital cover guarantee of SEK 200 million to its wholly-owned subsidiary Pengar i Sverige AB. This guarantee is needed to cover remaining operating losses and for one-off costs in connection with restructuring. Operations at Pengar i Sverige AB ceased on 2 July 2004.

In addition, the Executive Board decided on 23 June 2004 to make a planned capital injection of SEK 10 million to its wholly-owned subsidiary Svensk Kontantförsörjning AB, which is responsible for conducting central bank-related operations.

Riksbank signs primary dealer agreement with Deutsche Bank AG, London

The Riksbank has signed a primary dealer agreement in the foreign exchange market with Deutsche Bank AG, London. The agreement came into force on 12 August 2004.

The Riksbank's primary dealers in the foreign exchange market are ABN AMRO Bank N.V., Amsterdam; Citibank N.A., London; Calyon, Corporate and Investment Bank, London; Danske Bank A/S, Copenhagen; Deutsche Bank AG, London; FöreningsSparbanken AB; JP Morgan Chase Bank, London; Nordea Bank AB; SEB AB; Svenska Handelsbanken AB; UBS AG, London and Zürich.

*Decision on continued efficiency improvements in
cash management*

On 19 August 2004, the Executive Board of the Riksbank decided to
make further efficiency improvements in the bank's cash management
activities. This decision entails the activities of the Riksbank's subsidiary
Svensk Kontantförsörjning AB, SKAB, being transferred and coordinated
with the Riksbank's own activities in the same field. The transfer is plan-
ned for 1 October 2004. The decision also entails cash management ope-
rations being concentrated to Stockholm/Tumba and Göteborg/Mölndal.

The Executive Board also decided to offer the banks the opportunity
to establish private depots for receiving and distributing cash. It is pro-
posed that the banks would receive interest compensation for the cash
held in such depots. Private depots should contribute to more efficient
cash management in Sweden. The aim is for the proposed changes to be
implemented during Q2, 2005.

For further information, see the report "Översyn av kontanthante-
ringen i Sverige" ("Review of cash management in Sweden"; only avail-
able in Swedish) on the Riksbank's website, www.riksbank.se.

◼ Monetary policy calender

2000-01-03   The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.0 per cent as of 4 January 2000.

02-03   The *repo rate* is increased by the Riksbank from 3.25 per cent to 3.75 as of 9 February 2000.

04-03   The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.5 per cent as of 4 April 2000.

12-07   The *repo rate* is increased by the Riksbank from 3.75 per cent to 4.0 per cent as of 13 December 2000. The Riksbank also increases its *deposit* and *lending rates* in each case by 0,5 percentage points. The deposit rate is set at 3.25 per cent and the lending rate at 4.75 per cent. The decision takes effect on 13 December 2000.

2001-07-05   The *repo rate* is increased by the Riksbank from 4.0 per cent to 4.25 per cent as of 11 July 2001. The Riksbank also increases its *deposit* and *lending rates* in each case by 0.25 percentage points. The deposit rate is set at 3.5 per cent and the lending rate at 5.0 per cent. The decision takes effect on 11 July 2001.

09-17   The *repo rate* is lowered by the Riksbank from 4.25 per cent to 3.75 per cent as of 19 September 2001. The Riksbank also lowers its *deposit* and *lending rates* in each case by 0.50 percentage points. The deposit rate is set at 3.0 per cent and the lending rate at 4.5 per cent. The decision takes effect on 19 September 2001.

2002-03-18   The *repo rate* is increased by the Riksbank from 3.75 per cent to 4.0 per cent as of 20 March 2002. The *deposit rate* is accordingly adjusted to 3.25 per cent and the *lending rate* to 4.75 per cent.

04-25   The *repo rate* is increased by the Riksbank from 4.0 per cent to 4.25 per cent as of 2 May 2002. The *deposit rate* is accordingly adjusted to 3.5 per cent and the *lending rate* to 5.0 per cent.

06-28   The *reference rate* is confirmed by the Riksbank at 4,5 per cent for the period 1 July 2002 to 31 December 2002.

11-15   The *repo rate* is lowered by the Riksbank from 4.25 per cent to 4.0 per cent as of 20 November 2002. The *deposit*

rate is accordingly set at 3.25 per cent and the *lending rate* to 4.75 per cent.

12-05 The *repo rate* is lowered by the Riksbank from 4.0 per cent to 3.75 per cent as of 11 December 2002. The *deposit rate* is accordingly set at 3.0 per cent and the *lending rate* to 4.5 per cent.

2003-01-01 The *reference rate* is confirmed by the Riksbank at 4.0 per cent for the period 1 January 2003 to 30 June 2003.

03-17 The Riksbank decides to lower the *repo rate* from 3.75 per cent to 3.50 per cent, to apply from 19 March 2003. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 2.75 per cent and 4.25 per cent respectively.

06-05 The Riksbank decides to lower the *repo rate* from 3.50 per cent to 3.00 per cent, to apply from 11 June 2003. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 2.25 per cent and 3.75 per cent respectively.

06-30 The *reference rate* is confirmed by the Riksbank at 3.0 per cent for the period 1 July 2004 to 31 December 2004.

07-04 The Riksbank decides to lower the *repo rate* from 3.0 per cent to 2.75 per cent, to apply from 9 July 2003. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 2.00 per cent and 3.50 per cent respectively.

2004-01-01 The *reference rate* is confirmed by the Riksbank at 3.0 per cent for the period 1 January 2004 to 30 June 2004.

02-06 The Riksbank decides to lower the *repo rate* from 2.75 per cent to 2.50 per cent, to apply from 11 February 2004. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 1.75 per cent and 3.25 per cent respectively.

03-31 The Riksbank decides to lower the *repo rate* from 2.50 per cent to 2.00 per cent, to apply from 7 April 2004. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 1.25 per cent and 2.75 per cent respectively.

06-30 The *reference rate* is confirmed by the Riksbank at 2.0 per cent for the period 1 July 2004 to 31 December 2004.

◼ Statistical appendix

Statistics from Sveriges Riksbank are to be found on the Internet (www.riksbank.se). Dates of publication of statistics regarding the Riksbank's assets and liabilities including foreign exchange reserves plus financial market and the balance of payments statistics are available on the website of the International Monetary Fund (IMF) (dsbb.imf.org). Dates of publication is also available on www.riksbank.se.

1 Riksbank's assets and liabilities

ASSETS. PERIOD-END STOCK FIGURES. SEK MILLION

		Gold	Lending to banks	Fixed assets	Other	Total
2003	Jan	18 210	22 849	153 407	11 021	205 488
	Feb	18 210	23 405	155 029	6 759	203 403
	March	18 210	22 619	151 184	11 678	203 691
	April	18 210	23 276	156 777	3 306	201 569
	May	18 210	15 938	157 470	7 006	198 624
	June	18 210	15 674	159 341	2 259	195 484
	July	18 210	15 601	158 042	1 723	193 576
	Aug	18 210	17 186	161 861	3 642	200 899
	Sept	18 210	15 206	161 340	2 444	197 200
	Oct	18 210	14 971	163 016	1 198	197 395
	Nov	18 210	15 669	165 571	3 901	203 351
	Dec	18 030	23 825	143 076	10 445	195 376
2004	Jan	18 029	15 901	146 891	12 110	192 931
	Feb	18 029	14 887	146 551	11 828	191 295
	March	19 130	14 509	151 951	11 897	197 487
	April	19 129	14 975	150 885	12 255	197 244
	May	19 129	10 001	149 736	2 866	181 732
	June	17 719	10 760	146 234	3 182	177 895
	July	17 718	10 635	153 528	2 897	184 778
	Aug	17 718	10 801	150 035	2 800	181 354
	Sept	18 095	10 269	150 885	2 718	181 967

LIABILITIES. PERIOD-END STOCK FIGURES. SEK MILLION

		Notes and coins in circulation	Capital liabilities	Debts to monetary policy counterparts	Debts in foreign currency	Other	Total
2003	Jan	99 614	62 943	58	3 674	39 199	205 488
	Feb	100 475	62 943	33	3 327	36 625	203 403
	March	99 701	62 943	33	3 300	37 714	203 691
	April	100 318	62 943	98	4 135	34 075	201 569
	May	100 483	50 556	22	3 323	44 240	198 624
	June	100 142	50 556	123	4 173	40 490	195 484
	July	100 055	50 556	100	2 939	39 926	193 576
	Aug	101 644	50 556	69	7 247	41 383	200 899
	Sept	100 136	50 556	89	4 933	41 486	197 200
	Oct	99 987	50 556	58	6 483	40 311	197 395
	Nov	100 779	50 556	18	7 416	44 582	203 351
	Dec	108 940	50 556	540	3 653	31 687	195 376
2004	Jan	101 954	80 697	64	8 408	1 808	192 931
	Feb	100 615	80 697	61	7 774	2 148	191 295
	March	100 295	80 697	98	6 079	10 318	197 487
	April	100 863	80 697	68	4 769	10 847	197 244
	May	102 008	65 317	95	3 099	11 213	181 732
	June	102 858	65 317	190	4 159	5 371	177 895
	July	102 747	65 317	37	10 883	5 794	184 778
	Aug	102 979	65 317	280	6 821	5 957	181 354
	Sept	102 670	65 317	79	8 900	5 001	181 967

2 Money supply

END-OF-MONTH STOCK

		SEK million			Percentage 12-month change	
		M0	M3		MO	M3
2001	Jan	84 327	960 545	Jan	2.5	1.1
	Feb	84 282	947 276	Feb	4.0	−0.4
	March	85 188	969 559	March	5.0	2.6
	April	86 379	975 366	April	5.8	0.9
	May	86 711	983 764	May	5.9	−0.1
	June	87 288	1 012 094	June	7.2	6.2
	July	86 705	977 812	July	6.6	3.5
	Aug	87 693	985 811	Aug	6.6	3.8
	Sept	87 892	1 008 439	Sept	6.0	4.3
	Oct	88 809	1 022 639	Oct	7.3	5.4
	Nov	89 947	1 039 646	Nov	7.1	6.6
	Dec	96 743	1 038 972	Dec	8.8	6.7
2002	Jan	89 737	1 031 807	Jan	6.4	7.4
	Feb	88 950	1 014 905	Feb	5.5	7.1
	March	89 998	1 033 020	March	5.6	6.5
	April	88 666	1 049 030	April	2.6	7.6
	May	88 818	1 025 757	May	2.4	4.3
	June	89 383	1 053 910	June	2.4	4.1
	July	88 631	1 037 162	July	2.2	6.1
	Aug	89 945	1 051 986	Aug	2.6	6.7
	Sept	89 567	1 061 341	Sept	1.9	5.2
	Oct	89 461	1 051 867	Oct	0.7	2.9
	Nov	90 465	1 068 389	Nov	0.6	2.8
	Dec	95 866	1 086 057	Dec	−0.9	4.5
2003	Jan	90 122	1 085 994	Jan	0.4	5.3
	Feb	90 505	1 072 732	Feb	2.9	5.7
	March	91 966	1 092 435	March	2.2	5.8
	April	92 334	1 095 256	April	4.1	4.4
	May	92 346	1 097 622	May	4.0	7.0
	June	92 296	1 106 661	June	3.3	5.0
	July	91 608	1 090 284	July	3.4	5.1
	Aug	93 324	1 109 725	Aug	3.8	5.5
	Sept	92 451	1 113 021	Sept	3.2	4.9
	Oct	92 364	1 114 967	Oct	3.2	6.0
	Nov	93 070	1 107 251	Nov	2.9	3.6
	Dec	98 481	1 119 288	Dec	2.7	3.1
2004	Jan	93 087	1 109 798	Jan	3.3	2.2
	Feb	92 465	1 117 521	Feb	1.0	4.2
	March	92 399	1 116 429	March	0.5	2.2
	April	92 653	1 130 152	April	0.3	3.2
	May	93 032	1 132 356	May	0.7	3.2
	June	94 732	1 115 232	June	2.6	0.8
	July	92 962	1 115 661	July	1.5	2.3
	Aug	94 355	1 126 118	Aug	1.1	1.5

3 Interest rates set by the Riksbank

PER CENT

	Date of announcement	Effective from	Repo rate	Deposit rate	Lending rate	Period	Reference rate[1]
2000	02-04	02-09	3.75			2002:2 half-year	4.50
	12-07	12-13	4.00	3.25	4.75	2003:1 half-year	4.00
2001	07-06	07-11	4.25	3.50	5.00	2003:2 half-year	3.00
	09-17	09-19	3.75	3.00	4.50	2004:1 half-year	3.00
2002	03-19	03-20	4.00	3.25	4.75	2004:2 half-year	2.00
	04-26	05-02	4.25	3.50	5.00		
	11-15	11-20	4.00	3.25	4.75		
	12-05	12-11	3.75	3.00	4.50		
2003	03-18	03-19	3.50	2.75	4.25		
	06-05	06-11	3.00	2.25	3.75		
	07-04	07-09	2.75	2.00	3.50		
2004	02-06	02-11	2.50	1.75	3.25		
	03-31	04-07	2.00	1.25	2.75		

[1] 1 July 2002 the official discount rate was replaced by a reference rate, which is set by the Riksbank at the end of June and the end of December.

4 Capital market interest rates

EFFECTIVE ANNUALIZED RATES FOR ASKED PRICE. MONTHLY AVERAGE. PER CENT

		Bond issued by:					
		Central Government				Housing institutions	
		3 years	5 years	7 years	9–10 years	2 years	5 years
2003	Jan	3.79	4.23	4.36	4.70	3.99	4.54
	Feb	3.56	3.97	4.11	4.47	3.77	4.27
	March	3.53	4.03	4.17	4.57	3.86	4.34
	April	3.59	4.17	4.30	4.72	3.93	4.57
	May	3.25	3.77	3.90	4.37	3.56	4.16
	June	2.97	3.53	3.79	4.20	3.11	3.80
	July	3.22	3.85	4.20	4.51	3.21	4.06
	Aug	3.58	4.18	4.45	4.70	3.55	4.42
	Sept	3.54	4.18	4.48	4.73	3.50	4.42
	Oct	3.62	4.31	4.60	4.85	3.53	4.54
	Nov	3.76	4.45	4.74	4.98	3.58	4.67
	Dec	3.55	4.30	4.60	4.86	3.38	4.51
2004	Jan	3.22	4.00	4.46	4.65	3.39	4.35
	Feb	3.04	3.86	4.42	4.55	3.19	4.19
	March	2.72	3.53	4.16	4.31	2.85	3.86
	April	2.77	3.75	4.40	4.55	2.88	4.09
	May	2.96	3.97	4.55	4.68	3.09	4.36
	June	3.01	4.03	4.60	4.72	3.11	4.40
	July	2.86	3.88	4.45	4.57	2.95	4.22
	Aug	2.75	3.72	4.29	4.42	2.83	4.05

5 Overnight and money market interest rates

MONTHLY AVERAGE. PER CENT

		Repo rate	Interbank rate	Treasury bills 3-month	6-month	12-month	Company certificates 3-month	6-month
2001	Jan	4.00	4.10	4.07	4.12		4.17	4.26
	Feb	4.00	4.10	4.01	4.07		4.14	4.23
	March	4.00	4.10	4.06	4.02	4.11	4.24	4.23
	April	4.00	4.10	3.94	3.98	4.01	4.12	4.11
	May	4.00	4.10	4.01	4.06	4.28	4.16	4.20
	June	4.00	4.10	4.17	4.27	4.48	4.39	4.46
	July	4.17	4.27	4.31	4.42		4.50	4.58
	Aug	4.25	4.35	4.28	4.31	4.37	4.45	4.48
	Sept	4.05	4.15	4.01	4.06	4.15	4.18	4.22
	Oct	3.75	3.85	3.70	3.72		3.90	3.91
	Nov	3.75	3.85	3.71	3.74	3.91	3.89	3.87
	Dec	3.75	3.85	3.71	3.76	3.97	3.96	3.96
2002	Jan	3.75	3.85	3.74	3.81		3.94	3.97
	Feb	3.75	3.85	3.87	3.99		4.01	4.14
	March	3.84	3.94	4.09	4.29	4.64	4.27	4.43
	April	4.00	4.10	4.25	4.41		4.52	4.69
	May	4.25	4.35	4.29	4.48	4.79	4.64	4.79
	June	4.25	4.35	4.28	4.42	4.71	4.88	5.00
	July	4.25	4.35	4.26	4.37		4.89	4.95
	Aug	4.25	4.35	4.19	4.29	4.43	4.83	4.87
	Sept	4.25	4.35	4.17	4.21	4.29	4.82	4.84
	Oct	4.25	4.35	4.07		4.14	4.67	4.64
	Nov	4.15	4.25	3.91	3.84	3.93	4.20	4.19
	Dec	3.85	3.95	3.66	3.68	3.77	3.97	3.95
2003	Jan	3.75	3.85	3.65			3.90	3.88
	Feb	3.75	3.85	3.61	3.40	3.55	3.85	3.79
	March	3.64	3.74	3.40	3.36	3.35	3.64	3.57
	April	3.50	3.60	3.42			3.62	3.59
	May	3.50	3.60	3.18	2.96		3.43	3.37
	June	3.16	3.26	2.81	2.71	2.61	3.03	2.94
	July	2.82	2.92	2.68			2.87	2.82
	Aug	2.75	2.85	2.71	2.81		2.88	2.90
	Sept	2.75	2.85	2.71	2.73	2.91	2.88	2.92
	Oct	2.75	2.85	2.73			2.89	2.93
	Nov	2.75	2.85	2.72	2.75		2.88	2.93
	Dec	2.75	2.85	2.69	2.70	2.83	2.86	2.87
2004	Jan	2.75	2.85	2.60			2.77	2.74
	Feb	2.59	2.69	2.46	2.38	2.47	2.59	2.59
	March	2.50	2.60	2.27	2.23	2.28	2.43	2.40
	April	2.10	2.20				2.15	2.18
	May	2.00	2.10	1.99	2.07	2.33	2.15	2.23
	June	2.00	2.10	1.98	2.07	2.38	2.15	2.24
	July	2.00	2.10				2.15	2.24
	Aug	2.00	2.10	2.03	2.13		2.15	2.25

6 Treasury bill and selected international rates

MONTHLY AVERAGE. PER CENT

		3-month deposits				6-month deposits			
		USD	EUR	GBP	SSVX[1]	USD	EUR	GBP	SSVX[1]
2001	Jan	5.62	4.71	5.69	4.07	5.47	4.62	5.59	4.12
	Feb	5.25	4.70	5.61	4.01	5.11	4.61	5.53	4.07
	March	4.87	4.64	5.41	4.06	4.72	4.51	5.31	4.02
	April	4.53	4.64	5.25	3.94	4.40	4.53	5.14	3.99
	May	3.99	4.58	5.09	4.01	3.99	4.50	5.07	4.06
	June	3.74	4.40	5.10	4.17	3.74	4.28	5.18	4.27
	July	3.66	4.41	5.11	4.31	3.69	4.33	5.18	4.41
	Aug	3.48	4.30	4.87	4.28	3.49	4.17	4.88	4.35
	Sept	2.92	3.91	4.56	4.01	2.89	3.78	4.49	4.06
	Oct	2.31	3.54	4.27	3.70	2.25	3.39	4.25	3.72
	Nov	2.01	3.32	3.88	3.71	2.02	3.20	3.86	3.74
	Dec	1.84	3.27	3.94	3.71	1.90	3.19	3.96	3.76
2002	Jan	1.74	3.28	3.94	3.74	1.85	3.28	4.04	3.81
	Feb	1.81	3.30	3.94	3.87	1.94	3.33	4.08	3.99
	March	1.91	3.34	4.03	4.09	2.15	3.45	4.23	4.29
	April	1.87	3.39	4.06	4.25	2.11	3.47	4.26	4.41
	May	1.82	3.40	4.05	4.29	2.01	3.56	4.26	4.48
	June	1.79	3.41	4.06	4.28	1.93	3.52	4.27	4.42
	July	1.76	3.34	3.94	4.26	1.82	3.40	4.07	4.37
	Aug	1.69	3.28	3.90	4.19	1.69	3.31	3.91	4.29
	Sept	1.73	3.24	3.88	4.17	1.71	3.18	3.89	4.21
	Oct	1.71	3.20	3.88	4.07	1.67	3.08	3.87	
	Nov	1.39	3.07	3.88	3.91	1.40	2.96	3.89	3.84
	Dec	1.33	2.86	3.92	3.66	1.34	2.81	3.92	3.68
2003	Jan	1.27	2.76	3.88	3.65	1.29	2.69	3.87	
	Feb	1.25	2.63	3.65	3.61	1.25	2.51	3.59	3.40
	March	1.19	2.47	3.56	3.40	1.17	2.39	3.50	3.36
	April	1.22	2.48	3.54	3.42	1.20	2.41	3.48	
	May	1.20	2.35	3.53	3.18	1.16	2.25	3.49	2.96
	June	1.03	2.09	3.55	2.81	1.00	2.02	3.48	2.71
	July	1.04	2.08	3.38	2.68	1.05	2.04	3.37	
	Aug	1.05	2.09	3.43	2.71	1.11	2.12	3.52	2.81
	Sept	1.06	2.09	3.60	2.71	1.10	2.12	3.70	2.73
	Oct	1.08	2.09	3.72	2.73	1.12	2.12	3.87	
	Nov	1.08	2.10	3.88	2.72	1.17	2.17	4.07	2.75
	Dec	1.08	2.09	3.93	2.69	1.15	2.13	4.08	2.70
2004	Jan	1.04	2.03	3.96	2.60	1.10	2.06	4.11	
	Feb	1.03	2.02	4.08	2.46	1.09	2.03	4.19	2.38
	March	1.02	1.97	4.21	2.27	1.07	1.95	4.34	2.23
	April	1.06	1.99	4.30		1.19	2.01	4.45	
	May	1.16	2.03	4.44	1.99	1.44	2.08	4.63	2.07
	June	1.41	2.06	4.69	1.98	1.72	2.13	4.91	2.07
	July	1.54	2.06	4.77		1.80	2.13	4.93	
	Aug	1.66	2.06	4.86	2.03	1.87	2.11	4.98	2.13

1   Treasury bills.

7 Krona exchange rate: TCW index and selected exchange rates

MONTHLY AVERAGE

			SEK				
		TCW-index	EUR	GBP	USD	JPY	CHF
2001	Jan	129.6612	8.8963	14.0052	9.4669	0.0811	5.8170
	Feb	131.1553	8.9736	14.1555	9.7350	0.0838	5.8438
	March	133.4701	9.1254	14.4988	10.0316	0.0828	5.9416
	April	133.8280	9.1103	14.6320	10.1987	0.0824	5.9593
	May	133.9895	9.0536	14.7412	10.3333	0.0848	5.9019
	June	137.0501	9.2010	15.0876	10.7753	0.0882	6.0421
	July	137.4779	9.2557	15.2105	10.7666	0.0864	6.1150
	Aug	136.6723	9.3036	14.8466	10.3343	0.0851	6.1433
	Sept	142.0389	9.6670	15.5179	10.6089	0.0894	6.4799
	Oct	140.6226	9.5798	15.3446	10.5630	0.0871	6.4725
	Nov	138.9180	9.4131	15.2278	10.5965	0.0866	6.4196
	Dec	138.6116	9.4436	15.2024	10.5594	0.0832	6.4006
2002	Jan	135.7390	9.2292	14.9642	10.4398	0.0788	6.2594
	Feb	135.6543	9.1869	15.0223	10.5603	0.0791	6.2179
	March	133.8096	9.0600	14.7064	10.3396	0.0789	6.1690
	April	134.8265	9.1331	14.8742	10.3105	0.0788	6.2300
	May	135.2764	9.2236	14.6763	10.0519	0.0796	6.3300
	June	132.6093	9.1190	14.1612	9.5591	0.0774	6.1959
	July	134.3652	9.2705	14.5199	9.3400	0.0791	6.3380
	Aug	134.3777	9.2524	14.5486	9.4641	0.0795	6.3235
	Sept	133.2278	9.1735	14.5449	9.3504	0.0775	6.2617
	Oct	132.1625	9.1053	14.4489	9.2793	0.0749	6.2156
	Nov	131.3311	9.0785	14.2485	9.0655	0.0746	6.1869
	Dec	131.0292	9.0931	14.1771	8.9458	0.0732	6.1861
2003	Jan	130.9609	9.1775	13.9590	8.6386	0.0727	6.2767
	Feb	129.7272	9.1499	13.6813	8.4930	0.0711	6.2358
	March	130.3167	9.2221	13.5031	8.5298	0.0720	6.2777
	April	128.9566	9.1585	13.2756	8.4370	0.0704	6.1248
	May	127.1076	9.1541	12.8520	7.9229	0.0676	6.0426
	June	126.3154	9.1149	12.9638	7.8108	0.0660	5.9211
	July	127.6987	9.1945	13.1295	8.0807	0.0681	5.9417
	Aug	128.9600	9.2350	13.2074	8.2825	0.0697	5.9957
	Sept	126.7679	9.0693	13.0143	8.0861	0.0703	5.8616
	Oct	125.3358	9.0099	12.9077	7.6966	0.0703	5.8195
	Nov	125.2370	8.9908	12.9783	7.6831	0.0703	5.7642
	Dec	124.3958	9.0169	12.8514	7.3632	0.0682	5.8001
2004	Jan	125.3707	9.1373	13.1985	7.2493	0.0681	5.8343
	Feb	125.9654	9.1814	13.5574	7.2599	0.0682	5.8367
	March	127.6783	9.2305	13.7500	7.5243	0.0694	5.8922
	April	127.6519	9.1711	13.7941	7.6501	0.0711	5.9008
	May	126.7383	9.1312	13.5751	7.6061	0.0679	5.9248
	June	127.0144	9.1422	13.7711	7.5332	0.0688	6.0193
	July	127.3590	9.1954	13.8041	7.4931	0.0685	6.0222
	Aug	127.3415	9.1912	13.7313	7.5444	0.0683	5.9753
	Sept	125.7140	9.0954	13.3500	7.4484	0.0677	5.8943

Note. The base for the TCW index is 18 November 1992. TCW (Total Competitiveness Weights) is a way of measuring the value of the krona against a basket of other currencies. TCW is based on average aggregate flows of processed goods for 21 countries. The weights include exports and imports as well as "third country" effects.

8 Nominal effective TCW exchange rate

INDEX: 18 NOVEMBER 1992=100
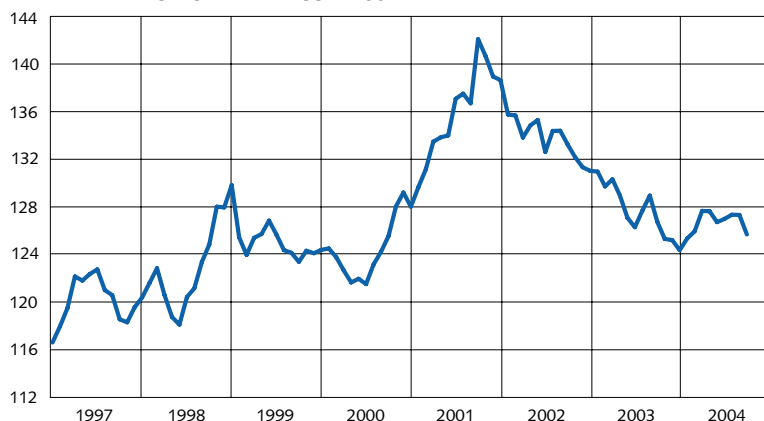
Note. TCW (Total Competitiveness Weights) is a way of measuring the value of the Swedish krona against a basket of other currencies. TCW is based on average aggregate flows of processed goods for 21 countries. The weights includes imports, exports as well as "third country" effects.

9 Forward net position on the foreign-exchange market with authorized currency dealers

REPORTING PERIOD. SEK MILLION

		Non-bank public		Banks abroad	The Riksbank	Total
		Resident (1)	Non-resident (2)	Net (3)	Net (4)	(1+2+3+4)
2002	July	–358 252	–10 076	136 339	0	–231 989
	Aug	–313 551	–13 862	153 001	–5 161	–179 573
	Sept	–360 149	– 5 411	160 670	–5 143	–210 033
	Oct	–342 143	– 5 719	216 218	–4 924	–136 568
	Nov	–348 617	–2 260	228 042	–5 089	–127 924
	Dec	–368 834	–5 810	209 273	–5 215	–170 586
2003	Jan	–325 302	2 280	221 587	–8 275	–109 710
	Feb	–321 149	6 386	231 208	–5 113	– 88 668
	March	–327 225	5 877	205 840	–5 112	–120 620
	April	–365 842	18 728	231 999	–5 113	–120 228
	May	–360 584	19 146	250 712	–5 064	– 95 790
	June	–351 974	25 664	197 708	–5 108	–133 710
	July	–341 819	17 016	205 349	–5 091	–124 545
	Aug	–359 475	11 041	156 955	–5 129	–196 608
	Sept	–324 385	17 034	228 887	–5 481	– 78 469
	Oct	–340 545	19 206	239 319	–5 463	– 82 025
	Nov	–309 229	6 781	214 104	–5 447	–88 349
	Dec	–252 394	– 4 626	233 988	–5 463	– 28 495
2004	Jan	–289 407	– 9 472	238 287	–8 892	– 69 484

Note. A positive position indicates that purchases of foreign currencies exceed sales. A negative position indicates that sales of foreign currencies exceed purchases.

■ Articles in earlier issues