MAINTAINING FINANCIAL STABILITY IN AN OPEN ECONOMY: SWEDEN IN THE GLOBAL CRISIS AND BEYOND

Maintaining Financial Stability in an Open Economy: Sweden in the Global Crisis and Beyond

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Foreword

THE ECONOMIC CRISIS endured by the global economy since 2007 was closely associated with problems in the financial markets. Governments and central banks adopted a series of measures in response to these problems. Many of the measures depart from fiscal and monetary policy in normal, non-crisis, times (and are therefore sometimes labeled "unconventional" measures). Sweden was not immune from these events, triggering the use of crisis-time measures by the Riksbank and other Swedish authorities.

Before the crisis the Riksbank's balance sheet size was kept at around 200 billion kronor. In October 2008 the balance sheet began to rise sharply reaching 700 billion kronor at the end of the year. The figure peaked at 763 billion in July 2009 and was still around 700 billion kronor in June 2010, before starting a gradual decline. Expansion of the Riksbank's balance sheet was primarily due to loans to Swedish banks on terms that departed from normal monetary policy measures. Also, during the period the Riksbank's repo rate was radically lowered, going down from 4.75 percent in September 2008 to 0.25 percent in July 2009. And the Riksbank kept it on that level until July 2010.

The use of various crisis measures raises a number of questions. Were the large increases in the balance sheet justified? Did the authorities move fast enough and did their actions correspond to their mandates? Is it possible to distinguish between monetary policy and financial stability policies? Could more have been done to prepare for this crisis and what are the lessons learned for future crisis prevention and management?

To get an expert analysis of these and other relevant issues, SNS asked two foreign researchers, *Ralph Bryant* at the Brookings Institution and *Dale Henderson* at Georgetown University, and one Swedish researcher, *Torbjörn Becker* at SITE (Stockholm Institute of Transition Economics) at the Stockholm School of Economics to undertake the task of evaluating the Riksbank's handling of the financial crisis 2007–2010.

We hope this study can contribute to the debate and be of value for decision makers. The views expressed in the study are, of course, those of the authors. SNS as an organization does not take a position. The mission of SNS is to initiate and present research-based analyses of issues of importance for society.

The study has been made possible through funding from the Jan Wallander and Tom Hedelius Foundation and from Danske Bank, Nektar (part of the group Brummer & Partners), Swedbank and the Swedish National Debt Office. Representatives from the last four have formed a reference group for the project. They have provided many valuable suggestions and constructive criticism during the work with the report. Many thanks go to the members of the group. The reference group members and the entities they represent are in no way responsible for the analysis and the conclusions in the report. This responsibility rests with the three authors alone.

Ralph Bryant and Dale Henderson travelled to Sweden twice to seek information on the issues they have studied. Together with Torbjörn Becker, they met with a large number of people in both the public and private sectors; see the end of the report. We thank all of them for so generously providing information and sharing views about the issues studied. Gabriela Guibourg at the Riksbank provided helpful comments on a near-final version of the report. Of course full responsibility for the report rests with the authors.

Funding for organising a conference to present the report and to discuss other papers within the monetary policy and financial stability area has been provided by the Marcus Wallenberg Foundation for International Cooperation in Science.

Stockholm in November 2011, January 2012
Stefan Sandström and *Anders Vredin,* SNS

Summary

SWEDEN IS HIGHLY open to the rest of the world, dependent on extensive cross-border transactions in goods, services, and financial assets and liabilities. Exports are now around half the size of GDP. Cross-border financial assets and liabilities are each 2½ times GDP. The banking system is more than 4 times GDP. Even more than in past decades, Swedish financial institutions and markets are pervasively linked to the rest of the global financial system.

Sweden has been buffeted by financial instability twice in the last twenty years. The dominant sources of the instability in the early-1990s crisis were domestic. In the recent global crisis, however, the underlying causes were predominantly external in origin, stemming from financial shocks emanating from financial markets and institutions outside Sweden.

Financial openness is essential to Sweden's healthy economic growth. But openness comes with risks as well as benefits. Our report attempts to assess these risks and benefits. We analyze the policy responses of the Swedish authorities to the recent crisis and examine how policies might be adjusted to improve stability in the future. We advocate a continuing review of the desirability of adjustments in policies that would reduce Sweden's external vulnerability.

When the financial crisis erupted in the fall of 2008 following the collapse of Lehman Brothers, the Swedish authorities responded with alacrity. In addition to adjustments in traditional monetary policy, they took a broad range of collective-support activities including emergen-

cy lending, emergency market support, modification in government guarantees, and facilitating the orderly recapitalization or resolution of institutions coping with possible insolvency.

The immediate problem in the crisis was that assets previously regarded as safe suddenly became suspect. In its initial response, the Riksbank provided substantial liquidity to the banking system both in foreign currency and Swedish kronor at longer than typical maturities and, at different times, at fixed and variable rates. In making these longer-term loans, the Riksbank was doing something akin to the so-called quantitative easing pursued by the Federal Reserve and the Bank of England. To ensure that enough liquidity could be supplied, in addition the Riksbank relaxed collateral requirements and extended the list of eligible counterparties.

Also at the outset of the crisis, the Swedish National Debt Office held extra auctions of Treasury bills. The proceeds were lent out accepting covered mortgage bonds as collateral to help stabilize financial markets. A few days later, the Riksbank sold "certificates" which had interest rates and maturities similar to those of Treasury bills and which were just as safe and as liquid. Issuing Riksbank certificates was another way to enhance liquidity.

A further significant crisis measure was the National Debt Office's guarantee program. Only newly issued debt was guaranteed. The peak use of the program came to some SEK 325 billion, about 10 percent of GDP, with some two thirds related to borrowing in U.S. dollars and euros. Two notable aspects of the guarantee program were its selective importance for a few institutions and the importance of foreign currency guarantees.

Still other emergency measures were appropriately adopted in the crisis. These included modifications in the deposit-insurance program, ancillary actions to support liquidity such as the extension of collateral arrangements, and attention to potential or actual insolvencies of a few individual financial institutions.

The complex effects of the various policy measures taken by the Swedish authorities during the financial crisis are difficult to disentangle. Sweden experienced significant declines in output and stock prices. Yet spreads on financial instruments were stabilized, albeit at above pre-crisis levels. Credit to households was relatively stable, and

credit to companies rebounded fairly quickly. Importantly, the financial system survived the crisis essentially intact.

Our report here and there raises questions about the details of particular policy measures. And our analysis takes into account some larger questions. Did the authorities move fast enough? Were their actions too timid, or did they intervene too aggressively? Could more have been done in preparing contingency arrangements for managing crisis conditions? When reading our evaluative observations, it should be remembered how much more difficult it is to make decisions in a crisis than when looking backwards with the advantage of hindsight. Crisis actions have to be decided on in the heat of the moment with very uncertain foresight.

All things considered, we judge that the Swedish crisis actions were commendably prompt and typically appropriate. The experience in the past crisis, moreover, augurs well for the management of potential future crises.

Our report discusses several aspects of the Riksbank's conduct of traditional monetary policy during the crisis. The main monetary-policy instrument, the Riksbank's repo rate, was forcefully reduced, cut from 4.25 percent to 0.25 percent in a nine-month period during 2008–2009. The rate reductions were slower than cuts by the Federal Reserve and slightly slower than those by the Bank of England. It is an open question whether the Riksbank repo rate should perhaps have been lowered more rapidly and whether reductions in the repo rate should have ceased when the rate had fallen to 0.25 percent.

Difficult decisions were necessary when the repo rate had reached the neighborhood of the zero lower bound. As we look in the rear-view mirror at the crisis period, we find the arguments for keeping the repo rate from falling below 0.25 percent not fully convincing. The hypothesis that a literally-zero policy rate would create significant problems has not yet been tested in any country. Nor does the recent experience with low rates appear to strengthen the arguments against a zero or even mildly negative rate. We believe that it would be worthwhile, in Sweden and elsewhere, to devote more resources to studying the issues associated with a zero lower bound for the repo rate, including whether innovative options might mitigate the hesitancy of central banks to cut policy rates all the way to zero.

The common belief is that the Riksbank, unlike the central-bank authorities in the United States and the United Kingdom, did not engage in large-scale asset purchases as part of their crisis response. Yet the Riksbank did make large amounts of fixed-rate longer-maturity kronor loans to the banks, against collateral, in July, September, and October 2009. Most commentators agree that the main purpose of those loans was to enhance the expansionary stance of policy. The collateral arrangements, the credit risk, and the term risk to the Riksbank of the loans were not very different from the credit and term risks that would have been associated with direct purchases of comparable-maturity securities from the banks. The ultimate effects on interest rates paid by households and nonfinancial corporations of the two options, direct lending against collateral versus explicit asset purchases, might not have been all that different either. Similarities between the two options, broadly speaking, were probably even more important than the differences. To put the point more provocatively, we contend that the Riksbank put its toes in the water with a policy having many effects similar to the quantitative easing pursued by the Federal Reserve and the Bank of England.

Our report emphasizes the forward-guidance aspects of the Riksbank's crisis-period monetary policy. We ask, for example, whether the forward guidance for prospective repo rates might have projected somewhat lower paths and whether greater prominence might have been given to the uncertainty associated with the repo-rate paths and the paths for the inflation and output target variables. We take it as given that the levels of forward-guidance paths and what is said about the degree of uncertainty associated with them are both fundamental aspects of the communication problem. And our predisposition is that—during times of severe financial stress—the uncertainty aspects of forward guidance should be emphasized perhaps even more than forecast levels. In our view, most central banks—including the Riksbank—insufficiently focused on the uncertainty aspects of forward guidance during the crisis period and did not give enough attention to how to incorporate their judgments about forward-looking uncertainty into their communications with the public. In particular, we are inclined to believe that the Riksbank's forward guidance in 2008–2009 said too little about the possible consequences of the severe

uncertainty for the target variables of monetary policy. And, free from the time constraints facing the Riksbank staff, we believe that it would have been helpful to amend the procedures for presenting the uncertainty bands in the Riksbank's fan charts.

The recent period 2010–2011, as the severe strains of the crisis were somewhat dissipating, has been characterized by a vigorous debate within the Riksbank about the most appropriate stance for projected repo-rate paths and more broadly about how best to manage forward guidance during exit from the crisis period. The differences of view within the Riksbank have resulted in a persistent division of the Executive Board into majority and minority views. These differences are a first-order issue. Modestly different projected levels for the repo-rate forward-guidance path are associated with likely significant differences in possible outcomes for the economy.

The division in Board members' views can be explained in large part by differences of judgment about the appropriate analytical approach for making decisions, not least about uncertainty. It is a subtle and unresolved issue whether the analytical treatment of uncertainty in the preparation of forward-guidance paths should help to determine the choice among the paths. The issue is subtle because the existence of uncertainty, great or small, does not by itself constitute persuasive grounds for relying on one or another analytical approach. All approaches, no matter to what extent they are based on explicit models, should try to incorporate sensitivity to uncertainty. Existing models are unable to capture adequately the uncertainty dimensions of financial strains, whether severe or moderate. Hence all model-based analysis must be cautiously amended by judgmental adjustments. The difficult tasks for policymakers are to determine how best to combine model-based and judgmental analysis and how best to explain the process and its associated uncertainties to the public. The ongoing debate within the Riksbank is a prime example of how very difficult these tasks can be.

Analysts and policymakers alike have been forced by the global financial crisis into a much sharper awareness of the deficiencies of existing models used to guide monetary policy. Models of the transmission of monetary policy through the financial system to the real economy have been shown to be more inadequate than was realized

before the crisis. One can now discern, fortunately, an intensification of research efforts to improve the modeling of financial behavior, including at the Riksbank. Eventually, modeling of macroprudential instruments and their effects will need to be integrated into the larger, general-equilibrium analytical frameworks underpinning all types of macroeconomic and prudential policy actions.

The turbulence of the last few years has altered the debate about how to conduct financial policies in at least four important ways. First, central banks, market participants, and analysts in general are taking much more seriously the view that traditional monetary policy should give higher priority to financial stability. Second, they are according new urgency to making improvements in prudential policies. Third, they are recognizing that traditional monetary policy and prudential policies have important implications for one another so that they probably should be coordinated if they are to be used to best advantage. Fourth, given these new preoccupations, government authorities and outside observers are focusing anew on the institutional allocation of the responsibilities for the various financial policies—within national governments and among international institutions. The latter sections of the report touch on all these issues.

Before the global financial crisis, most analysts expressed doubts whether the central bank's policy rate should respond to a financial-stability variable in addition to responding to the usual output and inflation variables. After the crisis, however, the debate has shifted ground. The debate now is broader, more about how to inhibit systemic financial strains and how to support financial stability more generally. Opposition to the general idea of "leaning against the wind," interpreted loosely as putting greater emphasis on financial stability, has softened somewhat. And even though crisis tensions have partially dissipated, the still vivid memories of the meltdown turmoil have encouraged more sympathy for attempts to reduce the probability of future crises.

Policymakers charged with traditional monetary policy will understandably look to prudential instruments for a major part of the task of ex ante crisis prevention. That proclivity, however, cannot rationalize a complete neglect of the issues of financial stability when making monetary-policy decisions. We share the increasingly widespread

agreement that it is unwise to rely solely on prudential instruments for reducing the risks of financial instability.

Prudential policies encompass both micro and macroprudential policies that aim at reducing the risk of financial instability. Although consultations at the Bank of International Settlement (BIS) play a key role in developing international guidelines under the Basel III accord, domestic authorities implement the policies. In addition to more general increases in capital requirements for banks, the ongoing international discussions are proposing measures to make these requirements countercyclical. Such countercyclical capital requirements (CCRs) can potentially be used to deal with "bubbles" and to moderate credit fluctuations for stabilization purposes. The BIS and others have analyzed how CCRs can be implemented in practice—and in particular which conditioning variables can be used to determine when to build up and when to draw down buffers. Some progress has been made, but more is needed to implement this type of requirement in a systematic way.

Sweden now has in use a loan-to-value ratio cap as a prudential tool. Its effects are being debated; further study is both warranted and promised. Liquidity ratios designed to reduce maturity mismatches currency by currency are another prudential tool potentially important for Sweden (given Swedish banks' extensive operations in foreign currencies). Many of the proposed prudential instruments are promising for use, in Sweden and elsewhere. But it is still too early to generalize confidently about how effective they will be in reducing vulnerabilities.

Buffers to deal with financial shocks can be built at the national as well as individual bank level. During the crisis in the fall of 2008, the Swedish authorities set up the Financial Stability Fund, which can extend support to troubled financial institutions, with a target size of 2.5 percent of GDP by 2025. In response to the external vulnerabilities in the financial system, the authorities also decided to increase foreign currency reserves in order to be able to support the financial system with liquidity not only in Swedish kronor but also in foreign currency. The size and funding of these buffers have been somewhat contentious.

In Sweden, as elsewhere, the authorities are addressing the issue of the degree to which "the financial system should pay for itself." Our report considers two situations in which this issue arises. One involves

the Riksbank's foreign-currency reserves. If the Riksbank is to provide liquidity in foreign currencies to financial institutions on short notice without relying on central-bank swap facilities, it has to hold foreign-currency reserves. Funds are obtained through long-term borrowing and used to purchase short-term liquid assets. The cost of holding foreign-currency reserves is the difference between the long-term borrowing rate and the lower return on short-term assets. We believe that financial institutions that want access to emergency foreign-currency borrowing from the Riksbank should pay an "insurance fee" that covers this cost. Such a fee may reduce the amount of foreign-currency business done by the financial institutions; as things stand now, that business is essentially being subsidized by the Swedish tax payer.

The other situation involves the financing of the Financial Stability Fund. The government started the fund off in 2008 with a contribution equal to .5 percent of GDP. Over time, as has been argued by the Swedish National Audit Office, private financial institutions themselves should replace the government's initial contribution by paying that amount into the fund (taking accumulated interest into account). In addition, financial institutions are required to pay fees to build up the Fund until it reaches the announced target of 2.5 percent of GDP. As recommended by the EU, those fees should be lodged in an account that is invested in a geographically diversified portfolio of liquid assets. Investing in that way actually increases government assets whereas using the funds to buy Swedish government debt does not (because government assets and liabilities are increased by the same amount).

The potential for instability in financial activity cannot be attributed to cross-border finance per se. The causes are deeply rooted in the information asymmetries, the expectational and informational cascades, and the adverse-selection and moral-hazard problems that pervade all aspects of financial behavior, domestic as well as cross-border. Yet the cross-border features unquestionably magnify the potential for instability. How to allocate resolution responsibilities and associated costs among Swedish authorities and foreign authorities for complicated cross-border cases is very much an open question, now under active international consideration.

For Sweden, a small open economy with extensive financial links to the rest of the world, the development of macroprudential tools aimed

at external vulnerability of the financial system seems to us a logical priority. Many practical aspects of such efforts remain to be worked out. If macroprudential financial policies have a promising future at all in Sweden, the prospects ought to be bright for those aimed at external-sector vulnerability. In any case, that is where the challenge may be greatest, and perhaps the payoff greatest, for successful measures and procedures.

Traditional monetary policy, to repeat, is relatively better suited for achieving stability of inflation and resource utilization. Macroprudential policies are relatively better suited for achieving financial stability. Yet all the target variables are affected by both types of policies. Thus even though a specialization in the two types of policies might seem appropriate, it would be inefficient—perhaps risky—if the two were conducted independently. Hence the logical question: to what degree, and how, should interactions between the two be managed? Should monetary policy and macroprudential policies be coordinated, even integrated? These issues are now high on the agenda in Sweden (as in most other countries).

Existing theory points in the direction of coordinated decisions. In general, decentralized non-cooperative decisionmaking produces outcomes for a society that are inferior to the best attainable outcomes that could result from centralized decisions or the equivalent situation of full cooperation and information sharing among the decentralized decisionmakers. The broad principle is that coordination of decisions has a potential payoff.

Decentralized policymakers should, other things being equal, take account of the effects of the instruments they control on the entire set of target variables (relevant to all policymakers). If, despite the general principle, decentralized decisions without cooperation and information sharing are to be pursued, then it is incumbent on the advocates of that approach to identify benefits from decentralization—such as increased accountability, or improved specialization of function, or the avoidance of an undue concentration of power in a single authority—which offset the potential efficiency losses stemming from the lack of coordination.

Much of Swedish political thinking and political history, we have learned, has struggled with striking an appropriate balance between

centralized and decentralized decisions. For Swedish financial policies, a significant degree of decentralization exists. Four separate authorities have important responsibilities. Microprudential policies are the province of Finansinspektionen. The Riksbank is responsible for monetary policies. The allocation of responsibility for macroprudential policies has yet to be clearly determined.

The Riksbank and Finansinspektionen engage in extensive information sharing and coordination at all levels. Integrating the two institutions could increase efficiency by removing the need for many of these activities. All three of the functions—macroprudential, microprudential, and monetary policy—would be under the same roof. Such a change, however, appears unlikely. Whatever the efficiency benefits of a merger of the Riksbank and Finansinspektionen might be, most of those with whom we talked in our interviews were either in favor of, or resigned to, a continuation of something like the current division of responsibilities between the two agencies. Most also did not envisage a major change in the responsibilities of SNDO and the Ministry of Finance. Several interviewees expressed reluctance to have the Riksbank gain more power relative to the other three agencies.

The difficult problem for Sweden, therefore, is how to catalyze coordination among the different authorities' decisions regarding monetary policy and financial stability while still preserving the perceived advantages of decentralization. The approach under most active consideration entails the creation of a new umbrella institution, a "Financial Stability Council" (FSC). The FSC would have overall responsibilities for financial stability and crisis management. Detailed decision-making authority, however, would remain decentralized among the same four agencies who now share the various responsibilities. The FSC would be charged with engendering the desired amount of information sharing, analysis, and coordination of decisions. The presumption seems to be that the FSC would primarily act as a vehicle for joint consultation and peer pressure.

Problematic challenges lie ahead in working out precise responsibilities and detailed procedures for the FSC. Difficulties will arise, for example, when macroprudential-policy and monetary-policy considerations call for different actions. When the Riksbank participates in a shared-responsibility approach to macroprudential policymaking,

will it be possible for Sweden to retain all the gains that have been attributed to political independence for monetary-policy decisions? The task of the FSC may be made more difficult by institutional features of the four Swedish financial-policy agencies that appear unlikely to change. It would be unfortunate if beneficial coordination were to be undermined by an understandable albeit regrettable tendency of decentralized institutions to insist on agency prerogatives predating the establishment of the FSC. We conjecture that the inter-agency problems can be resolved successfully provided that all parties are fully committed to the new institution.

Two procedural guidelines, as proposed by some advocates, would make it more likely that FSC joint recommendations to an individual agency would receive serious consideration. The first feature would be, following a FSC recommendation to an agency, a "comply-or-explain" obligation. The agency's response might be subsequently published. The second feature would be a commitment to publish the minutes of FSC meetings, perhaps with some lag. We believe both procedural guidelines would be supportive steps encouraging constructive cooperation.

Our analysis in this report focuses on coordination issues within Sweden. But we are mindful of the broader European and world context in which Swedish decisions are made. Intra-European and international considerations are powerful constraints on Swedish policymakers. The complications arise for all prudential policies, microprudential and macroprudential. And they arise powerfully for traditional monetary policy. Swedish policy must take into account, and try to contribute to, the evolution of European Union financial policies.

Perhaps the greatest uncertainty facing Swedish policymakers—about financial policies but also about every aspect of Sweden's economic policies—stems from doubts about the future of the Eurozone within the European Union. As this report was written, no one could clearly foresee whether a 17-member Eurozone struggling with sovereign debt issues would stay intact. Key aspects of the mandate of the European Central Bank were being debated. Although the issues were less explicitly discussed, it was also quite unclear how the European Union in the future would handle within its single-market framework the tensions between Eurozone countries and non-Eurozone coun-

tries. Those tensions are likely to become increasingly important for Sweden, as all the non-Eurozone countries—especially the United Kingdom and Denmark as well as Sweden—try to work out arrangements for themselves that are satisfactory and politically feasible.

The Eurozone member nations will be under continuing pressure to move faster toward measures of "fiscal union" (unless the Eurozone itself fractures). The European Central Bank will probably be pushed to play a stronger role as a lender of last resort for the Eurozone. Amid such pressures, it is unclear whether the issues of financial policies will evolve as a Eurozone responsibility rather than as a European Union responsibility. Perhaps even more in the next than in the last decade, the future of Europe—and Sweden within Europe—will continue to dominate financial, economic, and political discourse.

Introduction

SWEDEN IS HIGHLY open to the rest of the world, dependent on extensive cross-border transactions in goods, services, and financial assets and liabilities. The openness for goods and services has substantially increased during recent decades. The financial dimensions of openness have increased still more rapidly. Swedish financial institutions and markets are now pervasively linked to the rest of the global financial system.

Sweden has been buffeted by financial instability twice in the last twenty years. The first instance, the banking crisis in the early 1990s, resulted primarily from excesses and volatility in real estate markets within Sweden, compounded by Sweden's then-problematic fixed-exchange-rate policy. Speaking loosely, the early 1990s crisis was "home grown": the dominant sources of the instability were domestic. In contrast, the second period of financial instability—beginning in the second half of 2007, peaking in 2008–2009, and lasting into 2010 and, it is now clear, even into 2011—was predominantly "external" in origin. The underlying causes were financial shocks emanating from financial markets and institutions outside Sweden. Our focus in this report is on the recent global episode of financial instability and its implications for Swedish financial policies in the years to come.

Maintaining financial stability is a complex challenge for any country, but it is especially difficult when a country's economy and financial system are highly open. In the face of the vulnerabilities associated with openness, the financial policies of a country like Sweden must

cope not only with internal sources of disturbance but with external shocks whose occurrence Sweden has little or no ability to influence.

"Financial instability" is a term open to many nuances of interpretation. When financial institutions and markets perform well, they are vital and robust supports for the real economy. They perform essential functions such as intermediation between savers and investors, redistribution of risk to those willing to bear it, and provision of an efficient payments mechanism. But financial systems are also fragile, inevitably prone to episodes of stormy weather. Financial intermediaries have potentially volatile balance sheets, are linked together in complex and fragile ways, and can sometimes be buffeted by adverse effects of contagion and herd behavior. For the purposes of this report, it is sufficient to define financial instability as conditions in which financial activity loses its customary resilience and in which confidence declines severely enough to call into question the ability of some or all financial institutions to perform their essential functions.*

Governments may use several types of policies to maintain financial stability as well as more generally to influence the evolution of the economy and the financial system. We use the umbrella term *financial policies* to refer to the entire range of such policies. Financial policies include *central-bank monetary policy* as traditionally understood, *microprudential financial policies*, and *macroprudential financial policies*. To avoid misunderstandings about terminology, we say a few words at the outset about these different types of financial policies.

Central-bank monetary policy as traditionally and narrowly understood in most countries is focused on setting the path of a key short-term interest rate.** Other instruments of central-bank monetary policy include, for example, lending facilities and reserve requirements. Many analysts in the past have believed that the choice of a time path for the short policy rate (and paths for other monetary-policy instruments) should be determined solely by stabilization motives—for example, keeping the inflation rate near a target path and keeping employment or output near a target "normal" path. In recent years,

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* On definitions of financial instability, see for example Tucker (2011).

** This short-term policy rate in Sweden is the Riksbank's "repo rate." In the United States it is the federal funds rate. And so on.

however, it has become more common (albeit controversial) to assert that the paths for central-bank monetary-policy instruments should also be chosen with financial-stability considerations in mind. For example, in Sweden since the onset of the global financial crisis in 2008 there has been significant discussion about the pros and cons of the Riksbank using its repo rate to "lean against the wind" so as to lower the probability of financial disruptions stemming from excessive increases in asset prices.

Microprudential financial policies are designed to avoid adverse externalities generated by the behavior of individual financial institutions. In principle, every individual financial institution should be subject to supervision and regulation (for example, having its accounts examined and audited by a publicly accountable entity) to promote microeconomic efficiency and to protect individuals who deal with the institution from being subject to deceptive or fraudulent practices. It is helpful to distinguish between "ordinary intermediaries" and "systemically important financial institutions" (SIFIs). The former are small enough that the financial stability of the system as a whole is not threatened by any "moral hazard" problems they generate or by any difficulties one or a few of them experience. Individual financial institutions deemed SIFIs, in contrast, are large enough or interconnected enough that systemic financial stability is jeopardized by the moral hazard problems they generate and by difficulties they experience, caused either by domestic or external developments.

Macroprudential financial policies have a system-wide perspective. Such policies are designed especially to cope with adverse externalities generated by the activities of SIFIs. Macroprudential policies also address other systemic problems (such as exposure to same risks, information cascades, and herd behavior) that make it possible for a number of smaller institutions, acting independently, to generate together episodes of system-wide financial instability. A major focus of macroprudential policies is crisis prevention.

Following the financial turbulence of 2007–2009, it is now widely acknowledged that policymakers under-emphasized "systemic" issues in the years prior to the crisis. It is also now typically believed that financial policies in the future, macroprudential policies in particular, must give systemic issues higher priority.

Microprudential financial instruments and macroprudential financial instruments may be very similar in nature, perhaps even identical. Yet they may be used with differing micro and macro intents. For example, minimum capital requirements may be applied to individual financial institutions, perhaps differentially instead of uniformly. But an additional layer of minimum required capital, varied through time in response to cyclical developments and applied to all financial institutions (or just to SIFIs), might be used as a macroprudential instrument. Minimum liquidity requirements may similarly have both microprudential and macroprudential manifestations. So-called stress tests are still another example. Stress tests were probably originally developed as a microprudential tool for the supervision of individual institutions; yet recently, they have also been used with macroprudential motives as the driving force in several places, including the United States, countries in Europe, Australia, and Japan.

The most familiar prudential financial policy instruments include accounting standards, auditing procedures, capital and liquidity requirements, deposit insurance, and restrictions on particular forms of financial activity (such as constraints on loan-to-value ratios for mortgage lending). These instruments can be used for purposes of microprudential financial policies involving the supervision and regulation of individual institutions, or for purposes of macroprudential financial policies involving system-wide applications. If it is thought appropriate, many of the prudential instruments can be varied over time, an example being countercyclical capital requirements.

Prudential financial policies, both micro and macro, may be aimed mostly at internal developments. But in principle some microprudential and macroprudential instruments could be directed primarily at influences affecting the external sector of the economy. Examples of such policies include banks' liquidity coverage requirements, imposed currency by currency; limits on net open positions in foreign currencies; and reserve requirements on foreign-currency liabilities. Policies with this emphasis on external-sector developments can be thought of as "financial breakwaters" intended as partial shields to reduce the external vulnerability of an open economy.*

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* Bryant (2003), pp. 355–367.

Crisis-management financial policies are aimed at mitigating the effects of financial crises that emerge despite policymakers' prior efforts to prevent crises using other financial policies. Crisis-management issues will inevitably occur with central-bank monetary policies when the financial weather turns stormy. Such issues can also complicate microprudential and macroprudential financial policies. The traditional lender-of-last-resort dilemma whether a central bank should supply emergency liquidity assistance is likely to be the quintessential crisis-management issue in a financial storm. Supplying emergency liquidity may also entail setting of collateral requirements for market transactions, employing market-maker of last resort measures, or central-bank or government purchases of privately-issued assets not usually bought by financial authorities. Examples of prudential instruments that may need to be used in modified ways in crisis management include stress tests, official recapitalization of financial institutions, and resolution procedures for institutions that have become insolvent.

Analytical views and official thinking about financial policies, in both Sweden and the rest of the world, have been significantly shaped by the recent global financial crisis. Microprudential policies are undergoing a wholesale reevaluation. Analysts and policymakers, as noted already, are expressing greatly enhanced interest in macroprudential policies. The distinction between the conduct of central-bank monetary policy and the implementation of prudential policies directed at "financial stability" has become blurred. Belatedly, more attention is being given to their interconnectedness. A more focused spotlight has been turned on crisis-management policies and procedures, including especially lender-of-last-resort liquidity assistance and approaches to actual or threatened insolvency of financial institutions. Policymakers and analysts, moreover, are asking questions about the relative responsibilities of the governmental agencies charged with maintaining financial stability and macroeconomic stability. The Swedish institutions whose authorities and functions are being reevaluated are the Riksbank, Finansinspektionen (FI), the Swedish National Debt Office (SNDO), and the Ministry of Finance.*

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* When referring to these four institutions in this report (except in quotations or document names) we use a mixture of their Swedish names (Sveriges Riksbank, Fi-

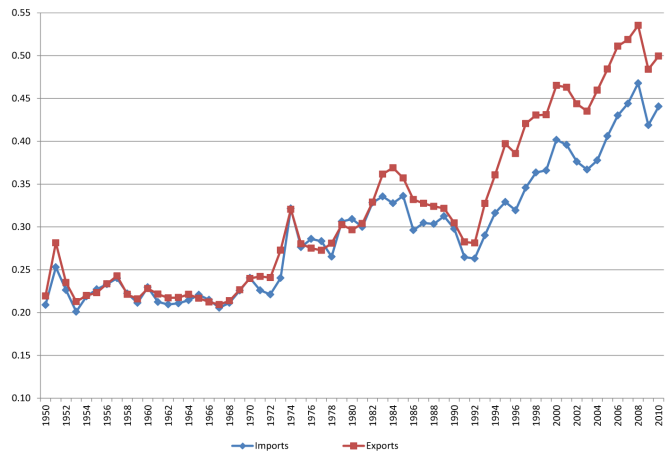
We touch on all these important aspects of financial policies, focusing on Sweden, in the report that follows. Our report has been prepared at a time when there is a clear window of opportunity for improvements in the financial-policy framework in Sweden. This window has opened for two main reasons. First, some events and policy actions before and during the global financial crisis of 2008–2011 have made it clear that there is a need and scope for improvements. Second, a generation of Swedish policymakers has managed two episodes of financial instability remarkably well, and taking advantage of the experience of these policymakers will make it more likely that improvements can be designed and implemented successfully.

nansinspektionen, Riksgälden, and Finansdepartementet) and the standard English versions of those names (Riksbank, Swedish Financial Supervisory Authority, Swedish National Debt Office, and the Ministry of Finance). We chose the names in the mixture because they were the ones used most commonly in our discussions with Swedes about the institutions.

Key Structural Features of the Swedish Financial System

SWEDEN'S OPENNESS TO the rest of the world in transactions for goods and services was already moderately high even in the 1950s and 1960s but it increased significantly further during the subsequent four decades. As of 2010 exports in current prices were fully half the size of current-price GDP and the import ratio in current prices was some 45 percent (Figure 1a).

Figure 1a. Export and Import Openness Ratios, Current Prices,1950–2010

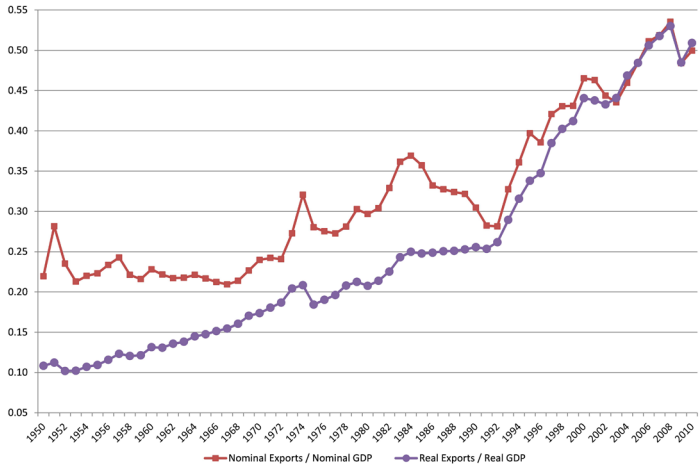


Sources: Lane and Milesi-Ferretti (2001, 2007, 2011).

If the ratios of trade to output are measured in constant rather than current prices, the rise in current-account openness is even more per-

sistent and dramatic. The ratio of exports to GDP in real terms, for example, was only some 10 percent in the 1950s but increased steadily in the subsequent six decades to over 50 percent (Figure 1b).

Figure 1b. Export Openness Ratios, Nominal and Real, 1950–2010



Sources: Lane and Milesi-Ferretti (2001, 2007, 2011).

A rough indication of financial openness to the rest of the world is provided by the ratios of Sweden's external financial assets and external financial liabilities to Swedish nominal GDP. In what follows we present several charts with these data, for Sweden and some comparator countries. Our data come from the External Wealth of Nations Mark II database made available by the thoughtful and careful research of Philip Lane and Gian Maria Milesi-Ferretti.*

The opening up of Sweden's financial system through external linkages started somewhat later than that for the markets for goods and services, but the increasing openness proceeded even faster after the 1980s (Figure 2). Cross-border assets and liabilities were some 2½ times the size of nominal GDP by 2007. After a temporary fall during the height of the financial crisis in 2008, they rose further in 2009 and 2010.

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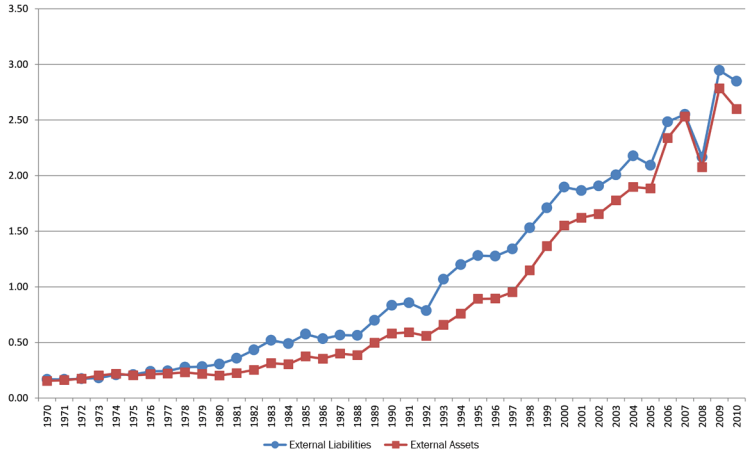
* Lane and Milesi-Ferretti (2001, 2007, 2011). An update of the data base with data through 2009 is available on the web. We thank Milesi-Ferretti for permitting us to use a still further updated and extended version of the database with data through 2010.

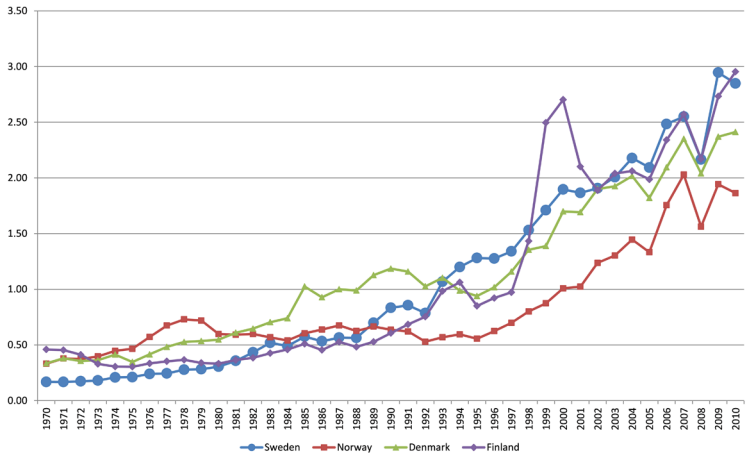
The surge in the ratios shown in Figure 2 is dramatic and merits greater emphasis than it has typically received. But is also needs to be kept in comparative perspective.

Figure 2. Sweden: Ratios of External Liabilities and External Assets to GDP, 1970–2010



Sources: Lane and Milesi-Ferretti (2001, 2007, 2011).

Figure 3. Ratios of External Liabilities to GDP: Sweden Compared with Norway, Denmark, Finland, 1970–2010



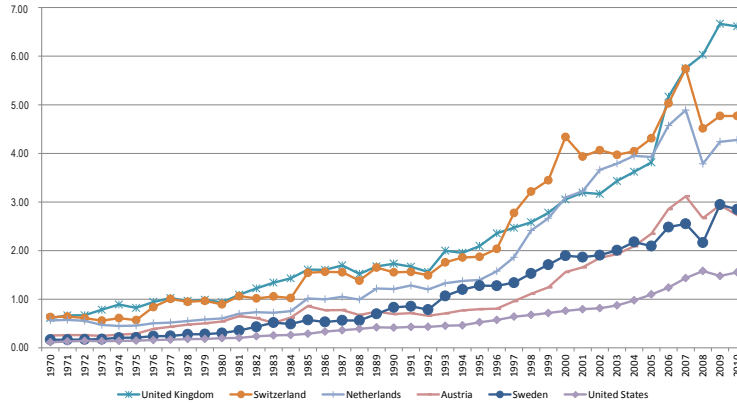
Sources: Lane and Milesi-Ferretti (2001, 2007, 2011).

Figure 3 compares the external-liabilities ratio for Sweden with those for the three other main Nordic countries. Norway and Denmark have

also seen rapid rises in their ratios, and the increases for Finland have been of the same order of magnitude as those for Sweden. All the Nordic financial systems are markedly more open now to the rest of the world than was true in the 1970s and early 1980s.

Indeed, the rapid rise in financial openness is typical of the great majority of developed countries. In Figure 4, Sweden's external-liabilities ratio is compared with those for the United States, Austria, the Netherlands, and the dominant European financial centers Switzerland and the United Kingdom. The large continental financial system of the United States has gradually grown in size relative to the continental U.S. economy; yet the rise in its external financial ratios is moderate relative to Sweden's. Sweden and Austria are similar as to the degree of external financial openness. But Sweden of course has not experienced anything like the outsize surges in financial openness experienced by the Netherlands, Switzerland, and the United Kingdom.

Figure 4. Ratios of External Liabilities and External Assets to GDP: Sweden Compared with United States, Austria, Netherlands, Switzerland, United Kingdom, 1970–2010



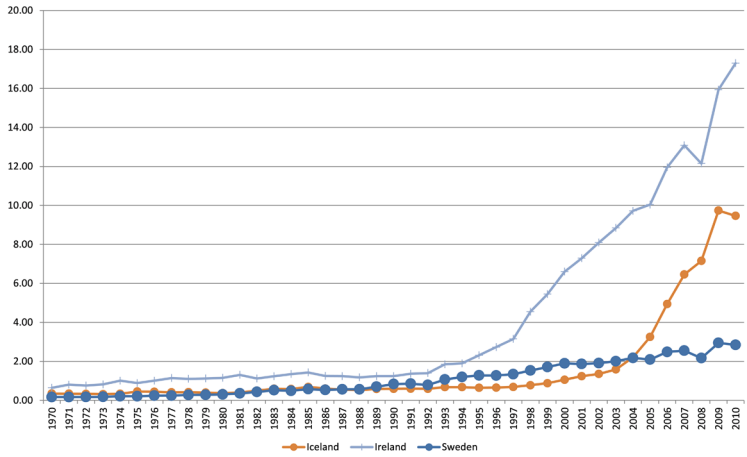
Sources: Lane and Milesi-Ferretti (2001, 2007, 2011).

The contrast between Sweden and both Iceland and Ireland shown in Figure 5 is an important reminder that ratio comparisons across countries need careful interpretation.* Yes, Sweden's cross-border financial linkages are much greater now than several decades ago and

* Ratios such as those in Figures 4 and 5 reveal some important facts, but they are just the start of an analysis to compare the Swedish financial system to financial systems in other countries.

entail greater vulnerability to external shocks than in the past. But Sweden's experience has definitely not had the flamboyant excesses and incautious financial risk taking that characterized the last two decades in Ireland and Iceland. Ireland and Iceland suffered crises so severe as to warrant the label financial collapse. Their collapses were predominantly caused by extreme financial imprudences at particular intermediaries and failures of prudential supervision and regulation. External shocks exacerbated the difficulties, yet severe problems were building up independent of issues of external vulnerability.* Although the financial system in Sweden (and virtually all developed economies) was afflicted with heightened financial stress in the worldwide crisis of 2008–2009, Sweden's turbulence never threatened to escalate to the elevated levels observed in Iceland and Ireland.

Figure 5. Ratios of External Liabilities and External Assets to GDP: Sweden Compared with Iceland and Ireland, 1970–2010



Sources: Lane and Milesi-Ferretti (2001, 2007, 2011).

Sweden's numerous financial institutions are diverse and complex. Tables 1 and 2 use the so-called financial-accounts data (known in

* See for example the reports of the official investigation commissions: Iceland Special Investigative Commission (2010), and Commission of Investigation into the Banking Sector in Ireland (2011). For further comparison of the Iceland, Ireland, and Switzerland banking systems, see IMF Staff (2010b).

some other countries as flow-of-funds-accounts data) to provide an overview of the broad structure of the Swedish financial system.

The balance-sheet assets of all financial corporations in Sweden at the end of 2010 amounted to some 15.9 trillion Swedish kronor (Table 1). Banks (commercial, savings, and cooperative) account for about two-fifths of this aggregate total, housing credit institutions for 14 percent, and insurance corporations for 22 percent. (The Riksbank's balance sheet accounts for 2 percent of the total.) Various other types of credit market corporations, finance companies, and other financial intermediaries—securities and fund-management companies and pension funds—account for the remaining one fifth. The aggregate balance sheets of the financial institutions are a large multiple of (nearly 5 times) the size of Sweden's GDP of SEK 3.3 trillion. Because the Swedish financial system has expanded faster than Swedish economic activity, this multiple has been rapidly increasing in the last two decades.

Table 1. Swedish Financial System, Major Financial Accounts Sectors, End-Year 2010

	SEK Million	% of Total	% of GDP
Banks	6,507,502	40.9	196.8
Housing credit institutions	2,249,809	14.1	68.0
Other monetary credit market corporations	604,588	3.8	18.3
Finance companies	248,433	1.6	7.5
Insurance corporations etc.	3,512,059	22.1	106.2
Other financial intermediaries	2,460,312	15.5	74.4
Central bank	326,495	2.1	9.9
All financial corporations	**15,909,198**	100.0	481.2

Source: Statistics Sweden (SCB) website, sections on annual and quarterly Financial Accounts and on National Accounts.

Swedish non-financial corporations are heavily engaged in international transactions on both current and capital account. They borrow extensively from Swedish financial intermediaries but also have numerous financial links with foreign financial institutions. As in much of Europe, for non-financial corporations borrowing from banks is proportionally more important than borrowing from nonbank financial institutions or direct borrowing from markets through securities issues. Non-financial corporations hold moderate amounts of deposits in Swedish banks but also considerable deposits and other asset claims

on banks outside Sweden (associated with their external trade).

Swedish households borrow from Swedish financial institutions, especially in the form of mortgages from the housing credit institutions. On the asset side, households hold considerable deposit claims on Swedish banks but even larger asset claims on Swedish insurance, security, pension, and fund-management intermediaries. These financial intermediaries in turn invest sizable parts of their balance sheets in claims on foreign financial institutions or in foreign equity markets. One can think of Swedish households as having, in effect, sizable financial assets held abroad because Swedish financial intermediaries, on behalf of the households, hold the foreign assets. But these foreign claims of households are only indirect. In terms of law, this large portion of the claims of Swedish households is a liability of Swedish financial intermediaries, not of foreign financial institutions.

The balance sheets of Swedish banks of course reflect, directly and indirectly, the financial decisions of Swedish households and non-financial corporations. Because Swedish residents invest heavily in nonbank financial intermediaries that in turn hold many foreign assets, Swedish households and non-financial corporations have fewer direct claims on banks in Sweden. The banks accordingly borrow substantial net sums from abroad (through so-called "wholesale financing"). These interrelated aspects of the Swedish financial system lead some observers to speak of a "deposit deficit" at Swedish banks and to argue that the structure of the banks' balance sheets, with its dominance of wholesale funding, is caused by the deposit deficit. In practice, the interconnections in the financial system are complex and multi-dimensional, with the causation running in multiple directions.

The main features of the Swedish financial system just identified can be seen in more detail in Table 2. This table uses the same end-2010 data summarized in Table 1 but now provides some cross-sector detail and highlights the great importance of Sweden's linkages with the rest of the world.

Swedish banks at the end of 2010 had 35 percent of their total assets as claims on the rest of the world and their external liabilities were more than 47 percent of total liabilities. In fact the banks' external liabilities were virtually as large as the entire size of nominal GDP itself. Insurance corporations of all types and other financial intermediaries

Table 2. A Financial-Accounts-Data Overview of the Structure of Sweden's Financial System, SEK Million, End-Year 2010

	Banks	Housing credit institutions	Other monetary credit market corporations
Financial Assets, Total All Sectors	6,507,502	2,249,809	604,588
Financial corporations	1,799,810	120,707	66,335
Non-financial corporations	1,178,816	487,539	164,221
Households and non-profit institutions serving households	820,549	1,600,676	36,334
General government	289,564	23,093	60,623
Rest of the world	2,274,874	6,185	273,259
Liabilities, Total All Sectors	6,691,233	2,253,930	612,344
Financial corporations	1,089,979	1,569,766	46,334
Non-financial corporations	705,578	36,967	713
Households and non-profit institutions serving households	1,235,890	7,790	0
General government	182,482	113,002	8,128
Rest of the world	3,160,048	444,656	519,917
Memoranda:			
External Financial Assets as % of Total Financial Assets	35.0	0.3	45.2
External Financial Assets as % of Nominal GDP	68.8	0.2	8.3
Total Financial Assets as % of Nominal GDP	196.8	68.0	18.3
External Liabilities as % of Total Financial Liabilities	47.2	19.7	84.9
External Liabilities as % of Nominal GDP	95.6	13.4	15.7
Total Liabilities as % of Nominal GDP	202.4	68.2	18.5

Source: Statistics Sweden (SCB) website, sections on annual and quarterly Financial Accounts and on National Accounts.

had, respectively, 32 and 36 percent of their assets as claims on the rest of the world (but much smaller percentages in external liabilities). Though smaller in total size, other monetary credit market corporations had 45 percent of their aggregate total assets as claims on foreigners and 85 percent of their aggregate total liabilities as borrowing from outside Sweden. These high proportions illustrate the advanced degree of Sweden's financial openness and reinforce the suggestion that Sweden may be significantly vulnerable to financial shocks that originate abroad.

The most detailed public information about Swedish financial institutions is found in the statistics for "monetary financial institutions" (MFIs). These data are less comprehensive than the Financial Accounts data. Insurance companies and securities, pension, and fund-management intermediaries, for example, are not considered MFIs. But the MFI data contain more detailed breakdowns of assets and liabilities by currency denomination and cross-border activity.

Table 3 presents a summary of the balance-sheet data of monetary

Finance companies	Insurance corporations	Other financial intermediaries	Central bank	**All financial corporations**
248,433	3,512,059	2,460,312	326,495	**15,909,198**
16,107	1,562,496	739,576	500	**4,305,531**
118,790	402,036	701,798	0	**3,053,200**
69,299	272	525	290	**2,527,945**
3,639	372,949	100,239	0	**850,107**
27,162	1,130,359	894,884	262,913	**4,869,636**
239,578	3,078,278	2,360,691	274,257	**15,510,311**
113,050	57,208	1,415,039	14,155	**4,305,531**
2,298	56,446	642,035	19,272	**1,463,309**
15,214	2,527,346	512,281	77,205	**4,375,726**
1,589	1,769	58,141	162,042	**527,153**
38,043	56,586	159,272	500	**4,379,022**
10.9	32.2	36.4	80.5	**30.6**
0.8	34.2	27.1	8.0	**147.3**
7.5	106.2	74.4	9.9	**481.2**
15.9	1.8	6.7	0.2	**28.2**
1.2	1.7	4.8	0.0	**132.4**
7.2	93.1	71.4	8.3	**469.1**

financial institutions, both in the aggregate and in some cases for individual banks. The figures for December 2010 are again used as a recent illustrative benchmark. The first page of the table aggregates all MFIs together. Subsequent pages are shown for the aggregate of banks (1.1), comprising "banking companies" (1.1.1), savings banks (1.1.2), and the branches of foreign banks located inside Sweden (1.1.3). Pages are also shown for housing credit institutions (1.2), finance companies (1.3), and all other financial institutions deemed to be MFIs (1.4). Within the category of banking companies (1.1.1), separate pages show the figures individually for the four major banks—Nordea, Handelsbanken, Skandinaviska Enskilda Banken (SEB), and Swedbank—and for a residual category of all other banking companies.

Structures and ownership patterns for financial institutions are complex and often interlocking. The largest groups include a bank entity, a housing (mortgage) credit institution, some form of funds-management and securities business, a life insurance company, and other units such as a finance company. The details of the structures,

Table 3. Summary Balance-Sheet Data for Swedish Monetary Financial Institutions (MFIs), Millions of Swedish Kronor or Swedish Kronor Equivalent, End-Year 2010

	All Monetary Financial Institutions Aggregated (1)			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**10,312,454**	**7,070,521**	**3,241,933**	**31.4**
Cash and Liquid Assets	347,749	189,860	157,889	45.4
Lending, total	7,529,815	5,518,571	2,011,244	2.7
Lending in Sweden	5,519,351	5,285,120	234,231	4.2
to MFIs	1,040,362	971,732	68,630	6.6
to non-MFIs	4,478,989	4,313,388	165,601	3.7
governmental (NDO, other central,local, social security funds)	140,536	139,924	612	0.4
financial institutions but not MFIs	114,612	112,949	1,663	1.5
non-financial corporations	1,705,978	1,545,243	160,735	9.4
households and non-profits serving households	2,517,863	2,515,272	2,591	0.1
Lending to ROW	2,010,464	233,451	1,777,013	88.4
to MFIs	978,605	135,014	843,591	86.2
to non-MFIs	1,031,859	98,437	933,422	90.5
EU countries other than Sweden	521,776	53,051	468,725	89.8
countries other than EU	510,083	45,386	464,697	91.1
Securities other than Shares	977,944	531,128	446,816	45.7
Shares/Participations	421,813	170,478	251,335	59.6
Other assets	1,035,133	660,483	374,650	36.2
TOTAL LIABILITIES + EQUITY	**10,312,454**	**6,120,526**	**4,191,928**	**40.6**
Deposits, total	4,674,805	3,207,799	1,467,006	31.4
Deposit liabilities to Swedish residents	3,104,225	2,863,496	240,729	7.8
to MFIs	1,079,473	956,270	123,203	11.4
to non-MFIs	2,024,752	1,907,226	117,526	5.8
Deposit liabilities to ROW	1,570,580	344,302	1,226,278	78.1
to MFIs	1,118,389	266,647	851,742	76.2
to non-MFIs	452,192	77,656	374,536	82.8
EU countries other than Sweden	227,255	56,064	171,191	75.3
countries other than EU	224,937	21,592	203,345	90.4
Securities issued (bonds, money market paper, shares in monetary investment funds)	3,728,275	1,682,556	2,045,719	54.9
Other liabilities	1,646,050	1,110,079	535,971	32.6
Subordinated liabilities, untaxed reserves	263,324	120,093	143,231	54.4
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.267			
Lending to ROW / Total Assets	0.195			
Deposit Liabilities to ROW / All Deposit Liabilities	0.336			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.152			

	Banks (1.1)			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**7,020,976**	**4,213,361**	**2,807,615**	**40.0**
Cash and Liquid Assets	307,822	155,684	152,138	49.4
Lending, total	4,803,103	2,982,515	1,820,588	37.9
Lending in Sweden	2,987,594	2,765,677	221,917	7.4
to MFIs	932,899	867,844	65,055	7.0
to non-MFIs	2,054,695	1,897,833	156,862	7.6
governmental (NDO, other central,local, social security funds)	63,541	63,536	5	0.0
financial institutions but not MFIs	114,108	112,554	1,554	1.4
non-financial corporations	1,059,660	906,881	152,779	14.4
households and non-profits serving households	817,388	814,865	2,523	0.3
Lending to ROW	1,815,508	216,837	1,598,671	88.1
to MFIs	956,847	122,397	834,450	87.2
to non-MFIs	858,661	94,440	764,221	89.0
EU countries other than Sweden	471,786	49,867	421,919	89.4
countries other than EU	386,875	44,573	342,302	88.5
Securities other than Shares	696,021	398,162	297,859	42.8
Shares/Participations	414,957	165,702	249,255	60.1
Other assets	799,074	511,299	287,775	36.0
TOTAL LIABILITIES + EQUITY	**7,020,976**	**3,770,578**	**3,250,398**	**46.3**
Deposits, total	3,762,279	2,446,347	1,315,932	35.0
Deposit liabilities to Swedish residents	2,328,655	2,132,822	195,833	8.4
to MFIs	327,705	249,360	78,345	23.9
to non-MFIs	2,000,950	1,883,462	117,488	5.9
Deposit liabilities to ROW	1,433,624	313,525	1,120,099	78.1
to MFIs	992,670	241,529	751,141	75.7
to non-MFIs	440,954	71,996	368,958	83.7
EU countries other than Sweden	217,472	51,006	166,466	76.5
countries other than EU	223,482	20,990	202,492	90.6
Securities issued (bonds, money market paper, shares in monetary investment funds)	1,679,769	385,565	1,294,204	77.0
Other liabilities	1,380,946	880,413	500,533	36.2
Subordinated liabilities, untaxed reserves	197,982	58,252	139,730	70.6
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.378			
Lending to ROW / Total Assets	0.259			
Deposit Liabilities to ROW / All Deposit Liabilities	0.381			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.204			

	Banking Companies (1.1.1)			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**6,080,763**	**3,357,691**	**2,723,072**	**44.8**
Cash and Liquid Assets	286,779	134,692	152,087	53.0
Lending, total	4,147,321	2,398,537	1,748,784	42.2
Lending in Sweden	2,462,418	2,273,510	188,908	7.7
to MFIs	880,697	818,226	62,471	7.1
to non-MFIs	1,581,721	1,455,284	126,437	8.0
governmental (NDO, other central,local, social security funds)	44,652	44,647	5	0.0
financial institutions but not MFIs	71,066	69,659	1,407	2.0
non-financial corporations	839,404	716,713	122,691	14.6
households and non-profits serving households	626,601	624,266	2,335	0.4
Lending to ROW	1,684,902	125,026	1,559,876	92.6
to MFIs	879,391	71,889	807,502	91.8
to non-MFIs	805,511	53,138	752,373	93.4
EU countries other than Sweden	436,542	20,185	416,357	95.4
countries other than EU	368,969	32,953	336,016	91.1
Securities other than Shares	615,715	320,115	295,600	48.0
Shares/Participations	409,298	160,067	249,231	60.9
Other assets	621,650	344,281	277,369	44.6
TOTAL LIABILITIES + EQUITY	**6,080,763**	**3,046,310**	**3,034,453**	**49.9**
Deposits, total	3,096,989	1,985,797	1,111,192	35.9
Deposit liabilities to Swedish residents	1,996,835	1,812,828	184,007	9.2
to MFIs	289,252	212,785	76,467	26.4
to non-MFIs	1,707,583	1,600,043	107,540	6.3
Deposit liabilities to ROW	1,100,154	172,970	927,184	84.3
to MFIs	675,870	116,353	559,517	82.8
to non-MFIs	424,285	56,618	367,667	86.7
EU countries other than Sweden	205,584	39,957	165,627	80.6
countries other than EU	218,701	16,661	202,040	92.4
Securities issued (bonds, money market paper, shares in monetary investment funds)	1,676,458	382,254	1,294,204	77.2
Other liabilities	1,111,109	621,781	489,328	44.0
Subordinated liabilities, untaxed reserves	196,207	56,477	139,730	71.2

ANALYSIS RATIOS:	
Lending to ROW / All Lending	0.406
Lending to ROW / Total Assets	0.277
Deposit Liabilities to ROW / All Deposit Liabilities	0.355
Deposit Liabilities to ROW / Total Liabilities+Equity	0.181

	Nordea			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**1,224,128**	**508,911**	**715,217**	**58.4**
Cash and Liquid Assets	93,270	57,858	35,412	38.0
Lending, total	736,803	329,219	407,584	55.3
Lending in Sweden	352,165	297,326	54,839	15.6
to MFIs	121,316	112,894	8,422	6.9
to non-MFIs	230,849	184,432	46,417	20.1
governmental (NDO, other central,local, social security funds)	4,074	4,069	5	0.1
financial institutions but not MFIs	1,240	703	537	43.3
non-financial corporations	175,316	129,915	45,401	25.9
households and non-profits serving households	50,219	49,746	473	0.9
Lending to ROW	384,638	31,892	352,746	91.7
to MFIs	309,988	27,631	282,357	91.1
to non-MFIs	74,649	4,260	70,389	94.3
EU countries other than Sweden	56,192	3,919	52,273	93.0
countries other than EU	18,457	341	18,116	98.2
Securities other than Shares	149,223	77,118	72,105	48.3
Shares/Participations	151,789	25,232	126,557	83.4
Other assets	93,044	19,486	73,558	79.1
TOTAL LIABILITIES + EQUITY	**1,224,128**	**479,265**	**744,863**	**60.8**
Deposits, total	612,015	413,402	198,613	32.5
Deposit liabilities to Swedish residents	375,059	343,461	31,598	8.4
to MFIs	41,215	37,567	3,648	8.9
to non-MFIs	333,844	305,894	27,950	8.4
Deposit liabilities to ROW	236,957	69,942	167,015	70.5
to MFIs	214,472	59,384	155,088	72.3
to non-MFIs	22,485	10,557	11,928	53.0
EU countries other than Sweden	18,437	8,481	9,956	54.0
countries other than EU	4,048	2,076	1,972	48.7
Securities issued (bonds, money market paper, shares in monetary investment funds)	299,661	15,629	284,032	94.8
Other liabilities	250,009	45,480	204,529	81.8
Subordinated liabilities, untaxed reserves	62,442	4,754	57,688	92.4
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.522			
Lending to ROW / Total Assets	0.314			
Deposit Liabilities to ROW / All Deposit Liabilities	0.387			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.194			

	Handelsbanken			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**1,619,848**	**791,352**	**828,496**	**51.1**
Cash and Liquid Assets	99,564	30,183	69,381	69.7
Lending, total	1,213,115	550,373	662,742	54.6
Lending in Sweden	592,637	523,661	68,976	11.6
to MFIs	299,294	256,479	42,815	14.3
to non-MFIs	293,343	267,182	26,161	8.9
governmental (NDO, other central,local, social security funds)	9,341	9,341	0	0.0
financial institutions but not MFIs	28,860	28,369	491	1.7
non-financial corporations	206,109	181,608	24,501	11.9
households and non-profits serving households	49,033	47,864	1,169	2.4
Lending to ROW	620,479	26,713	593,766	95.7
to MFIs	205,447	8,795	196,652	95.7
to non-MFIs	415,033	17,919	397,114	95.7
EU countries other than Sweden	240,876	6,341	234,535	97.4
countries other than EU	174,157	11,578	162,579	93.4
Securities other than Shares	60,618	40,428	20,190	33.3
Shares/Participations	68,182	50,503	17,679	25.9
Other assets	178,368	119,864	58,504	32.8
TOTAL LIABILITIES + EQUITY	**1,619,848**	**623,052**	**996,796**	**61.5**
Deposits, total	848,790	411,936	436,854	51.5
Deposit liabilities to Swedish residents	467,635	383,587	84,048	18.0
to MFIs	92,215	28,885	63,330	68.7
to non-MFIs	375,420	354,702	20,718	5.5
Deposit liabilities to ROW	381,156	28,350	352,806	92.6
to MFIs	198,680	14,375	184,305	92.8
to non-MFIs	182,476	13,976	168,500	92.3
EU countries other than Sweden	99,786	10,339	89,447	89.6
countries other than EU	82,690	3,637	79,053	95.6
Securities issued (bonds, money market paper, shares in monetary investment funds)	484,256	44,410	439,846	90.8
Other liabilities	241,733	159,317	82,416	34.1
Subordinated liabilities, untaxed reserves	45,069	7,389	37,680	83.6

ANALYSIS RATIOS:	
Lending to ROW / All Lending	0.511
Lending to ROW / Total Assets	0.383
Deposit Liabilities to ROW / All Deposit Liabilities	0.449
Deposit Liabilities to ROW / Total Liabilities+Equity	0.235

	Skandinaviska Enskilda Banken (SEB)			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**1,559,068**	**800,734**	**758,334**	**48.6**
Cash and Liquid Assets	56,454	15,953	40,501	71.7
Lending, total	987,633	578,665	408,968	41.4
Lending in Sweden	577,312	540,488	36,824	6.4
to MFIs	24,020	19,597	4,423	18.4
to non-MFIs	553,292	520,891	32,401	5.9
governmental (NDO, other central,local, social security funds)	7,515	7,515	0	0.0
financial institutions but not MFIs	19,465	19,426	39	0.2
non-financial corporations	222,021	189,925	32,096	14.5
households and non-profits serving households	304,292	304,026	266	0.1
Lending to ROW	410,321	38,178	372,143	90.7
to MFIs	212,256	15,130	197,126	92.9
to non-MFIs	198,066	23,049	175,017	88.4
EU countries other than Sweden	104,430	8,009	96,421	92.3
countries other than EU	93,636	15,040	78,596	83.9
Securities other than Shares	191,156	50,220	140,936	73.7
Shares/Participations	110,719	33,857	76,862	69.4
Other assets	213,106	122,039	91,067	42.7
TOTAL LIABILITIES + EQUITY	**1,559,068**	**748,813**	**810,255**	**52.0**
Deposits, total	687,585	355,492	332,093	48.3
Deposit liabilities to Swedish residents	350,987	302,651	48,336	13.8
to MFIs	19,003	16,635	2,368	12.5
to non-MFIs	331,984	286,016	45,968	13.8
Deposit liabilities to ROW	336,598	52,842	283,756	84.3
to MFIs	173,841	25,608	148,233	85.3
to non-MFIs	162,757	27,234	135,523	83.3
EU countries other than Sweden	78,012	18,392	59,620	76.4
countries other than EU	84,745	8,842	75,903	89.6
Securities issued (bonds, money market paper, shares in monetary investment funds)	481,984	172,451	309,533	64.2
Other liabilities	342,330	197,343	144,987	42.4
Subordinated liabilities, untaxed reserves	47,169	23,527	23,642	50.1
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.415			
Lending to ROW / Total Assets	0.263			
Deposit Liabilities to ROW / All Deposit Liabilities	0.490			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.216			

	Swedbank			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**1,122,161**	**801,284**	**320,877**	**28.6**
Cash and Liquid Assets	30,245	24,772	5,473	18.1
Lending, total	802,184	592,390	209,794	26.2
Lending in Sweden	590,576	565,742	24,834	4.2
to MFIs	328,367	324,629	3,738	1.1
to non-MFIs	262,209	241,113	21,096	8.0
governmental (NDO, other central,local, social security funds)	21,266	21,266	0	0.0
financial institutions but not MFIs	16,913	16,574	339	2.0
non-financial corporations	168,838	148,269	20,569	12.2
households and non-profits serving households	55,191	55,003	188	0.3
Lending to ROW	211,608	26,648	184,960	87.4
to MFIs	149,355	19,734	129,621	86.8
to non-MFIs	62,253	6,914	55,339	88.9
EU countries other than Sweden	19,598	1,310	18,288	93.3
countries other than EU	42,655	5,604	37,051	86.9
Securities other than Shares	136,766	108,312	28,454	20.8
Shares/Participations	55,305	28,806	26,499	47.9
Other assets	97,661	47,004	50,657	51.9
TOTAL LIABILITIES + EQUITY	**1,122,161**	**758,069**	**364,092**	**32.4**
Deposits, total	627,322	529,351	97,971	15.6
Deposit liabilities to Swedish residents	528,472	512,036	16,436	3.1
to MFIs	106,282	101,544	4,738	4.5
to non-MFIs	422,190	410,492	11,698	2.8
Deposit liabilities to ROW	98,849	17,314	81,535	82.5
to MFIs	83,519	15,225	68,294	81.8
to non-MFIs	15,330	2,089	13,241	86.4
EU countries other than Sweden	3,885	1,033	2,852	73.4
countries other than EU	11,445	1,056	10,389	90.8
Securities issued (bonds, money market paper, shares in monetary investment funds)	275,081	72,638	202,443	73.6
Other liabilities	191,292	147,215	44,077	23.0
Subordinated liabilities, untaxed reserves	28,466	8,865	19,601	68.9
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.264			
Lending to ROW / Total Assets	0.189			
Deposit Liabilities to ROW / All Deposit Liabilities	0.158			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.088			

	All Other Banking Companies			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**555,558**	**455,410**	**100,148**	**18.0**
Cash and Liquid Assets	7,246	5,926	1,320	18.2
Lending, total	407,586	347,890	59,696	14.6
Lending in Sweden	349,728	346,293	3,435	1.0
to MFIs	107,700	104,627	3,073	2.9
to non-MFIs	242,028	241,666	362	0.1
governmental (NDO, other central,local, social security funds)	2,456	2,456	0	0.0
financial institutions but not MFIs	4,588	4,587	1	0.0
non-financial corporations	67,120	66,996	124	0.2
households and non-profits serving households	167,866	167,627	239	0.1
Lending to ROW	57,856	1,595	56,261	97.2
to MFIs	2,345	599	1,746	74.5
to non-MFIs	55,510	996	54,514	98.2
EU countries other than Sweden	15,446	606	14,840	96.1
countries other than EU	40,064	390	39,674	99.0
Securities other than Shares	77,952	44,037	33,915	43.5
Shares/Participations	23,303	21,669	1,634	7.0
Other assets	39,471	35,888	3,583	9.1
TOTAL LIABILITIES + EQUITY	**555,558**	**437,111**	**118,447**	**21.3**
Deposits, total	321,277	275,616	45,661	14.2
Deposit liabilities to Swedish residents	274,682	271,093	3,589	1.3
to MFIs	30,537	28,154	2,383	7.8
to non-MFIs	244,145	242,939	1,206	0.5
Deposit liabilities to ROW	46,594	4,522	42,072	90.3
to MFIs	5,358	1,761	3,597	67.1
to non-MFIs	41,237	2,762	38,475	93.3
EU countries other than Sweden	5,464	1,712	3,752	68.7
countries other than EU	35,773	1,050	34,723	97.1
Securities issued (bonds, money market paper, shares in monetary investment funds)	135,476	77,126	58,350	43.1
Other liabilities	85,745	72,426	13,319	15.5
Subordinated liabilities, untaxed reserves	13,061	11,942	1,119	8.6

ANALYSIS RATIOS:	
Lending to ROW / All Lending	0.142
Lending to ROW / Total Assets	0.104
Deposit Liabilities to ROW / All Deposit Liabilities	0.145
Deposit Liabilities to ROW / Total Liabilities+Equity	0.084

	Saving Banks (1.1.2)			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**147,424**	**146,526**	**898**	**0.6**
Cash and Liquid Assets	1,745	1,704	41	2.3
Lending, total	127,865	127,112	753	0.6
Lending in Sweden	127,369	126,651	718	0.6
to MFIs	14,035	13,529	506	3.6
to non-MFIs	113,334	113,122	212	0.2
governmental (NDO, other central,local, social security funds)	609	609	0	0.0
financial institutions but not MFIs	131	131	0	0.0
non-financial corporations	41,455	41,337	118	0.3
households and non-profits serving households	71,138	71,044	94	0.1
Lending to ROW	497	462	35	7.0
to MFIs	0	0	0	0.0
to non-MFIs	497	462	35	7.0
EU countries other than Sweden	201	167	34	16.9
countries other than EU	296	295	1	0.3
Securities other than Shares	10,386	10,288	98	0.9
Shares/Participations	5,416	5,416	0	0.0
Other assets	2,012	2,006	6	0.3
TOTAL LIABILITIES + EQUITY	**147,424**	**146,611**	**813**	**0.6**
Deposits, total	124,640	123,888	752	0.6
Deposit liabilities to Swedish residents	124,022	123,289	733	0.6
to MFIs	3,528	3,302	226	6.4
to non-MFIs	120,494	119,987	507	0.4
Deposit liabilities to ROW	618	599	19	3.1
to MFIs	0	0	0	0.0
to non-MFIs	618	599	19	3.1
EU countries other than Sweden	354	336	18	5.1
countries other than EU	264	263	1	0.4
Securities issued (bonds, money market paper, shares in monetary investment funds)	1,274	1,274	0	0.0
Other liabilities	20,548	20,487	61	0.3
Subordinated liabilities, untaxed reserves	962	962	0	0.0
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.004			
Lending to ROW / Total Assets	0.003			
Deposit Liabilities to ROW / All Deposit Liabilities	0.005			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.004			

	Foreign Bank Branches in Sweden (1.1.3)			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**792,789**	**709,144**	**83,645**	**10.6**
Cash and Liquid Assets	19,298	19,289	9	0.0
Lending, total	527,917	456,866	71,051	13.5
Lending in Sweden	397,807	365,517	32,290	8.1
to MFIs	38,167	36,089	2,078	5.4
to non-MFIs	359,640	329,428	30,212	8.4
governmental (NDO, other central,local, social security funds)	18,281	18,281	0	0.0
financial institutions but not MFIs	42,911	42,764	147	0.3
non-financial corporations	178,800	148,829	29,971	16.8
households and non-profits serving households	119,649	119,555	94	0.1
Lending to ROW	130,110	91,349	38,761	29.8
to MFIs	77,456	50,508	26,948	34.8
to non-MFIs	52,654	40,841	11,813	22.4
EU countries other than Sweden	35,043	29,515	5,528	15.8
countries other than EU	17,611	11,326	6,285	35.7
Securities other than Shares	69,920	67,759	2,161	3.1
Shares/Participations	243	219	24	9.9
Other assets	175,411	165,011	10,400	5.9
TOTAL LIABILITIES + EQUITY	**792,789**	**577,657**	**215,132**	**27.1**
Deposits, total	540,650	336,662	203,988	37.7
Deposit liabilities to Swedish residents	207,799	196,707	11,092	5.3
to MFIs	34,926	33,274	1,652	4.7
to non-MFIs	172,873	163,433	9,440	5.5
Deposit liabilities to ROW	332,851	139,955	192,896	58.0
to MFIs	316,800	125,176	191,624	60.5
to non-MFIs	16,052	14,780	1,272	7.9
EU countries other than Sweden	11,535	10,715	820	7.1
countries other than EU	4,517	4,065	452	10.0
Securities issued (bonds, money market paper, shares in monetary investment funds)	2,038	2,038	0	0.0
Other liabilities	249,289	238,145	11,144	4.5
Subordinated liabilities, untaxed reserves	813	813	0	0.0
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.246			
Lending to ROW / Total Assets	0.164			
Deposit Liabilities to ROW / All Deposit Liabilities	0.616			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.420			

	Housing Credit Institutions (1.2)			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**2,309,647**	**2,245,998**	**63,649**	**2.8**
Cash and Liquid Assets	2,821	2,821	0	0.0
Lending, total	2,236,668	2,181,547	55,121	2.5
Lending in Sweden	2,180,333	2,180,333	0	0.0
to MFIs	75,042	75,042	0	0.0
to non-MFIs	2,105,291	2,105,291	0	0.0
governmental (NDO, other central,local, social security funds)	22,556	22,556	0	0.0
financial institutions but not MFIs	101	101	0	0.0
non-financial corporations	486,238	486,238	0	0.0
households and non-profits serving households	1,596,395	1,596,395	0	0.0
Lending to ROW	56,335	1,214	55,121	97.8
to MFIs	0	0	0	0.0
to non-MFIs	56,335	1,214	55,121	97.8
EU countries other than Sweden	7,181	628	6,553	91.3
countries other than EU	49,154	586	48,568	98.8
Securities other than Shares	13,583	13,583	0	0.0
Shares/Participations	1	1	0	0.0
Other assets	56,574	48,046	8,528	15.1
TOTAL LIABILITIES + EQUITY	**2,309,647**	**1,907,773**	**401,874**	**17.4**
Deposits, total	686,246	608,189	78,057	11.4
Deposit liabilities to Swedish residents	634,255	608,188	26,067	4.1
to MFIs	634,255	608,188	26,067	4.1
to non-MFIs	0	0	0	0.0
Deposit liabilities to ROW	51,991	0	51,991	100.0
to MFIs	51,991	0	51,991	100.0
to non-MFIs	0	0	0	0.0
EU countries other than Sweden	0	0	0	0.0
countries other than EU	0	0	0	0.0
Securities issued (bonds, money market paper, shares in monetary investment funds)	1,441,855	1,128,425	313,430	21.7
Other liabilities	168,445	158,059	10,386	6.2
Subordinated liabilities, untaxed reserves	13,101	13,101	0	0.0
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.025			
Lending to ROW / Total Assets	0.024			
Deposit Liabilities to ROW / All Deposit Liabilities	0.076			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.023			

	Finance Companies (1.3)			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**294,195**	**230,126**	**64,069**	**21.8**
Cash and Liquid Assets	1,145	1,082	63	5.5
Lending, total	165,186	128,471	36,715	22.2
Lending in Sweden	130,702	126,490	4,212	3.2
to MFIs	9,663	8,948	715	7.4
to non-MFIs	121,039	117,542	3,497	2.9
governmental (NDO, other central,local, social security funds)	714	714	0	0.0
financial institutions but not MFIs	76	76	0	0.0
non-financial corporations	52,365	48,916	3,449	6.6
households and non-profits serving households	67,885	67,837	48	0.1
Lending to ROW	34,483	1,980	32,503	94.3
to MFIs	2,055	783	1,272	61.9
to non-MFIs	32,428	1,198	31,230	96.3
EU countries other than Sweden	19,133	1,054	18,079	94.5
countries other than EU	13,295	144	13,151	98.9
Securities other than Shares	2,289	2,051	238	10.4
Shares/Participations	5,949	3,874	2,075	34.9
Other assets	119,626	94,650	24,976	20.9
TOTAL LIABILITIES + EQUITY	**294,195**	**237,037**	**57,158**	**19.4**
Deposits, total	201,681	150,730	50,951	25.3
Deposit liabilities to Swedish residents	134,423	120,583	13,840	10.3
to MFIs	111,329	97,501	13,828	12.4
to non-MFIs	23,094	23,082	12	0.1
Deposit liabilities to ROW	67,258	30,148	37,110	55.2
to MFIs	56,155	24,610	31,545	56.2
to non-MFIs	11,102	5,537	5,565	50.1
EU countries other than Sweden	9,673	4,961	4,712	48.7
countries other than EU	1,429	576	853	59.7
Securities issued (bonds, money market paper, shares in monetary investment funds)	4,953	4,953	0	0.0
Other liabilities	39,585	34,497	5,088	12.9
Subordinated liabilities, untaxed reserves	47,976	46,856	1,120	2.3
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.209			
Lending to ROW / Total Assets	0.117			
Deposit Liabilities to ROW / All Deposit Liabilities	0.333			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.229			

	All Other MFIs (1.4)			
	All currencies	SEK	foreign currencies	% f.c.
TOTAL ASSETS	**687,635**	**381,035**	**306,600**	**44.6**
Cash and Liquid Assets	35,960	30,272	5,688	15.8
Lending, total	324,859	226,039	98,820	30.4
Lending in Sweden	220,722	212,621	8,101	3.7
to MFIs	22,758	19,899	2,859	12.6
to non-MFIs	197,964	192,722	5,242	2.6
governmental (NDO, other central,local, social security funds)	53,727	53,120	607	1.1
financial institutions but not MFIs	327	218	109	33.3
non-financial corporations	107,716	103,210	4,506	4.2
households and non-profits serving households	36,195	36,175	20	0.1
Lending to ROW	104,136	13,418	90,718	87.1
to MFIs	19,703	11,833	7,870	39.9
to non-MFIs	84,433	1,584	82,849	98.1
EU countries other than Sweden	23,675	1,501	22,174	93.7
countries other than EU	60,758	83	60,675	99.9
Securities other than Shares	266,051	117,333	148,718	55.9
Shares/Participations	907	902	5	0.6
Other assets	59,858	6,489	53,369	89.2
TOTAL LIABILITIES + EQUITY	**687,635**	**205,137**	**482,498**	**70.2**
Deposits, total	24,599	2,532	22,067	89.7
Deposit liabilities to Swedish residents	6,891	1,902	4,989	72.4
to MFIs	6,183	1,220	4,963	80.3
to non-MFIs	708	682	26	3.7
Deposit liabilities to ROW	17,708	629	17,079	96.4
to MFIs	17,574	509	17,065	97.1
to non-MFIs	134	121	13	9.7
EU countries other than Sweden	109	96	13	11.9
countries other than EU	25	25	0	0.0
Securities issued (bonds, money market paper, shares in monetary investment funds)	601,697	163,611	438,086	72.8
Other liabilities	57,074	37,110	19,964	35.0
Subordinated liabilities, untaxed reserves	4,266	1,885	2,381	55.8
ANALYSIS RATIOS:				
Lending to ROW / All Lending	0.321			
Lending to ROW / Total Assets	0.151			
Deposit Liabilities to ROW / All Deposit Liabilities	0.720			
Deposit Liabilities to ROW / Total Liabilities+Equity	0.026			

Source: Statistics Sweden (SCB) website, section on Financial Institutions, Assets and Liabilities.

however, vary from one group to another.* The figures in Table 3, because they do not reveal the interlocking ownership complexity within groups, tend to give an understated impression of the significance of cross-border linkages between Sweden's financial institutions and the rest of the world.

Each page of Table 3 contains rows for key aggregates of assets and liabilities, emphasizing the distinction between domestic counterparties (within Sweden) and counterparties located in the rest of the world (ROW). The first three columns on each page report data for assets and liabilities denominated in Swedish kronor, denominated in foreign currencies, and the total for all currencies. The final rows on each page, and the final columns, provide analytical ratios summarizing the importance of the external and foreign-currency dimensions.

Consider first the position of all monetary financial institutions when aggregated together (p. 36, bottom).** About a fifth of all the MFIs' total assets and 15 percent of their total liabilities are vis-à-vis foreign entities. More than a quarter of all their lending and a third of all their deposit liabilities are external. The foreign-currency dimensions of the aggregate balance sheet are likewise prominent. Assets in foreign currencies (presumably the most important of which are US dollars and Euros) are some 31 percent of the total and the liabilities plus equity position in foreign currencies is some 41 percent of the total.

Banking companies, especially the largest, are even more intensively linked to the rest of the world. And their foreign-currency assets and liabilities are proportionately still more important. For all banking companies taken together (p. 38), 45 percent of total assets and fully half of total liabilities plus equity are denominated in foreign currencies. Figure 6 illustrates the importance of the foreign-currency

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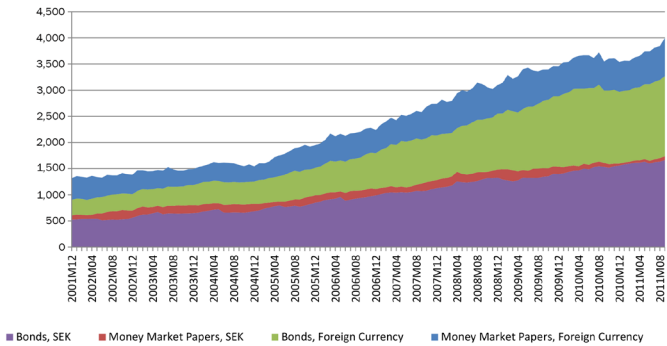
* For discussion, see Riksbank, *The Swedish Financial Market 2011*, especially pp. 77–79 and Table 7.

** Second-order discrepancies exist between the balance-sheet amounts for financial institutions reported in the Financial Accounts data and the amounts reported in the MFI data. Hence the amounts for assets and liabilities totals differ somewhat between Table 2 and Table 3. The discrepancies, which arise mainly from differences in concepts and reporting procedures, are unimportant for the points stressed here in our overview.

dimension by plotting the kronor and foreign-currency funding of the monetary financial institutions over the period 2001 through 2011.

Figure 6. MFI's Long-Term and Short-Term Market Funding, SEK and Foreign Currency, SEK Billion, December 2001–September 2011



Source: SCB.

Nordea (fourth page of Table 3) is an especially notable example of the foreign interconnections. Although the head office is located in Sweden, Nordea might be best described as a Nordic institution. It has leading bank offices in Finland, Denmark, and Norway as well as in Sweden. A large fraction of its lending, perhaps as much as three quarters, is from its offices outside of Sweden. Nordea's Swedish operations include one of the largest finance companies; Nordea is a major institution in funds management and mortgage credits.* Although not as dominant as in Nordea's case, the other major groups have extensive foreign connections as well. Handelsbanken has expanded in the Nordic region, both by acquisitions and the opening of branch offices. The SEB group has considerable activities in Germany and the Baltics. Swedbank has been very active in the Baltics, especially since taking over a leading Baltic institution, Hansabank, in 2005.**

The figures in Table 3 reveal another key feature of the balance

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* Swedish Bankers Association (2010), p. 4. Nordea was formed by the combination of Nordbanken and Gota Bank after the Swedish banking crisis of the early 1990s.

** Ibid.

sheets of Swedish financial institutions. The lending carried out on the asset side of balance sheets is financed to a large extent by market funding—often termed "wholesale funding"—rather than by deposits or other direct liabilities to households and nonfinancial corporations. To illustrate, look for example at all banking companies (1.1.1, third page in the table). They have 4,147 SEK billion of lending claims, of which 59 percent (2,463 billion) is claims on all Swedish residents and the remaining 41 percent (1,685 billion) is claims on foreign entities. But their deposit liabilities to non-MFI entities in Sweden are only 1,707 billion, representing not much more than two-fifths of their total lending claims of 4,147 billion. Deposit liabilities to non-Swedish non-MFI creditors are only another 424 billion, so that a rough measure of "non-wholesale" funding is only about half of total lending.

A fact not revealed by the data in Table 3 is that the maturities of the market funding arranged by the banks are typically shorter, often significantly shorter, than the maturities of the lending claims that are financed. The situation varies from one major bank to the other, as the individual-bank pages in the table show. But all the major banks, to some degree, have relied heavily on market borrowing and the issuance of marketable securities with an average maturity shorter than the average maturity of their lending.

The preceding examples refer to banks. Indeed, the banking sector is a decisive player in the Swedish financial system. In turn the four major banks dominate the banking sector. Some three-fourths of the deposits from and loans to Swedish economic actors outside the financial system are on the books of Nordea, Handelsbanken, SEB, and Swedbank. But the nonbanking intermediaries, MFI figures for which are shown on the last three pages of Table 3, are significant players as well.* Furthermore, the nonbanking intermediaries are also characterized by wholesale funding of their assets and extensive cross-border and cross-currency linkages with the rest of the world. The housing credit institutions have over 17 percent of their liabilities denominated

* As noted already, there are complex interlocking relationships among the major banks and the nonbank intermediaries. The dominance of Nordea, Handelsbanken, SEB, and Swedbank in the Swedish financial system appears even greater when these interlocking relationships are taken into account.

in foreign currencies but only 3 percent of their assets. The finance companies are smaller in size, but 33 percent of their deposit liabilities are to ROW residents and two-fifths of their assets and liabilities are denominated in foreign currencies. For All Other MFI intermediaries (1.4 in the reporting system; see table's last page), 45 percent of their assets and fully 70 percent of their liabilities plus equity are denominated in foreign currencies.

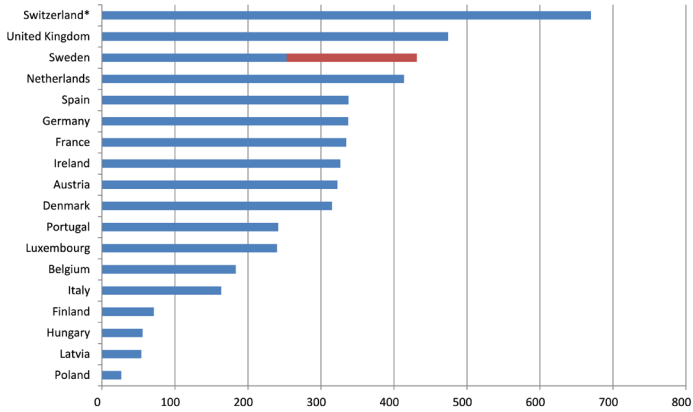
Our overview of the Swedish financial system has emphasized two key characteristics. Swedish financial institutions rely heavily on borrowing and lending across the Swedish border, with many of the transactions and the resulting balance-sheet items denominated in foreign currencies. And the financial institutions depend significantly on wholesale market funding, arranged at shorter maturities, to finance their lending at longer maturities. The combination of these characteristics can be potentially hazardous in periods of global financial stress. Such vulnerabilities did suddenly surface in the fall of 2008 (discussed below). In our view they continue to be a major risk for the stability of the Swedish financial system and the Swedish economy.

The data for MFIs in Table 3 (and also the Financial Accounts data in Tables 1 and 2) pertain only to offices of the financial institutions located in Sweden. As is proper for many types of national statistics (for example, the balance of payments and income and product accounts), the collection of the underlying MFI data emphasizes residency in Sweden. The MFI data, in other words, are not "consolidated" figures for all activities of Swedish-owned banks. The MFI statistics thus do not include either the operations outside Sweden of the branches of Swedish-owned banks or of the Swedish-owned banks' foreign subsidiaries. And the MFI data do include the in-Sweden operations of the branches in Sweden and the Swedish subsidiaries of foreign-owned banks. Obviously, therefore, the apparent size and structure of the Swedish banking system depend critically on whether the data used are Swedish-residency or consolidated.

The Riksbank has several times, for example in its Financial Stability Reports, published a chart that compares countries' ratios of bank assets to nominal GDP. We have reproduced that chart for the larger European countries in Figure 7. As Figure 7 makes clear (see also the

footnote), Sweden's banking system relative to GDP appears significantly larger relative to other countries when the comparison takes into account the consolidated data.

Figure 7. Bank Assets in Relation to GDP, Percent, June 2010



Note: The red area of the bar for Sweden refers to the four major Swedish banks' assets abroad in relation to the Swedish GDP. The banking assets include all of the assets of the national banking groups, that is both foreign and domestic assets. This means, for example, that Nordea's assets abroad form a large part of Sweden's banking assets. UBS and Crédit Suisse contribute to Switzerland's relatively large banking sector in the same way.
*Data for Switzerland refers to 2009.
Sources: The ECB, the Swiss National Bank and the Riksbank.

The contrast between the MFI data and consolidated data is most marked for Nordea. The consolidated data for Nordea show a figure for balance-sheet total assets at end-year 2010 that is more than 4½ times greater than the figure shown in Table 3! The differences, though less dramatic, are nonetheless also important for the other major banking groups. The consolidated end-2010 data for total assets for Handelsbanken, for SEB, and for Swedbank are, respectively 49 percent, 42 percent, and 18 percent larger than the figures in Table 3.*

* The underlying consolidated data can be seen in the Riksbank's 2011:1 *Financial Stability Report*, Chart 3.2 (p. 40). Note that the size of Sweden's financial system relative to nominal GDP appears much larger if consolidated rather than Swedish-residency data are used as a metric. A comparison of Sweden with other countries is shown in the 2011:1 *Financial Stability Report*, Chart 3.1 (p. 39). A snapshot of the

Our generalizations about the potential vulnerabilities of the Swedish financial system can be influenced in their details by whether analysis focuses on the MFI and Financial-Account data based on Swedish residency of financial institutions or alternatively on the consolidated data.* Those details, however, are less important than the main points. The generalizations seem to us valid regardless of which data source is emphasized. We observe, moreover, that our points about the Swedish financial system's vulnerability to shocks originating outside Sweden would have emerged even more dramatically in the data if it had been possible for us to make more use of the consolidated data.

Our discussion so far emphasizes the vulnerabilities associated with Sweden's financial openness. That emphasis should not foster misunderstanding. We also believe that Sweden experiences invaluable benefits from its financial openness.

The savings generated in an economy, the portion of the current-period incomes of households and other economic agents that is not consumed, are like a pervasive fluid. The financial system acts as a reservoir for these funds. Savers place funds into the reservoir. Businesses and others whose current-period spending exceeds their income draw funds out, borrowing to finance their excess spending.

Financial activity, the placement of savings in the reservoir and the withdrawal of savings to finance investment, is fundamentally beneficial. Financial intermediation and financial markets are vital underpinnings without which modern economies could not function and prosper. Without financial activity, the behavior of economic actors would be severely restricted. No actor could invest more in real capital assets than its current saving because there would be no way to finance the excess expenditures. Financial activity permits individuals and enterprises to implement intertemporal patterns of spending that differ from the time profiles of their incomes. Saving and investment decisions can be taken independently. The economy-wide aggregate flows of investment and saving, and hence the growth of economic activity, can be substantially greater and more efficient.

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consolidated data for the four major banks is also shown in Riksbank, *The Swedish Financial Market* 2011, Table 8 (p. 80).

* We did not have access to disaggregated and comprehensive figures for the consolidated data.

Such generalizations would apply even to an economy completely closed to the rest of the world. But they apply with still greater force to actual open economies with extensive cross-border trade and financial activity. When the financial reservoirs of different nations are highly interconnected, the aggregate decisions of the ultimate savers in any single nation and the aggregate decisions of ultimate investors in that nation do not need to be closely linked. Net transfers of saving from one nation to another permit savings and investment decisions to be independent not only for individuals within each nation, but for nations as a whole. Loosening of the links between aggregate saving and aggregate investment for individual nations substantially enhances the potential for each nation's economic well-being and for prosperity for the world as a whole. Just as financial transactions within national reservoirs generate major benefits for individual economic agents, large benefits may result from financial transactions between agents in different national reservoirs.

Yet the benefits come commingled with significant costs and risks. And such costs and risks can become highly adverse if financial openness becomes extreme and "excessive."

Even in a well-functioning financial system like Sweden's, particular investments in real capital turn out to be disappointments. Some financial transactions go sour. Conditions change. Poor decisions and fallible judgments are made. Mishaps—both mistakes and accidents—are inevitable when uncertainty and risk are rife and when asymmetric-information and principal-agent complexities abound. When particular investments or financial transactions go sour inside Sweden, repercussions of the mishaps get transmitted abroad. When shocks originate outside Sweden, they buffet the Swedish financial system and real activity in the Swedish economy. Accidents, and even more so mistakes, can be especially problematic when investments have been financed with direct shifts of savings into or out of the Swedish financial system thereby creating cross-border or cross-currency linkages. Because of the greater risks and uncertainties and the differences between Swedish and foreign institutions, coping with the consequences of mishaps associated with cross-border financial activity can be especially complex and difficult.

Within national financial reservoirs, mistakes and accidents inevi-

tably cause waves or even generate storms. Storms can spread and become virulent because of herding behavior, contagion, and excessive volatility in asset prices. Thus financial activity not only reflects, but can even itself cause, financial turbulence. Financial turbulence can be counterproductive, disrupting basic nonfinancial activities and hence severely damaging economic welfare. Financial systems are inherently fragile, inherently vulnerable to instability.

The fragility intrinsic in domestic financial activity can be powerfully exacerbated by cross-border risks and uncertainties. The cross-border and cross-currency dimensions of financial intermediation often amplify the consequences of distressed financial conditions. In adverse circumstances, many national financial reservoirs can be simultaneously afflicted by volatile cross-border capital flows, disruptive fluctuations in exchange rates, and severe balance-of-payments crises. As we know from the global meltdown in the fall of 2008, episodes of stormy weather can even occasionally lead to a hurricane-level crisis—to which Sweden cannot be at all immune.

The potential for instability in financial activity cannot be attributed primarily to cross-border finance. The causes are deeply rooted in the information asymmetries, the expectational and informational cascades, and the adverse-selection and moral-hazard problems that pervade all aspects of financial behavior, domestic as well as cross-border. Yet the cross-border features unquestionably magnify the potential for instability.

Recent technological innovations, particularly in communications and electronics, have heightened the complexity of financial activity and made it still less likely that financial turbulence can be suppressed altogether. Computers, high-speed electronic communication, and internet software have generated irreversible changes in the ways that financial activity is conducted. It is not possible to turn the clock back on these innovations. An important part of the increased mobility of financial funds, both within Sweden and across its national borders, is due to these technological developments. Major aspects of the rapid, price-sensitive movement of savings and financial funds around the world are thus also essentially irreversible. Policymakers and market participants have no other effective choice but to learn how best to

adapt to this reality.*

Judgments about the preferred degree of openness of a financial system, for Sweden or any country, are complex to make because both the benefits and the hazards of financial activity are so consequential. The average citizen finds the subject especially difficult because policymakers and financial specialists often espouse contradictory, and sometimes extreme, views. One polar position is that the net benefits of liberalized capital flows are overwhelmingly positive. Such advocates of untrammeled markets assert that cross-border finance is so efficient and beneficial that it is a mistake to interpose any government-policy impediments at all. The opposite polar position argues that untrammeled cross-border finance is "out of control," invariably unstable, with the costs far exceeding any benefits. Those with this view support recommendations for sweeping institutionalist reforms, perhaps even the erection of high Great Walls around national financial systems.

Our discussion in this report eschews extreme positions about government policies. A balanced, middle-way perspective is needed—in Sweden, and in all countries. The fragility and hazards should not be exaggerated. The benefits should not be deemphasized. But neither should policy be impervious to the risks and potential damage. A balanced perspective acknowledges that financial openness is essential to Sweden's healthy economic growth. But it also supports a thoughtful management of the benefits and risks and a continuing review of whether incremental adjustments in policies may be required to influence Sweden's external vulnerability.

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* The need for a thoughtful management of the benefits and costs of financial openness is a major theme in Bryant (2003). Several recent papers from the International Monetary Fund also focus on related questions. See, for example, IMF Staff (2010a, 2010b, 2011e); Cihák, Muñoz, and Scuzzarella (2011); Huang and Ratnovski (2010).

Swedish Emergency Financial Policies during the Global Crisis

ATYPICAL STRESSES AND danger signals, originating especially with mortgage-backed securities in the United States, began to trouble world financial markets as early as August 2007. Tensions increased episodically, notably after the failure of Bear Stearns in March 2008 and the pressing into government conservatorship in August 2008 of the U.S. government-sponsored housing-finance institutions Fannie Mae and Freddie Mac. Swedish financial institutions were relatively little troubled until the dramatic failure of Lehman Brothers on September 15, 2008. After the announcement of Lehman's bankruptcy, however, "all hell broke loose."*

Most of the advanced world's financial systems were pushed into severe turbulence. Distress moved rapidly from the United States to markets around the globe. Notwithstanding the fact that the first-round shocks and tremors all originated outside Sweden, Swedish markets and institutions were caught up in the hurricane. "Hurricane" does not exaggerate the stormy conditions in the fall of 2008. Like financial institutions everywhere, Swedish banks became wary of lending, to customers and even to one another. They increased their demand for assets with safer returns, high liquidity, and unquestioned value as

* Paulson (2010), p. 228. In testifying before the Riksdag in mid-November 2008, the Riksbank Governor Stefan Ingves remarked that "The global financial system has since [mid-September] been shaken to its foundations and even countries like Sweden —far from the centre of the crisis—are tangibly affected."

collateral. Their heavy involvement in foreign currency borrowing and lending made them especially vulnerable to turmoil in international financial markets.

Spreads and the Financial Turmoil

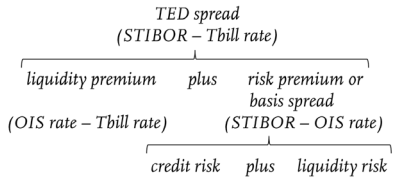
The difference between interest rates on various assets—"spreads"—are typical gauges of financial-market stress. In non-crisis conditions, spreads typically change little and are modest in size. To illustrate the turbulence in the 2008 crisis, we briefly identify here the unprecedented changes in several spreads. Spreads between the official policy short rate and the rates on private debt can be decomposed into two basic categories: (i) spreads between the official rate (the Riksbank "repo rate" in Sweden) and the rates on government debt of various maturities; and (ii) spreads between the rates on government debt and private debt of comparable maturities.

The relationships among interest rates on government debt of different maturities are summarized in the term structure of interest rates for government debt. Longer-term government rates are usually above the official policy rate because of a "market risk premium" and a maturity-related "liquidity premium."* Spreads of longer-term government debt over central banks' official short rates during the 2008 crisis rose substantially in Sweden and elsewhere, due to large increases in the combined risk premiums.

The spreads of private debt instruments over government debt rose still more dramatically. This drastic widening happened at all maturities. A common measure for the private/government spread for Sweden at a short maturity, referred to as the TED spread, is the difference between the Stockholm Interbank Offer Rate (STIBOR) and the

* The official policy short rate is presumed virtually risk free. Longer-term rates on government debt typically have a positive spread over the official rate for at least two reasons. First, there is a "market risk premium." Although yields for longer-term government obligations if held to eventual maturity are certain, yields for those securities for holding periods shorter than the time to maturity are not; the uncertainty arises because of the possible capital gains or losses resulting from changes in market conditions. Second, a maturity-related "liquidity premium" (also referred to as a "term premium") exists because markets for longer-term debt are thinner, with the consequence that sales on short notice may not yield "full value."

Swedish Treasury bill (Tbill) rate. The TED spread can be broken down into two components:



The first is an issuer-related "liquidity premium." For Sweden this premium is commonly represented by the difference between the Overnight Index Swap (OIS) rate and the Treasury bill rate. In non-crisis conditions the OIS/Tbill spread is very small because both financial claims are regarded as essentially riskless. The main difference between them is that the OIS rate applies to a private contractual obligation, for example the obligation of a bank, whereas the Treasury bill rate applies to government debt.* The second component of the TED spread, also relatively small in non-crisis conditions, is a "risk premium" or "basis spread." This risk premium has two components "credit risk" (also referred to as "counterparty risk" or "default risk") and "liquidity risk." The credit risk is due to the possibility that an interbank borrower may not repay its borrowings in full. The liquidity risk is associated with the lending bank tying up its funds in a loan, causing the funds to be un-usable in other ways until the loan is repaid.** In Sweden the risk-premium component of the TED spread is commonly represented by the difference between STIBOR and the

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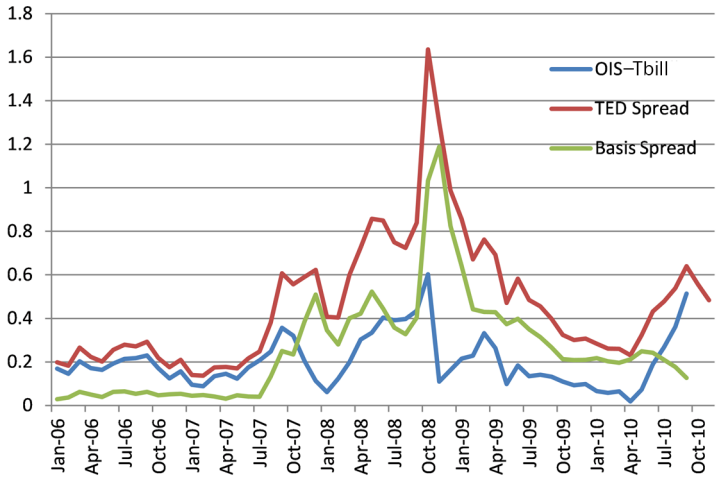
* A three-month overnight index swap is an agreement to swap interest payments. One party agrees to pay another the interest earnings obtained by investing a given amount at a fixed three-month rate in return for the interest earnings from investing the same amount plus any accrued interest at the overnight rate every night for the same three months. The OIS rate is the fixed rate associated with swap. An overnight index swap is regarded, in normal times, as virtually riskless because only interest payments (which are small relative to principal) are at risk.

** The Riksbank's *Financial Stability Report* 2009:1 speaks of the risk premium in the STIBOR/OIS spread as attributable to counterparty risk, composed of a credit-risk element and a "replacement risk" (what we term liquidity risk).

OIS rate. During the 2008 crisis, the demand for Swedish Treasury bills jumped sharply because they were deemed safer and more liquid. The interbank market, especially internationally and even in Sweden, seized up; for some banks viewed as potentially weaker, the market froze altogether. Figure 8 plots some of these money-market spread data.

Short-term interbank markets were affected most at the outset, but spreads ballooned at medium and longer maturities as well. The spread between corporate-bond rates and government-bond rates widened significantly, with the upward changes largest for the bonds of institutions or companies viewed as most susceptible to adverse effects from the crisis and their likely effects for real economies. For example, the "bond spread" in Sweden of covered mortgage bonds over Swedish government bonds of comparable maturity rose well above pre-crisis levels.

Figure 8. Money Market Spreads, Percentage Points, 2006–2010

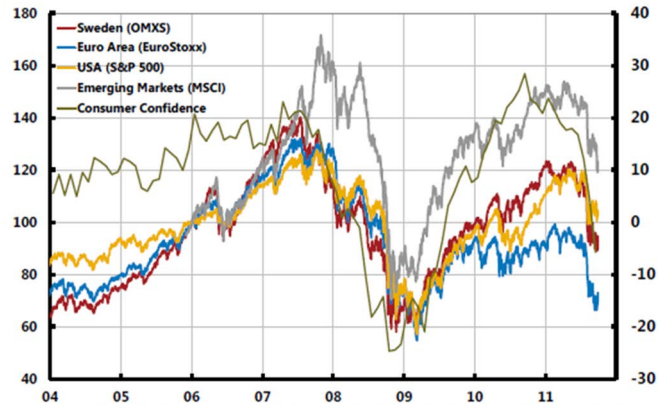


Source: OECD.

Equity markets around the world, not least in Sweden, tumbled precipitously in the fall of 2008 and early 2009. Measures of stock-market volatility soared to elevated levels not witnessed for decades, perhaps ever. The losses in wealth of many equity owners were huge, further

dampening general confidence and expectations about the future evolution of economic activity. Figure 9 reproduces a chart from an October 2011 speech of Riksbank Deputy Governor Karolina Ekholm that highlights the enormous swings in the stock market indexes of Sweden, the Euro area, and the United States. Swedish consumer sentiment was comparably volatile.*

Figure 9. Stock-Market Indexes (January 2006=100) and Swedish Consumer Confidence, 2004–2011



Note: The left axis is the stock market index and the right axis the value of the households' confidence indicator.
Sources: Ekholm (2011), Reuters EcoWin and the National Institute of Economic Research.

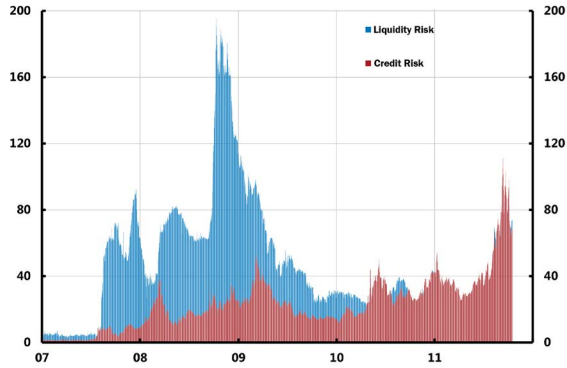
Policymakers would like to know how much the widening of spreads during a financial crisis is attributable to upward adjustments in appraisals of credit risk and how much to other factors such as liquidity risk. Reliable estimates of such a breakdown typically cannot be made in the midst of a crisis. But some analysts, looking in the rear-view mirror, have made estimates for Sweden and other countries.** According to those estimates, in the early stages of the crisis the steep widening in spreads was largely due to factors other than premiums for credit risk,

* Ekholm (2011).

** For example, Harbo Hansen and Welz (2011).

most probably liquidity risk. Over time, however, credit risk became more important; by the spring of 2009, it may have accounted for most of the risk premium (see Figure 10, reproduced from the October 2011 Riksbank Monetary Policy Report).

Figure 10. Estimated Breakdown of Risk Premium Between Liquidity Premium and Credit Premium, Basis Points, 2007–2011



Note: The figure shows an estimated decomposition of the risk premium on the money market into a credit premium and a liquidity premium. The credit premium is estimated on the basis of the CDS premium, among others. The liquidity premium is then residually calculated as the difference between the total risk premium and the estimated credit premium.
Sources: The Riksbank *Monetary Policy Report*, October 2011, and Reuters EcoWin.

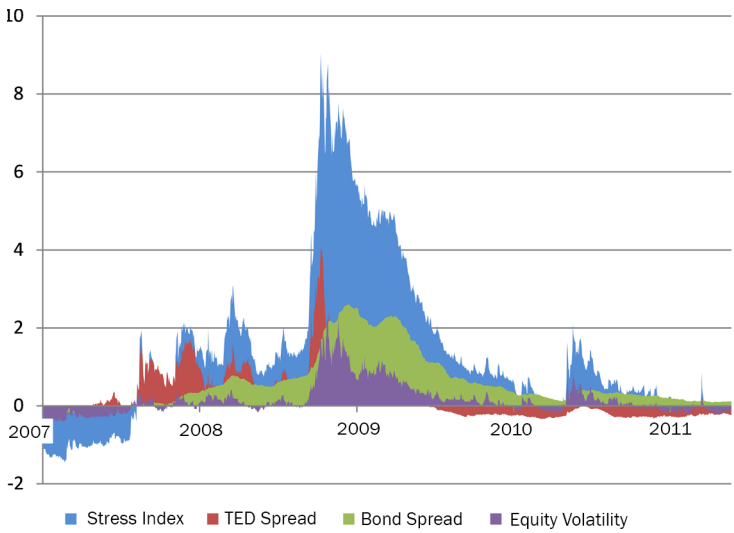
That credit risk became increasingly important can be confirmed directly by observing what happened to the premiums of Credit Default Swaps (CDSs) for the debt of Swedish banks. These premiums indicate what percentage of principal that lenders to Swedish banks had to pay to insure themselves against the default of the major four Swedish banks. The credit default premiums increased to high levels and fluctuated around that high level until the spring of 2009.*

In its own descriptions of the increased turbulence in global and Swedish financial markets, the Riksbank developed two composite indexes of financial-market stress. One index was an international measure; the other pertained to Sweden alone. These indexes were

* See for example Riksbank, *Monetary Policy Report*, October 2011, p. 47.

intended only as rough summary measures. Questionably for some analytical purposes, the indexes give equal weight to their components. For our purposes here, however, they provide an overall indication of the severity of the unprecedented strains.* The indexes rocketed up after the failure of Lehman, persisted at high levels into the early months of 2009, and gradually subsided as 2009 went on. The two indexes are shown in Figures 11 and 12.

Figure 11. International Stress Index, 2007–2011



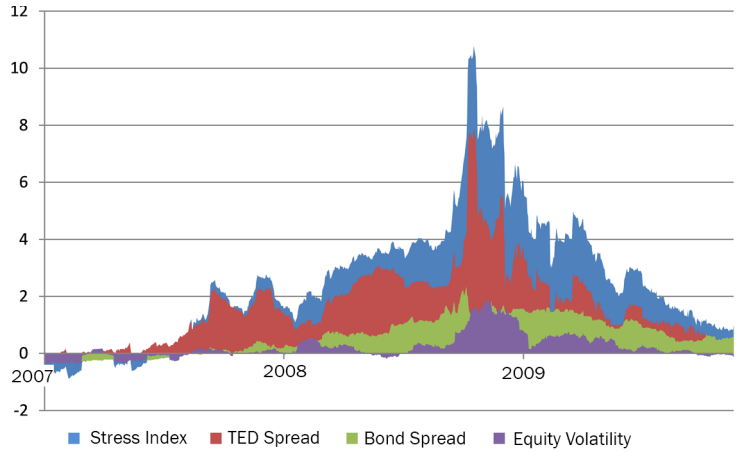
Source: The Riksbank.

In the first days of the crisis in September and October 2008, the strains were immediately apparent in several parts of the Swedish financial system. Potentially very adverse consequences could be readily imagined—by the banks, other private financial intermediaries, and the large nonfinancial corporations. Swedish policymakers shared the view that the situation was dangerous and that, looking ahead, much

* See Riksbank, *Financial Stability Report* 2009:2, Box on "Financial Stress Index," pp. 32–33 for a discussion of the construction of the indexes.

worse might well be coming.*

Figure 12. Swedish Stress Index, 2007–2009



Source: The Riksbank.

Collective Action in a Financial Crisis: Background Observations

As background for discussing the array of crisis-response actions taken by the Swedish authorities, we emphasize that a fundamental aspect of governance in a modern financial system is the possibility that government authorities, acting in the interest of society as a whole, may need to provide liquidity and other collective support in a financial crisis. This collective-support function is commonly termed "lender of last resort."** Narrowly defined, the lender-of-last-resort function

* To maintain perspective about the initial days of the crisis when Sweden was being very strongly buffeted, one should remember that, even then, things in Sweden appeared less bad than in the United States and much of the rest of Europe. In retrospective reviews, moreover, analysts tend to find that spreads and market volatility in Sweden increased less than in the euro area, United Kingdom, and United States. See, for example, Harbo Hansen and Welz (2011), p. 6.

** These responsibilities are typically, but not invariably, assigned to the central bank. In Sweden the responsibilities are shared in complex arrangements between the Riksbank, the Swedish National Debt Office, Finansinspektionen, and the Ministry of

can be construed as providing emergency liquidity assistance to individual financial institutions under narrowly constrained guidelines. Broadly construed, it may also include several other types of support activities such as the extension of liquidity assistance to entire groups of institutions, provision of guarantee facilities, and the recapitalization or orderly "resolution" of institutions that have become insolvent. Whether narrowly or broadly construed, the function certainly comprises catalyzing cooperative actions to manage a crisis.

The Swedish collective-support actions taken during the recent crisis are sometimes labeled "unconventional." Because crises are abnormal and because such actions had not been used for many years or had been used on a much smaller scale, the unconventional label may seem natural and appropriate. Since lender-of-last-resort functions are long-accepted components of the responsibilities that central banks and governments are expected to fulfill, however, there is also a sense in which the actions can be construed as "conventional" rather than unconventional. Our report tends to avoid the use of the "unconventional" and "conventional" labels. Our main distinction is between policies taken during crisis situations versus policies followed in more normal—pre-crisis or post-crisis—conditions. The reason for our terminological preference is the fact that particular financial-policy instruments may have uses (albeit different in detail) for crisis management and for crisis prevention.

Advice on how to fulfill the lender-of-last-resort function goes back more than a century and a half to Walter Bagehot's recommendations in *Lombard Street*.* A widely accepted interpretation of Bagehot's advice is that the lender of last resort should extend its emergency loans freely, but only to solvent institutions, against sound collateral, at penalty rates. Although Bagehot's principles may at first seem straightforward, major difficulties emerge when they are examined closely. As of the early 21st century there is general agreement that what are

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Finance (further discussed below).

* Bagehot (1873). The general ideas even date to Thornton (1802). Many subsequent reiterations and refinements deal with controversial points; see, for example, Kindleberger (1978), Fischer (1999), Bryant (2003), and Madigan (2009).

"solvent" institutions, "good collateral," and "penalty rates" should be determined by comparisons with normal (non-crisis) times, not with conditions in the crisis itself.* To help prevent crises, the lender-of-last-resort authorities should commit in advance that they will take collective support measures if a crisis does occur.

Collective-support action in financial crises—if taken, even if merely anticipated during non-crisis conditions—creates a moral hazard dilemma. If private financial institutions can confidently count on a lender of last resort to extend emergency assistance on a stormy day, on sunny days they may be encouraged to take on too much risk and to underestimate the systemic problems that their lending decisions may create. Bagehot's guidelines were motivated in part by the objective of minimizing the inescapable moral-hazard complications associated with the provision of collective support in a financial crisis. **

Overview of Crisis Actions

In what follows, we consider the broad range of collective-support activities taken by Swedish authorities during the 2008–2010 crisis

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* Bagehot used the term "common times" rather than normal or non-crisis times. Bagehot does not mention "penalty" rates but rather recommends "high" or "very high" rates. Whether lending rates should include any penalty, no penalty, or even a subsidy, is still controversial. Whatever the penalty may be, however, it is agreed that the penalty should be set relative to interest-rate conditions prior to the onset of severe crisis strains.

** The provision of any insurance typically gives rise to some degree of moral hazard. The insured, because of the insurance, has a diminished incentive to avoid the insured-against event. Bagehot's principle that lender-of-last-resort assistance should be given only to solvent institutions is an extension of a widely accepted tenet of capitalism. Few citizens wish to keep badly managed, unprofitable non-financial businesses alive through government support (the interested owners themselves being obvious exceptions). Similarly, a financial institution should typically be allowed to fail if it has been poorly managed and taken foolish risks. An admiral in the British Navy, John Byng, was executed in 1756 for his failure to relieve British forces on Minorca. Voltaire, commenting on the incident, suggested that it was a good thing to dispatch an admiral from time to time "pour encourager les autres." It seems unnecessarily harsh to argue that financial intermediaries should fail from time to time just to encourage the others. But it would surely also be a mistake, even in conditions of financial distress, to use general taxpayer funds to keep a financial intermediary alive that has consistently been badly managed.

period. These measures include emergency lending, emergency market support, modification in government guarantees, facilitating the orderly recapitalization or resolution of institutions coping with possible insolvency, and in general the catalyzing of cooperative behavior to manage the crisis.* Finally we discuss the crisis-period Riksbank decisions for the setting of the official policy interest rate, the instrument of traditional monetary policy.

Four Swedish governmental agencies were directly involved in managing the crisis. They were the Riksbank, the Swedish National Debt Office (SNDO), Finansinspektionen (FI), and the Ministry of Finance. The Riksbank is an independent public authority with its own legislative mandate, accountable to the Riksdag, the Swedish parliament. The SNDO and FI are public authorities that receive guidance from and report to the Ministry of Finance; they are not part of the government in the sense that they are not directly a part of the Ministry of Finance. Communication among the four entities occurs both through bilateral contacts and jointly through a consultation group chaired by a state secretary of the Ministry of Finance.** The formal members of the consultation group are the State Secretary at the Ministry of Finance with responsibility for financial market matters, a member of the Executive Board of the Riksbank, the Director General of Finansinspektionen, and the Director General of the National Debt Office. A majority of the crisis-management measures in 2008–2010 were implemented

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* This grouping of crisis functions has some similarities to the discussion in Tucker (2009). Buiter and Sibert (2007) termed emergency market support the "market maker of last resort" function. Tucker uses "capital of last resort" instead of "recapitalization or resolution of institutions coping with possible insolvency."

** The consultation group is described in a May 2009 document titled "Memorandum of Understanding (MOU) between the Government Offices (Ministry of Finance), Sveriges Riksbank, Finansinspektionen and the Swedish National Debt Office Regarding Cooperation in the Fields of Financial Stability and Crisis Management." This group is referred to in various IMF documents as the Domestic Standing Group (DSG). In contrast to the May 2009 MOU, a June 2005 MOU did not include the Swedish National Debt Office. In 2008 the SNDO was given extensive new powers as a supporting authority under the new Government Support to Credit Institutions Act. Prior to the crisis the SNDO also had taken over management of Sweden's deposit insurance system, thus giving it an "important role in the fields of financial stability and crisis management."

by the Riksbank and the SNDO. But all four entities were represented at meetings where possible measures were discussed.

The early effects on Sweden of the world crisis following the announcement of Lehman's failure stemmed from the disruptions in the interbank markets. The Swedish banks, accustomed to rolling over their short-term wholesale funding easily, suffered major borrowing and liquidity problems, both in their U.S.-dollar and other foreign-currency funding and in their funding in Swedish kronor. Lenders previously willing to lend to Swedish banks abruptly stopped their willingness to roll over their lending and themselves scrambled to enhance their own liquidity. Given these problems, the Swedish authorities judged that the immediate need was to ameliorate the banks' funding problems.

In the very first days, the SNDO initiated a program for extra auctions of Treasury bills and for repo transactions that supported the market for mortgage covered bonds (in effect, swaps of Treasury bills for the covered mortgage bonds). The Riksbank in consultation with other central banks established a U.S. dollar swap network with the Federal Reserve and instituted a program of lending U.S. dollars to the banks. By October 2, the Riksbank had announced a special facility for lending kronor to the banks. The Riksbank lending programs in U.S. dollars and kronor were extended further in subsequent weeks. Issuance of Riksbank Certificates was begun, providing Swedish banks with an additional instrument for managing their liquidity and facilitating Riksbank management of the short-term financial markets. Finansinspektionen announced alterations in regulations supporting insurance companies' investments in mortgage bonds. The Government increased deposit-insurance guarantees in early October and by October 20 had announced a plan for guaranteeing certain borrowings by the banks. Implementing its mandate for conduct of traditional monetary policy, the Riksbank cut its official repo rate on October 8 by 50 basis points to 4.25 percent, more than reversing its increase in the repo rate on September 3 by 25 basis points.

The Swedish authorities responded with alacrity after the eruption of the crisis. With the perspective of hindsight, one can raise numerous questions. Did the authorities move too slowly? Were their actions too timid, omitting additional measures that might have had con-

structive effects? Alternatively, did the Swedish authorities overstep their mandates, intervening too aggressively in trying to ameliorate the crisis? Was communication and coordination adequate among the authorities? Could more contingency preparations have been made for managing crisis conditions? What lessons can be learned for managing possible future crises?

Hindsight always seems clearer than perceptions of the moment. Crisis actions have to be decided in the heat of the moment with very uncertain foresight. In what follows we use hindsight to discuss the range of actions taken by the Swedish authorities in the crisis. But we offer these observations knowing that hindsight can provide a misleading or unfair impression of the difficulties of crisis decisionmaking. All things considered, we have the view that the Swedish crisis actions were commendably prompt, typically appropriate, and augur well for the management of potential future crises.

Emergency Liquidity Support in U.S. Dollars

Financial institutions caught in a financial crisis want to borrow from a lender of last resort because their usual sources of funding may no longer be available and because they themselves are scrambling for liquidity and trying to reduce their exposures to credit risk. The cross-border dimensions of the funding and liquidity problems can be especially problematic. As discussed earlier, Swedish banks relied heavily on borrowing in the short-term dollar markets. As the crisis erupted, the banks' dollar funding came under strong pressure.*

A large proportion of the banks' short-term dollar borrowings, roughly half, were used to fund longer-maturity *kronor* assets.** The

* Blomberg (2009) summarizes the initial squeeze on banks' funding in the early periods of the crisis. Goodhart and Rochet in their report to the Riksdag (2011, p. 20) assert that "in the panic that ensued after September 15, 2008, markets become so dysfunctional that the ability for banks to swap (or sell) kronor for dollars became abridged, while the cost of doing so rose sharply as the kronor depreciated against the US dollars; there was a panic demand for US dollars. A failure by a main Swedish bank to meet its due repayment in dollars could have been disastrous, and was not all that far from occurring."

** Nyberg (2011b)

banks entered into swap contracts that involved purchasing kronor with dollars spot and purchasing dollars with kronor forward. The spot purchase of kronor enabled them to fund their kronor lending; the forward purchase of dollars insured that they would have the dollars necessary to repay their loans at maturity. These activities resulted in a maturity mismatch in kronor, with long-term kronor assets being financed, in effect, by "manufactured" short-term kronor liabilities. When in the crisis short-term *dollar* lenders stopped rolling over their loans, the Swedish banks as a group were short of *kronor* funding. Of course, a cut off of a normal source of funding is disruptive, even if that funding is effectively in the home currency. It is relatively straightforward in principle for a country's lender of last resort to provide emergency lending in its domestic currency. Significant practical difficulties may arise, however, especially if the amounts are large and arrangements must be made quickly.

The banks' remaining short-term dollar borrowings were used to fund longer-term dollar assets generating a maturity mismatch in dollars. Swedish banks also had a sizeable business in euro-denominated borrowing and lending, which had its own maturity mismatch. It is *not* relatively straightforward for the lender of last resort in a country to provide emergency assistance in foreign currencies.

The Riksbank had foreign-exchange reserves, and the SNDO had the authority to borrow in foreign currencies. But the official access to large amounts of foreign-currency liquidity might not have been, or been seen to have been, sufficient to meet the banks' crisis demand for foreign-currency liquidity. Fortunately, because of experience with earlier periods of financial strain around the world, the practice of swapping currencies between central banks was well understood. The Riksbank made arrangements with the Federal Reserve and European Central Bank to obtain dollars and euros in exchange for kronor and was then in a position to make emergency dollar loans to the banks.

The Riksbank's swaps were part of a broader internationally coordinated initiative among major central banks, headed by the Federal Reserve. Federal Reserve swap lines with the ECB, the Bank of England, the Swiss National Bank, and several others were expanded as

early as September 15.* More central banks were included by September 24 (the day of the announcement of the line with the Riksbank) and on October 29. By October 7, and again on October 13, coordinated actions for scheduling term and forward auctions to provide dollar liquidity had been announced. On October 8 many of the central banks, including the Riksbank, announced a coordinated reduction in policy interest rates.

The prompt cooperation among central banks in arranging dollar and other foreign-currency liquidity was instrumental in bolstering confidence in global markets. Analysts are nearly unanimous in commending the central banks for their coordinated response. We certainly share that general judgment and in particular believe that the response of the Swedish authorities was timely and appropriate.**

The Riksbank's emergency dollar lending was subsequently complemented by SNDO crisis arrangements, made public on October 20 and instituted on October 31, to guarantee certain of the banks' borrowings in exchange for a fee. The guaranteed borrowings could be denominated either in foreign currency or in kronor. In practice, a large fraction of the guaranteed loans was in foreign currencies. This guarantee program became large in magnitude and may have been as important as the Riksbank's lending in mitigating lack of confidence in the financial system. The guarantee program was particularly significant in supporting one of the four major banks. We discuss the SNDO's guarantee program further below.

The Riksbank's dollar lending was implemented through auctions, the first of which was announced on September 29. The October 1, 15, and 22 auctions were oversubscribed, suggesting the strength of the

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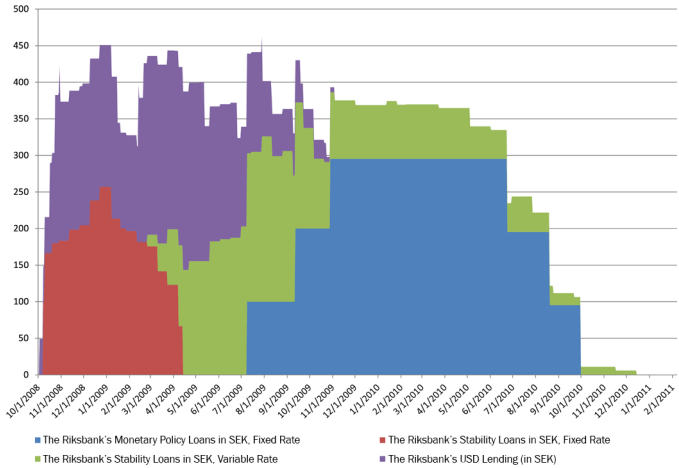
* A Federal Reserve network of reciprocal currency arrangements ("swap network") was in existence as long ago as the 1970s. It was newly established in December 2007, and expanded in March and May 2008 prior to its substantial expansion in September–October 2008.

** For discussion of the importance of the swap network among central banks and its beneficial effects during the crisis, see for example Bernanke (2010) and Nyberg (2011b). Other commentary and analysis may be found in Allen and Moessner (2010), especially introduction and section 7; Allen et al. (2011); BIS Committee on the Global Financial System (2010a, 2010b).

latent demand. Borrowing banks put up collateral. The dollar lending reached its highest point in May 2009 (SEK 210 billion, USD 30 billion). Strains in global dollar markets had eased sufficiently by November 2009 such that the Riksbank felt able to discontinue its emergency dollar lending.*

Figure 13. Riksbank Crisis Period Lending in US Dollars and in Kronor, Fixed-Rate, Variable-Rate, Monetary-Policy Loans, SEK Billion, 2008–2011



Sources: The Riksbank and the Swedish National Debt Office.

Although easing the strains experienced by Swedish banks in their dollar funding proceeded successfully in the fall of 2008 and early in 2009, it would be imprudent to assume that similar strains in the future could always be handled so readily. Riksbank officials obviously, and appropriately, share this concern. A clear statement of the issues appears in a speech by Deputy Governor Nyberg in May 2011. He asks:

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* The initial auctions were scheduled for October 1 and 22, and subsequently another for October 15. Further auctions were held in November. In December the Riksbank announced that it would continue to offer loans in US dollars to its primary monetary policy counterparties after the turn of the year to replace maturing loans. The Riksbank's swap line with the Federal Reserve was increased in February 2009 and, together with other central banks, renewed in June 2009. The Federal Reserve swap line expired on January 27, 2010.

> ... why [doesn't] the Riksbank, quite simply, reach an agreement with the Federal Reserve so that they can always supply us with dollars should we need them. It worked perfectly during the crisis, so why not trust in a solution like this? This would also remove the problem of the shortage of dollars. Now, no doubt the Federal Reserve is happy to help solve problems that it is clearly in its own interest to solve. And doubtless this was the situation during the crisis, when the shortage of dollars in Europe threatened to rebound on the US market. But, should only one or a few Swedish banks be facing problems, the situation would be different. How would the Federal Reserve explain to the US public that, from the kindness of its heart, it was helping a little country in Europe whose banks have no noticeable influence whatsoever on the US financial system? I don't think we should have any illusions about this matter, regardless of how strong our current cooperation is with the Federal Reserve. When there is a crisis, we must be prepared to deal with matters ourselves. This is my absolute conviction after almost thirteen years at the Riksbank.*

Notably, in May 2009 after the strains in financial markets had somewhat dissipated, the SNDO borrowed the equivalent of SEK 100 billion to augment the foreign-currency reserves of the Riksbank.

The situation in Iceland in October 2008 reveals clearly that the central bank of a small open economy cannot be invariably confident in having access to dollars through a Federal Reserve swap. An unusually frank press release from the central bank in Iceland discusses its, often unsuccessful, efforts to arrange swap lines with other central banks during its crisis. In May 2008 the Iceland central bank was able to arrange swap facilities with the Riksbank and the central banks of Norway and Denmark. But the Federal Reserve unambiguously refused its October requests.**

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* Nyberg (2011b).

** Board of Governors of the Central Bank of Iceland (2008). Allen and Moessner (2010) call attention to this press release.

Emergency Liquidity Support in Kronor

The provision of emergency liquidity support can entail direct lending of two types. The lender-of-last-resort institution may lend, on terms equivalently available to an entire group of borrowers, to meet a general increase in the demand for liquidity. Auctions open to financial institutions in a similar situation at the same time are an example of this direct lending, in effect lending to the market. Almost all of the emergency lending in Sweden during the 2008–2009 crisis was of this type. In a second type of direct lending, the lender of last resort makes a loan to an individual institution with a demand for liquidity that other institutions are unwilling to satisfy on anything like normal terms. Direct lending to an individual illiquid institution (that may well be suspected more than other financial institutions to be at risk of insolvency) is the most constrained and most problematic form of emergency liquidity support.*

In Sweden's case in 2008, the very first initiative for emergency liquidity support was executed not by the Riksbank but by the SNDO ("in consultation with the Riksbank"). It took the form not of direct lending but of a close substitute, making available to the market an additional supply of Swedish government treasury bills. The initial SNDO announcement was made on September 18.

To appreciate the actions, one needs to realize that before the crisis there was a tendency to equate supplying liquidity with increasing bank reserves, either by buying securities outright or by lending with securities as collateral. What became abundantly clear during the crisis, however, is that supplying liquidity can also involve increasing the supply of very liquid securities by "exchanging" them for less liquid securities. Treasury bills are regarded as totally safe, highly liquid, and unquestioned collateral. Given those properties, soon after Lehman

* IMF Staff (2011b) cites Swedish legislation from 1998 and 2003 that applies the term Emergency Liquidity Assistance (ELA) exclusively and narrowly to loans to individual institutions that are illiquid but solvent. The IMF quotes a statement in the Riksbank's *Financial Stability Report* 2003:2 asserting that the Riksbank "will support an illiquid but solvent financial institution, while the government is expected to deal with an insolvent one"; but the statement also indicates that "the Riksbank recognizes that the assessment of systemic risk and financial condition under a time pressure will be based on imperfect information." The traditional Bagehot distinction between illiquidity and insolvency is venerable, but difficult to apply precisely in a crisis.

Brothers declared bankruptcy the demand for Swedish Treasury bills increased sharply. Assets that had been regarded as safe before the crisis suddenly became suspect and were accepted as collateral on significantly worse terms, if at all. Beginning on September 19 and 23 and continuing in subsequent weeks, the SNDO held periodic "extra" auctions of Treasury bills. It lent the proceeds from these auctions to financial intermediaries in repo transactions, accepting covered mortgage bonds as collateral. The combined operations had essentially the same effect as if the SNDO had sold Treasury bills and bought the mortgage bonds. The banks were able to "mobilize" illiquid mortgage securities and obtain liquid Treasury bills. The action helped stabilize the mortgage bond market because banks had less reason to sell these bonds on the market.

The Riksbank could not have itself taken the same actions. Earlier, prior to the crisis and for reasons unrelated to its responsibilities as the primary lender of last resort, the Riksbank had eliminated Swedish Treasury bills from its own balance sheet; it therefore had none to supply to the market. Under the extreme circumstances of the time, the extra Treasury bill auctions helped significantly to provide the emergency liquidity being demanded. Later in the crisis, in fact only a few days later, the Riksbank did develop a close substitute for Treasury bills. It sold "certificates" with interest rates and maturities essentially the same as those of Treasury bills; and these certificates, claims on the Riksbank, were as safe and as liquid as Treasury bills. The Riksbank stood ready to discount (buy back) the certificates with essentially no loss in value. It is interesting to speculate whether, in a future crisis, the Riksbank might use its certificates to provide liquidity in a similar way that the SNDO provided liquidity using Treasury bills in the current crisis.*

The Riksbank's emergency direct lending to the banks in kronor

* The Riksbank began issuing certificates with a 7-day maturity on October 14; the auction was not fully subscribed. Further auctions were announced and implemented in subsequent weeks. In later auctions the Riksbank began offering certificates with longer maturities. According to a "Questions and answers" published on the Riksbank website on October 13, 2008, "A Riksbank Certificate is in principle the same thing as a treasury bill, but has a shorter maturity."

had similarities to its direct dollar lending. The loans were offered at auctions, initially at a fixed interest rate with a term of three months against collateral. The interest rate on the loans was the repo rate plus a surcharge (for example 25 or 40 basis points). The existence of the facility was announced on October 2nd with the first auction held on October 6; subsequent auctions were held as soon as October 8 and 22. On October 24, the Riksbank announced that it would schedule regular auctions for its kronor lending at approximately two-week intervals. Maturities of the loans were extended, eventually to as much as 12 months. The announced sums were to be set taking into account prevailing market conditions and the outcome of previous auctions.

The Riksbank lending made it possible for the banks better to manage the maturity structure of their balance sheets. The Riksbank lending was long-term enough to enable the banks to lengthen the average maturity of their funding. By accepting deposits and selling certificates, the Riksbank also enabled the banks to shorten the maturity of their assets or, at a minimum, to acquire more liquid assets. So long as the uncertainty remained severe in the interbank market, claims on the Riksbank were more attractive to the banks than lending to other banks or to customers outside the financial system. It was an indication of the crisis-elevated demand for liquidity that the banks were willing to borrow from the Riksbank at rates above the repo rate and hold the proceeds in assets on which the return was the repo rate or below.

Beginning in February 2009, the Riksbank lengthened the maturity of its kronor lending to the banks and contracted the loans at a variable interest rate. By early 2009, the repo rate had been cut substantially and the banks presumed that the repo rate would be cut still further later in 2009. The banks were accordingly reluctant to enter contracts at a fixed rate when they thought rates might fall over the course of the loans. To take account of these expectations, the Riksbank in February 2009 began to offer variable-rate rather than fixed-rate contracts.*

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* The Riksbank press release of February 13, 2009 said in part: [past loans at a fixed rate] "have contributed to safeguarding the banks short-term funding and to lowering rates in the interbank market. Recently interest in these loans has declined. This could be a positive sign and reflect that conditions in the financial markets are more stable now than they were in the autumn. At the same time, the situation in the finan-

After the repo rate had fallen close to the zero lower bound in the summer of 2009, direct lending was again made at a fixed interest rate.

Beginning in the summer of 2009, the Riksbank held three large auctions for fixed-rate kronor loans. According to many of our interviewees and to a number of Riksbank publications, these loans should not any longer be characterized as emergency liquidity support. Rather they were made for monetary-policy purposes (labeled on the Riksbank website as "fixed rate loans for monetary policy purposes against collateral with a maturity of twelve months"). This lending reached a peak of almost SEK 300 billion in the fourth quarter of 2009 and then gradually fell to zero by September 2010. We comment further on this last stage of Riksbank kronor lending in a later part of our report.

Deposit-Insurance Modifications and Guarantees of Borrowing

The guarantee-provision (guarantor) function of the lender of last resort may be, as already noted, a critical component of crisis management. That function was strongly used in the Swedish financial crisis when the SNDO extended Swedish deposit insurance and established its new program for borrowing guarantees. Our conjecture is that these actions, especially the latter, were important additional factors in preventing a further adverse evolution of confidence in the Swedish financial system.

The SNDO has responsibility for managing the Swedish system of deposit insurance (in both normal and crisis times). During the banking crisis of the early 1990s, Sweden did not have a deposit insurance scheme. Deposit insurance was introduced in 1996. The SNDO got control in 2008. Prior to the crisis, the limit for deposit insurance on current accounts was set at SEK 250,000.*

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cial markets is far from normal. The commercial paper market has not recovered and the effects of the decline in market borrowing risk [are] having a negative effect on companies outside of the financial sector. Pricing may have contributed to the weaker interest in participating in the Riksbank's auctions."

* IMF Staff (2011b), Appendix I, provides a detailed description of the Swedish deposit insurance scheme and a comparison with the Core Principles for Effective Deposit Insurance Systems issued in June 2009 by the Basel Committee on Bank Supervision

On October 6, early in the crisis, the SNDO proposed doubling this limit to SEK 500,000. It also proposed to extend the guarantee to cover all types of deposits in accounts regardless of whether the funds could be withdrawn freely. These proposals were incorporated in a bill that the Government presented to the Riksdag. On October 29 the Riksdag approved the Government's proposal with the new limit retroactively applicable to October 6.

No clear method exists for judging whether the extension of the deposit-insurance scheme had minor or major effects in enhancing depositor confidence. Despite the pressure on the balance sheets of financial institutions, actual or even incipient deposit runs seem to have been absent. Only a few small financial institutions failed (below), and deposit-insurance funds were not required to be used during 2008–2009 as part of their resolution.

The International Monetary Fund Financial Sector Assessment Program (FSAP) for Sweden, prepared in 2011, recommends some reforms for Swedish deposit insurance. The Government proposed reforms to the Riksdag in April 2011, and the Riksdag adopted them on July 1, 2011.*

The SNDO new crisis facility for borrowing guarantees was part of a larger Government program announced on October 20, 2008. The larger program was described as a "plan to safeguard the stability of the financial system." When enacted by the Riksdag at the end of October, the new legislation was called the Government Support to Credit Institutions Act and effectively gave the Government, through new powers allocated to the SNDO, virtually unlimited authority to finance measures deemed necessary for ensuring financial-system stability. The main focus of the Act was to provide a framework through which the authorities could deal with weak or insolvent systemically important

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and the International Association of Deposit Insurers (IADI).

* The reforms are intended to ensure Sweden's compliance with the revised EU Deposit Insurance Directive and entail shortening the payout deadline for the insurance, stricter information requirements for institutions collecting insured deposits, and a new trigger for payout dependent on decisions by FI. The reforms also improve information exchange between the FI and SNDO on matters related to deposit insurance.

institutions, together with other measures aimed at promoting confidence and stability of the financial sector. The Act identified explicitly the tools of guarantees, capital injections, and state takeovers. But it went even further, using imprecise language that might justify almost any form of support in situations deemed an emergency. Specific tools were to be detailed in Government ordinances, including rules about fees to be paid by institutions and restrictions on their actions (such as compensation for senior management) when operating with government support.*

Part of the Government package of October 20 was a stability fund to handle future solvency problems in Swedish institutions and a legislative authority to provide capital infusions (recapitalization). The Government initially allocated SEK 15 billion to the stability fund. The announced upper limit for capital injections was SEK 50 billion. A special stability fee was to be charged to all credit institutions in Sweden. The announced aim was that the stability fund—together with accumulated contributions to the deposit guarantee fund—would amount to an average of 2.5 percent of GDP within 15 years.** A financial institution could receive an injection of capital from the Government only if it were judged, in the prevailing circumstances, to be important for the system as a whole (in effect, a SIFI).

Probably the most significant component of the October 20 package was the SNDO's guarantee program for newly issued debt of eligible financial institutions. The program had an initial intended upper limit of SEK 1,500 billion, later reduced to SEK 750 billion. The new debt, which could be denominated in kronor or foreign currencies, would be

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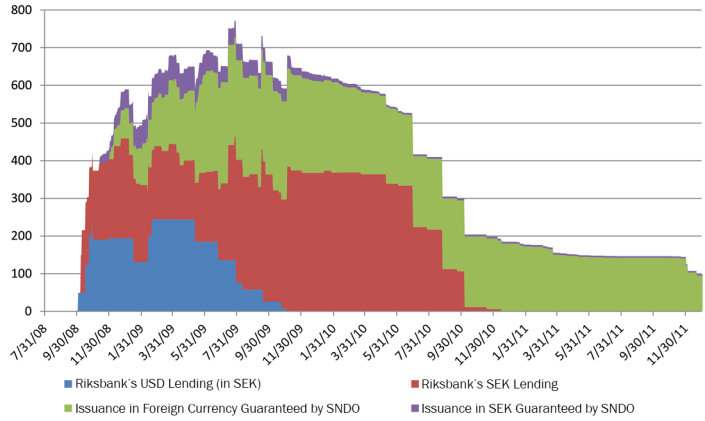
* For purposes of the Act, "institutions" are defined broadly as "banking companies, savings banks and member-owned banks as well as credit market companies with a significant share of lending on the Swedish market that is provided subject to security in the form of a mortgage of real property, site leaseholds, tenant-owner property or with a significant share of the lending in the Swedish market to local government."

** According to the IMF Staff (2011a), the Swedish authorities envisage "exploring a proposal to merge the stability and deposit insurance funds in the future and introduce risk-based fees. In this context, developments at the EU level will also be taken into account."

guaranteed for a fee.* The peak use of the program, in May–July 2009, came to some SEK 354 billion or a little more than 10 percent of GDP. In practice, about 30 percent of the total of the guaranteed borrowings were in kronor and some two thirds in U.S. dollars and euros (with quite small percentages in other foreign currencies).

Figure 14. Emergency Lending and Guarantee Support During the Crisis: Riksbank Direct Lending and Oustanding Volumes of the SNDO's Guarantee Program, SEK Billion, 2008–2011



Sources: The Riksbank and the Swedish National Debt Office.

We show in Figure 14 a chart that visually documents the large size of the SNDO guarantee program. The figure adds the guaranteed bor-

* The guarantee program is governed by Ordinance (2008:819) titled Government Guarantees to Banks and others, and by the National Debt Office's Regulations (2008:1). To participate, an institution must conclude a guarantee contract with the SNDO. The Act in section 11 says that "the fee for debt securities with maturities not exceeding one year shall be 0.5 percent of the amount guaranteed. The fee for debt securities with maturities of more than one year shall be determined on the basis of the market price for credit default swaps under normal market conditions, with an add-on fee of 0.5 percentage points. The add-on fee for covered bonds will be 0.25 percentage points." Announcements about the fee structure were made on October 22 and December 9. In the early-1990s banking crisis, an explicit guarantee scheme was announced in September 1992 and approved by Parliament in December 1992 (at a time when a formal deposit insurance scheme did not exist). It covered deposits and various other bank liabilities, contingent and foreign. That scheme was removed in July 1996.

rowings to the Riksbank's direct lending (shown separately in the earlier Figure 13). The amounts in the SNDO guarantee program did not become large until late in 2008 and in early 2009, but by the summer of 2009 they reached an order of magnitude similar to the Riksbank's direct lending.* Moreover, the borrowings guaranteed by the SNDO had longer maturities. As the chart makes evident, a sizable proportion of the guaranteed borrowing is still outstanding as of the autumn of 2011. (We believe that there has not been any newly issued borrowing guaranteed under the program since early 2010.)

Perhaps the most notable aspect of the guarantee program has been its selective importance for a few institutions. At one point, some 90 percent of the guaranteed new borrowing was accounted for by Swedbank, the one of the four major banks that experienced the greatest strains in the worst months of the crisis. The OECD Economic Survey of Sweden in fact asserts that one bank of systemic importance (it does not identify Swedbank by name) "was completely reliant on the guarantee for its medium-term funding for several months."** Other borrowers using the guarantee for smaller amounts were Carnegie, SBAB, Sparbanken Gripen, Sparbanken Öresund, and Volvofinans Bank. SEB signed up for the SNDO guarantee program but did not actually use it. Several of the borrowing institutions, especially Swedbank, still had outstanding loans guaranteed under the facility in the autumn of 2011.

Although it appears with the wisdom of hindsight that the SNDO new facility for borrowing guarantees was successful, the experience of countries such as Ireland is a sobering reminder that guarantee schemes can go awry. Guarantee schemes can turn especially problematic if they do not make a careful distinction between guarantees for *newly issued borrowings and for outstanding borrowings that already exist at the time of announcement of the guarantees*. The Swedish facility for guarantees did apply, wisely, just to newly issued borrowing.

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* The peak of the guaranteed borrowing was SEK 354 billion, see SNDO (2010).

** OECD (2011), pp. 56–57. Among the four major banks, Swedbank had the greatest exposure to the Baltic countries in its balance sheet and for that reason experienced especially strong market pressures in its funding.

In the heat of the global crisis on September 30, 2008, Ireland issued a strong blanket guarantee covering all borrowings by the banks, outstanding as well as newly issued. Irish banks had borrowed extensively outside of Ireland, relying heavily on wholesale funding for their domestic lending to property developers. By 2008 Irish customer deposits may have provided just 22 percent of domestic bank funding while 37 percent of the funding was in the form of deposits and securities from the international capital markets.* The blanket guarantee of September 2008 required a very costly subsequent recapitalization of Irish banks. The beleaguered Anglo Irish Bank was nationalized and the other two big Irish banks received recapitalization injections in January 2009.**

Ancillary Actions and Programs Supporting Liquidity and Managing the Crisis

A complete account of actions taken during the crisis by the Swedish authorities would need to evaluate numerous additional measures. We cannot feasibly discuss all of them here. Instead, we briefly identify three groups.

The first set entailed adjustments that facilitated the crisis-lending programs. Guidelines governing the eligibility of collateral and other collateral arrangements were adjusted to make borrowing and lending proceed more smoothly. For example, as early as September 22, 2008 and again on October 8 the Riksbank increased credit availability in the RIX payments system by substantially expanding the percentage of covered bonds issued by the borrower or institutions closely linked to the borrower that it would accept as collateral. Another example was a reduction in the minimum credit-rating requirement for longer-term securities pledged as collateral. The Riksbank also increased the number of counterparties permitted in Riksbank transactions such as fine tuning. Restrictions on permitted counterparties were changed again in April 2009.

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* Connor, Flavin, and O'Kelly (2010).

** For an extensive account of the Irish financial turmoil and the policy responses taken by the Irish authorities, see Commission of Investigation into the Banking Sector in Ireland (2011). The Riksbank *Financial Stability Report*, 2011:1, p. 22ff, has an explicit comparison between Sweden and Ireland.

A second group of adjustments—another "crisis-management activity"—eased regulatory constraints on the accounting practices and behavior of insurance companies. Life insurance companies were strongly affected by the increase in the spreads between private interest rates and Swedish government bond rates resulting from crisis increases in liquidity and credit-risk premiums. The increase in spreads was manifested partly in a decrease in government rates.

Life insurance companies have liabilities to their policyholders with long maturities. When determining whether these insurance companies are solvent, their liabilities must be discounted back to the present and the present values of the liabilities compared with the values of the companies' assets.

Prior to the crisis, the insurance companies were required by regulation to use a prevailing government bond rate for the purposes of discounting their liabilities. When government bond rates fell to abnormally low levels, however, the present value of the insurance companies' liabilities using this discount rate rose above the value of their assets. Finansinspektionen responded by altering the applicable regulations at least twice in October 2008. Analogous regulatory changes were made for occupational pension funds. The applicable discounting rates for liabilities were specified to be an average of interest rates on government bonds over a longer past period, with the averaging calculation producing a discounting rate higher than the unusually low rates that prevailed during the crisis itself. The changes in discount rates had the result, as desired and as appropriate, of showing insurance companies remaining solvent.

Interestingly, on October 9 and 16 when FI announced the altered regulations, the aim of the actions was described as "making it possible for life insurance companies to increase their investment in mortgage bonds" and "stimulating an increased supply of interest-bearing securities with long maturities." Broadly interpreted, one can thus describe these regulatory changes as part of a comprehensive emergency effort to supply liquidity to the markets and support their smoother functioning.

A third illustration of additional crisis-period measures was the Riksbank establishment on October 28 of a temporary credit facility for commercial paper intended to increase the supply of loans to the Swedish corporate sector. The three-month loans were offered in auc-

tions, intended to occur at two-week intervals. Commercial paper was used as collateral for the loans. Borrowers were charged a minimum of the repo rate plus a surcharge of 0.4 percent. The first auction was held on November 5. A limit of SEK 40 billion was set for the program.* Under the commercial paper program the Riksbank did not actually purchase commercial paper but instead arranged for it to be used as collateral. It was a crisis-generated program involving direct lending to corporations outside the financial system.

It is informative to compare the Riksbank's commercial-paper facility with the "Commercial Paper Funding Facility (CPFF)" announced by the Federal Reserve on October 7, 2008. The Federal Reserve program created a special purpose vehicle that actually purchased three-month unsecured and asset-backed commercial paper. Arguably, there may be less difference than might at first appear between a program of asset purchases and a lending program where assets are used as collateral (see below for further discussion). By the time that collateral arrangements are taken into account, the underlying credit-risk to the central bank of the two methods may not be very different.**

Treatment of Potential or Actual Insolvencies

During the worst weeks of the crisis following the failure of Lehman Brothers, only two smaller banks—Kaupthing Bank Sverige AB and Carnegie Investment Bank AB—were so buffeted by liquidity stresses that Riksbank emergency liquidity support could not prevent actual insolvency or liquidation by sale.

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* Further details are given in a Riksbank press release for November 12, 2008.

** Buiter (2008), in criticizing what he perceived as the Federal Reserve's timidity, sarcastically observes "Why make things simple when they can be made complicated? The Fed appears to be embarrassed about doing the right thing—acting as Market Maker of Last Resort (MMLR) by accepting illiquid securities as collateral in repos. By extending both the list of securities eligible as collateral in repos and the maturity of its operations, the Fed is doing what Anne Sibert and I have urged central banks to do since this crisis began. All that remains to be done are (1) the extension of the set of eligible counterparties and (2) the conduct of outright purchases of asset-backed securities rather than just their acceptance as collateral in repos."

The 2008 experience contrasts markedly with the 1990–1992 banking and financial crisis in Sweden. In that earlier crisis, a bigger number of banking failures, of larger banks (such as Nordbanken, Första Sparbanken, and Gota Bank), was a dominant feature. The underlying causes of the 1990–1992 crisis were predominantly domestic excesses in real estate markets compounded by Sweden's fixed exchange-rate policy. Two decades later, the Swedish approach in the 1990s of cleaning up after the banking crisis by transferring troubled debt to specialized asset-management companies, such as Securum, is now often cited as a role model for other countries. The 1990s experience informed the architects of the Government Support to Credit Institutions Act, enacted in October 2008 as part of the immediate response to the turmoil following the failure of Lehman Brothers.*

The October 2008 Act as noted earlier gave the SNDO and the government virtually unlimited authority to finance measures deemed necessary for ensuring financial-system stability. In addition to the guarantee authority already discussed, the Act provided overall guidelines for how the SNDO and the government could deal with systemically important institutions that became weak or insolvent. Riksbank Deputy Governor Nyberg has commented that the Act

> is less detailed than the more specific bankruptcy regulations in the United States and United Kingdom with regard to what can be done, and not least, how it should be done. This of course gives some flexibility, but the flip side of the coin is that there is uncertainty regarding what actually applies. The act states that support can be provided in various forms. The institution or its assets and liabilities can be taken over by another institution, the institution can be recapitalised with state funds or liquidated in an orderly manner.**

During conversations with interviewees, we formed the impression that considerable sentiment exists for clarifying and improving the

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* For the establishment of Securum after the 1990s banking crisis in Sweden, see Bergström, Englund, and Thorell (2003). Other references on the 1990s crisis include Englund (1999); Jonung (2009); Jonung, Söderström, and Stymne (1996).

** Nyberg (2011a).

Government Support to Credit Institutions Act. The Riksbank essentially conveyed that message to the Riksdag already in 2010.*

In October 2008 the two smaller banks Kaupthing Bank Sverige AB and Carnegie Investment Bank AB received emergency liquidity support, in the first instance from the Riksbank. Their situations were quite different. But at the peak of the crisis both situations were considered systemically significant. Neither financial institution would have been termed a SIFI in calmer times. As later explained by Deputy Governor Nyberg, however,

> In Sweden, both Kaupthing and Carnegie were assessed as systemically important in autumn 2008, quite simply because the situation in the Baltic countries had spread uncertainty concerning the entire Swedish financial system. If depositors had begun to queue outside Kaupthing and Carnegie, the doubts could have spread to Latvia and Lithuania—and not least to London and New York, where the major Swedish banks obtain a lot of their funding.

Nyberg goes on to emphasize that systemic importance is not easy to determine, and that it certainly cannot be plausibly related merely to the size of a bank.**

In a severe crisis, a definition of systemic importance used in noncrisis conditions is almost certain to become badly frayed. Judgments in the heat of the moment tend to lean—and probably ought to lean—toward perceiving a troubled institution as systemic, as able to spread dangerous contagion. In our conversations about Carnegie's situation, we often asked interviewees whether they felt the decision to treat Carnegie as systemically important at the peak of the crisis had been an error. No one offered that opinion, and most strongly endorsed the way the situation had been handled.

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* The Riksbank submission to the Riksdag said in part: "In several respects, these measures [the Government Support to Credit Institutions Act] represent a significant reinforcement of the public framework for dealing with credit institutions with problems. At the same time, one must remember that the measures were adopted during an ongoing crisis and within tight time constraints. Therefore, it has not been possible to carry out a thorough analysis of how to set up an effective financial regulatory framework which will be sustainable in the long term." (Sveriges Riksbank (2010a).)

** Nyberg (2011a).

Another small financial intermediary, HQ Bank, encountered problems in 2010. It suffered a large loss in its trading portfolio of derivatives. HQ's situation caused concern at Finansinspektionen. Ultimately FI revoked HQ's banking license in August 2010 and asked the courts to force the bank into liquidation. The situation of HQ bank is interesting here just as a contrast with what was done with Kaupthing and Carnegie in October 2008. As Nyberg summarized the situation, "the mood [in 2010] was quite different, and the contagion risks were assessed as slight. HQ Bank was therefore not assessed as systemically important, although there was some concern as to how deposits in other small banks might be affected."*

The treatment of the Swedish subsidiary of Iceland's Kaupthing Bank has to be judged in the light of the extraordinary strains in Iceland's banking sector during 2008, which followed a period of chaotic growth and inadequate supervision and regulation.** Kaupthing Bank itself was the largest bank in Iceland and had operated in thirteen countries, including all the Nordic countries; it was the seventh largest bank in Nordic countries in terms of pre-crisis market capitalization. The strains in Iceland's financial system had already become so great in May 2008 that the Riksbank together with the central banks of Norway and Denmark had entered into a Euro/Icelandic kronor swap agreement with the central bank of Iceland "to support the Icelandic central bank in its efforts to safeguard macroeconomic and financial stability." The dramatic banking and financial crisis in Iceland was further exacerbated by the failure of Lehman Brothers. The Icelandic Financial Supervisory Authority took control of Kaupthing Bank in early October 2008.

Kaupthing's global troubles made it difficult for the Swedish subsidiary Kaupthing Sverige AB to meet its payment obligations in Sweden. Thus the Swedish authorities, judging the risks to be systemic for the Swedish financial system, announced in a Riksbank October 8 press release the extension of emergency liquidity assistance in the form of a loan against collateral of SEK 5 billion:

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* Ibid.

** Iceland Special Investigative Commission (2010); Benediktsdottir, Danielsson, and Zoega (2011).

> In the situation that has arisen there is an imminent risk that the bank [Kaupthing Bank Sverige AB] may suffer liquidity problems. To safeguard financial stability in Sweden and ensure the smooth functioning of the financial markets, the Riksbank has therefore decided to grant liquidity assistance to Kaupthing Sverige.

The Riksbank press release stressed that it

> has made the assessment that Kaupthing Bank Sverige AB is solvent. Finansinspektionen (the Swedish Financial Supervisory Authority) has made the same assessment. The Riksbank thus bases its decision on an assessment that the bank is suffering temporary liquidity problems, but that its solvency is not threatened.

The Riksbank also emphasized that its actions were in line with its legislative authority.

Almost immediately thereafter, Kaupthing Bank's general problems led to its nationalization in Iceland and the closing of offices in Sweden. Deposits in Sweden were repaid. In March 2009 the Bank of Åland acquired most of Kaupthing's Swedish activities. The Riksbank's emergency liquidity assistance was fully reimbursed.

The case of Carnegie Investment Bank AB had fewer international complications than Kaupthing. But Carnegie was a large participant in Nordic securities markets. Like virtually all other financial intermediaries in Sweden and elsewhere, it had severe trouble maintaining adequate liquidity in September and October 2008. Behind its liquidity problems were increased collateral requirements sparked by the financial crisis. When the difficulties Carnegie faced became acute, the Riksbank amid the general anxiety decided to extend emergency liquidity assistance.

A first loan to Carnegie of SEK 1 billion with collateral was announced on October 27. Immediately on the following day, October 28, the Riksbank announced an extension of its loan facility; the maximum amount of the liquidity support was capped at SEK 5 billion (including the SEK 1 billion arranged the preceding day). The Riksbank press release described the support as "a preventive measure in order to make it easier for Carnegie to release its own liquidity should the need arise." As with the lending to Kaupthing Bank Sverige AB,

the press release stressed that "it is the assessment of the Riksbank and Finansinspektionen that Carnegie is solvent."*

The assessment of Carnegie's situation, however, changed rapidly. In early November Finansinspektionen uncovered violations of banking restrictions and developed a view that the institution was badly managed. FI then revoked Carnegie's banking license and the SNDO on November 10 took over control of the bank. As part of the takeover arrangements, the SNDO made a support loan to Carnegie so that Carnegie could repay the emergency liquidity assistance from the Riksbank.

By May 2009, the SNDO had arranged a sale of Carnegie. The bank was acquired in a joint venture by the private equity company Altor Equity Partners and the investment company Bure Equity. The SNDO assesses that the total proceeds from the sale of Carnegie and its subsidiary Max Matthiessen will over time fully cover the SNDO support loan provided to Carnegie in November 2008 as well as costs that it subsequently incurred in its dealing with Carnegie.

The general verdict of commentators about the Swedish authorities' crisis handling of Kaupthing Bank Sverige AB and Carnegie Investment Bank AB is favorable. Actions were taken promptly. Contagion was largely averted. Costs to taxpayers were avoided.

That is not to say that future problems about the treatment of potential and actual insolvencies of financial institutions can be easily managed. The cross-border dimensions of resolution when financial institutions are active in several national jurisdictions are particularly difficult. Swedish financial institutions have numerous offices abroad (branches and subsidiaries) with sizable balance sheets. Nordea is the most prominent example, but there are many others less large. And foreign banks have numerous affiliates in Sweden, which like Kaupthing Bank Sverige AB could pose complications in future troubled times. How to allocate resolution responsibilities and associated costs among Swedish authorities and foreign authorities for complicated

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* The Riksbank lending to Carnegie was supplied on the legislative authority of Chapter 6, Section 8 of the Sveriges Riksbank Act which states that "The Riksbank can in exceptional circumstances grant credit to banks on special terms for the purpose of supporting liquidity." (Press release of October 28, 2008.)

cross-border cases is very much an open question, now under active international consideration. In principle it would be preferable to have legislative provisions that are reasonably compatible across national jurisdictions. But that is not yet the case, not even within Europe, much less for the world as a whole.

Within Sweden itself, emergency support and resolution procedures are more straightforward. But even in that context some issues remain to be worked out more fully. Some details of the allocation of responsibilities and powers between the Riksbank and the SNDO, for example, could be clarified. The following quotation from a Riksbank submission to the Riksdag illustrates the point:

> One question which came to the fore when Kaupthing Sverige AB and Carnegie Investment Bank got into difficulties in the autumn of 2008 was how the Riksbank's scope for granting liquidity assistance on special terms works in relation to the National Debt Office's scope for providing liquidity assistance under the terms of the Support Act. It is important to clarify which authority is responsible for liquidity assistance in the different phases of a chain of events. It is also important to consider how the Riksbank's liquidity assistance should be handled if the institution receiving this assistance later becomes insolvent or, in some other way, no longer meets the requirements for the assistance.*

* Sveriges Riksbank (2010).

Crisis Decisions about the Traditional Instrument of Monetary Policy

THE FOCUS OF our discussion now shifts from the crisis-period actions that many have labeled "unconventional" to the Riksbank's crisis-period decisions about the official repo rate, its traditional instrument of monetary policy. It stretches the use of language to apply the label "conventional" to these policy-rate decisions during the turbulence of the crisis.

Financial conditions during 2007 and the first eight months of 2008 were much less strained in Sweden and the rest of Europe than in the United States. The Federal Reserve began to lower the U.S. federal funds rate in September 2007 (Figure 15) and had reduced it by mid-December 2007 to 4.25 percent; by the end of April 2008, following the failure of Bear Stearns, the federal funds rate was already at the low value of 2 percent. Policy rates in the Eurozone area and in Sweden were raised further in July 2008. Controversially, especially when viewed with hindsight, the Swedish repo rate was raised another 25 basis points in early September 2008.*

When the hurricane struck in mid-September after the failure of Lehman Brothers, many central banks realized the necessity of some sort of dramatic departure from their customary procedures for setting their policy rates. Just how to proceed with that departure was

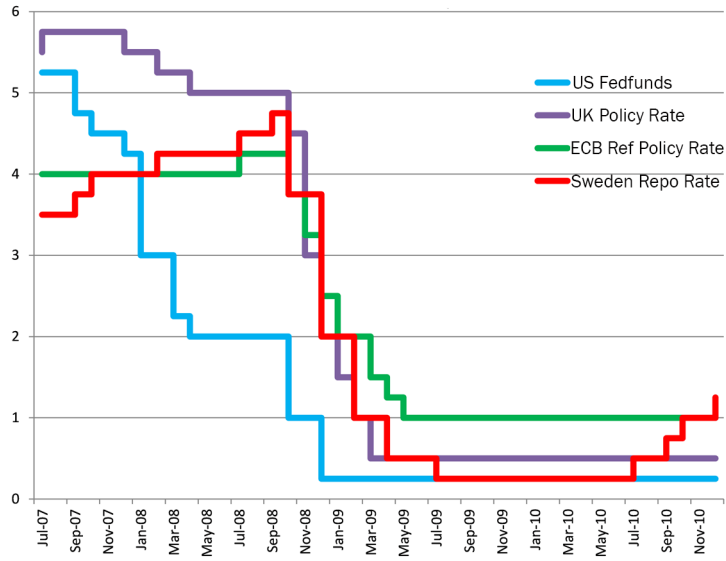
* The September 2008 Riksbank Executive Board meeting did marginally lower the future path of the repo rate relative to the path set in July 2008. The Executive Board, moreover, was divided. Half the members favored an unchanged repo rate and recommended a still lower future path than the one chosen.

unclear. But there was consensus that large reductions were appropriate. And there was consensus that a coordinated reduction would be helpful in sending a constructive signal. The coordinated reduction, 50 basis points, was announced on October 8.

The Federal Reserve, starting from the much lower level of 2 percent, had lowered the federal funds rate close to the zero lower bound by mid-December. But it took substantially more weeks for European rates to fall near the zero lower bound. The repo rate in Sweden was reduced from the level of 4.25 percent announced on October 8 to announced levels of 3.75 percent on October 22, 2.0 percent on December 3 (an unprecedentedly large reduction of 175 basis points), to 1.0 percent on February 10, 2009, and to 0.50 percent on April 20. The repo rate did not reach the near-zero floor of 0.25 percent until July 1, 2009, some nine months after the global crisis had erupted.

The Riksbank treated the rate of 0.25 percent as the lower practical limit of the policy rate. It decided that it could not reduce the rate all the way to zero nor experiment with any suggestion to explore negative values (further discussed below).

Figure 15. Policy Rates for Major Central Banks, Percent, 2007–2010



Source: The Riksbank.

The Riksbank's Pre-Crisis Flexible Inflation Targeting

The history of "inflation targeting" at the Riksbank is complex and does not lend itself to a simple summary. As background for our discussion here, we resort to a bare-bones exposition that identifies some main conceptual elements. The Riksbank and other analysts refer to their approach as "flexible inflation targeting" because the Riksbank "does not focus solely on inflation" but also strives "to stabilize the real economy, that is, production and employment."*

To explain the essentials of the approach, policymakers are often represented as summarizing their preferences in a loss function defined over target variables. Prior to the crisis, two target variables dominated the discussion in Sweden. Suppose the Riksbank's loss function is defined over these two variables. Each variable enters the loss function in deviation form: the deviation of Swedish inflation (π_t) from a target value (π_t^*), and the deviation of Swedish output (y_t) from potential or "normal" desired output (y_t^*). In abstract form, the Riksbank's (expected) loss function can be represented as

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[\left(\pi_t - \pi_t^* \right)^2 + \lambda_y \left(y_t - y_t^* \right)^2 \right]$$

The parameter λ_y indicates the importance of deviations of output relative to deviations of inflation.

The instrument of traditional monetary policy is an overnight interest rate controlled by the central bank, in Sweden the repurchase or repo rate. Riksbank policymakers respond to evolution of developments in the economy by choosing a path for their interest-rate instrument. These choices can be represented in abstract form as a "reaction function," or "interest-rate rule." The Riksbank's reaction function, a rough guide to its monetary-policy decisions, might be summarized as

$$i_{p,t} = i_{p,t}^* + \alpha_\pi \left(\pi_t - \pi_t^* \right) + \alpha_y \left(y_t - y_t^* \right)$$

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* Ingves (2011c), p. 1. For the history, see also Ingves (2006); Svensson (2009, 1999a, 1999b); Ingves, Apel and Lenntorp (2010); Heikensten (2003); Apel, Claussen, and Lennartsdotter (2010).

where $i_{p,t}$ is the official repo rate, $i_{p,t}$* is an equilibrium or normal level of the repo rate, and α_π and α_y are positive coefficients. Asterisks indicate, as in the loss function, target or desired values of variables. Given its loss function, the Riksbank is presumed to seek the best possible outcome for the Swedish economy by minimizing the squared deviations of the *forecasted paths* of π_t and y_t from their *desired paths* π_t* and y_t*.* The Riksbank chooses α_π and α_y to minimize these deviations.

When making decisions about the current value and prospective paths for their repo-rate instrument, Riksbank policymakers must use some analytical method that attempts to summarize how various shocks affect the economy and how variations in their instrument paths will be transmitted to the economy. For shorthand, refer to their method as their analytical "model" that tries to capture, among other things, the "transmission mechanism" running from their instrument decisions to their target variables.

Whatever else one may believe about the merits and demerits of Swedish flexible inflation targeting, the approach did not provide clear-cut indications of how to make decisions about the repo rate after the onset of the hurricane in mid-September 2008. The Riksbank's Executive Board of course recognized those difficulties, as the *Minutes* of their meetings and their *Monetary Policy Reports* and *Monetary Policy Updates* frankly stated. Perhaps the greatest source of difficulties was that the crisis conditions created an immense increase in uncertainty about the reliability of their analytical models and about the functioning of the transmission process.

Spreads: Key Links in the Transmission Mechanism

Nonfinancial corporations and households typically are not able to borrow funds at the official policy rate. Instead their spending decisions are based on various market interest rates for private debt, such as

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* The time subscripts on the variables are reminders that policymakers must compare *paths*, forecasted vs. desired, for inflation and output not just their current values.

those for commercial and industrial loans, mortgages, and corporate bonds. Often these market rates are longer-term rates. To achieve the Riksbank's objectives in influencing spending decisions (and hence prices and output), therefore, its model of the transmission process must take account of the relationships between market interest rates, i_m, and its policy rate, i_p.

In non-crisis conditions, an interest-rate reaction function like that shown above can be based on the implicit assumption that changes in the spreads between private market rates and the official repo rate $(s_t = i_{m,t} - i_{p,t})$ are of minor importance and therefore can be safely ignored. When this assumption is justified, the Riksbank can reliably affect private market interest rates, and therefore spending, by changing the policy rate without taking time variation in spreads into account.

However, increases in spreads can be much too large and too volatile to be ignored during times of financial crisis. The sharp increase in financial turmoil in the fall of 2008 led, as discussed earlier, to substantial, often unprecedented increases in many spreads in the Swedish financial system. And of course the increases in spreads during the crisis months were only part of the tightening of credit conditions sparked by the market turmoil. Lending terms offered by the financial intermediaries were undoubtedly toughened as well.

The ballooning of spreads and the volatile nature of changes was not homogeneous across markets. And that diversity reinforced confusion about how the transmission process for repo-rate decisions might be changing and might hence be complicating the task of deciding how much to lower the repo rate in the last months of 2008 and the first half of 2009. Because the ballooning of spreads is a characteristic symptom of crises, it may seem natural to ask whether Riksbank policymakers could have modified their pre-crisis approach and improved their crisis performance by, in effect, adding a spread, or spreads, to the reaction function summarizing their repo-rate decisions.

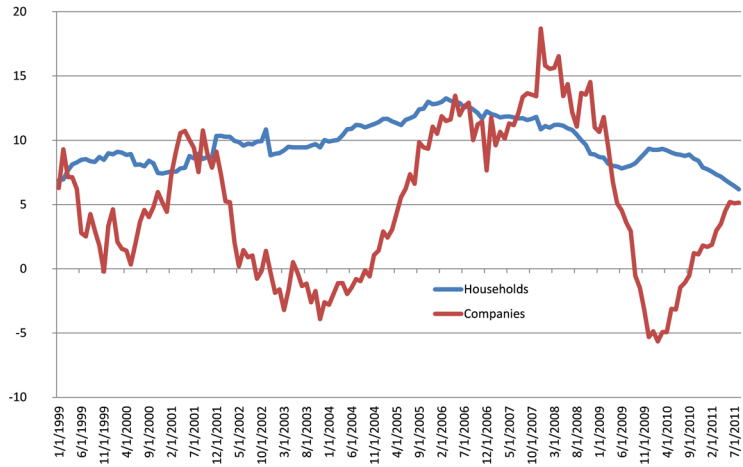
Several analysts have in fact emphasized the possible merits of policymakers focusing on changes in spreads in times of financial crisis. Taylor (2008) and others, for example, suggest a modification in the reaction function to incorporate changes in the spread between a relevant private rate and the official rate. They add the spread with a negative sign to obtain

$$i_{p,t} = i_{p,t}^{*} + \alpha_{\pi}\left(\pi_t - \pi_t^{*}\right) + \alpha_{y}\left(y_t - y_t^{*}\right) - \alpha_{s}\left(s_t - s_t^{*}\right)$$

where α_s is positive and $s_t = i_{m,t} - i_{p,t}$ is some measure of a market spread If α_s were equal to one, changes in the spread brought about by crisis conditions would be fully offset by changes in the policy rate.*

As the Riksbank was reducing the repo rate in the last months of 2008 and the first half of 2009, private interest rates were lower than they would have been without the Riksbank reductions. The repo-rate reductions effectively offset part of the rise in spreads that was occurring. From our reading of the Executive Board *Minutes* and the *Monetary Policy Reports* and *Monetary Policy Updates*, we doubt that spread variables received a strong, continuing focus as a guide to how fast the policy rate should be reduced. But policy discussions did sometimes focus explicitly on how the widening of spreads complicated the transmission of the Riksbank's policy rate to the rest of the financial system and to the real economy.

Figure 16. MFIs' Lending to Nonfinancial Corporations and to Households in Sweden, Annual Percentage Change, 1999–2011



* Examples of such studies are Taylor (2008), McCulley and Toloui (2008), Meyer and Sack (2008), and Taylor and Williams (2008, 2009).

Riksbank policymakers certainly understood that the dramatic widening of spreads justified some sort of adjustments in the setting of the repo rate. It seems likely to us that future development of the Riksbank analytical models and future research on guidelines for setting the policy rate will pay greater and more systematic attention to the role of spread variables, especially for crisis situations. Indeed, some sentiment exists for according more emphasis to the evolution of spreads even in non-crisis conditions (see below).

Figure 16 illustrates the point that there was a significant tightening of credit conditions from the perspective of nonfinancial corporations in 2008–2009, although not so much for households. But the chart also shows a strong bounce back in 2010 for lending to companies.

The Zero Lower Bound and Some Difficult Questions about Crisis-Period Decisions

As long as the Riksbank's policy rate during the crisis remained well above zero, it is understandable that the Executive Board's main preoccupation about the repo rate was to decide how fast to reduce that rate. Moreover, in the turbulent weeks of September, October, and November the Swedish authorities had their hands full, as discussed already, in designing emergency actions not directly related to decisions about the repo rate. As the crisis evolved and the policy rate was lowered, however, the challenges for Riksbank decisions about the traditional instrument of monetary policy became further complicated by nearing the zero lower bound. Not having had to directly face that issue earlier, the Executive Board and the staff were forced to do so by the winter of 2009.

The *Monetary Policy Update* of early December 2008 did not mention the chance that the repo rate might have to be cut so drastically that the rate could approach zero. *The Monetary Policy Report* of February 2009, however, did begin the process of addressing the issue of the zero lower bound. In particular, the Report's pessimistic, weaker-growth scenario considered the possibility that the repo rate might have to be reduced to zero.* The Report also included an article

* The weaker-growth scenario showed the repo rate reduced literally to zero and

entitled "Monetary Policy Alternatives in Times of Financial Crisis and Concern over Deflation"; the article explicitly starts a discussion of possibilities for Riksbank actions if the repo rate actually were to reach the zero lower bound.* Several "what if" comments were made at the February 10 Board meeting about the zero lower bound, including by Ingves and Svensson. Even so, it seems probable that few if any individuals at the Riksbank in early February thought the situation would worsen enough so that the repo rate would actually have to be reduced to the zero lower bound.** No doubt some considerable amount of contingency planning occurred about the zero lower bound issues. It might have been prudent to do still more.

In the discussion that follows, we raise some difficult questions. The questions explore whether Riksbank policymakers might have been bolder in adjusting their behavior during the peak months of the crisis. In particular, we explore the repo-rate decisions, and their communication to the public, in the months of rapid reduction and the approach to the neighborhood of the zero lower bound constraint. To say the obvious at the outset, it is much easier to ask difficult questions than it is to supply satisfactory answers. Many at the Riksbank have already asked the questions. And we have no illusions about having satisfactory answers ourselves.

The first group of questions ponders whether the Riksbank could have moved faster and/or further in reducing the repo rate. The rate, as noted above, was reduced to 1.0 percent in February 2009, to 0.50

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staying at that value throughout 2010 (*Monetary Policy Report*, February 2009, Figure 1.4, p. 26). As later developments showed, the majority opinion at the Riksbank was that, in practice, the repo rate should not be reduced all the way to zero even if it were possible to do so.

* Riksbank, *Monetary Policy Report*, February 2009. The article about policy alternatives is at pp. 50–53.

** In Riksbank, Minutes of the Executive Board's Monetary Policy Meeting No. 1, 2009 (February 10). Svensson is quoted as observing "Although it is not very probable that a situation with a binding zero lower bound for the policy rate will arise, it is wise to consider what measures would be appropriate if this were to happen." Svensson had commented extensively on Japan's experience with very low interest rates; see, for example, Svensson (2001).

percent in April, and then to 0.25 percent in early July. The rate never fell below 0.25 percent (and began to be increased a year later in 2010). Might the Riksbank have reduced the rate more in February or in April 2009, and moved further by the July meeting all the way to zero, or even below?

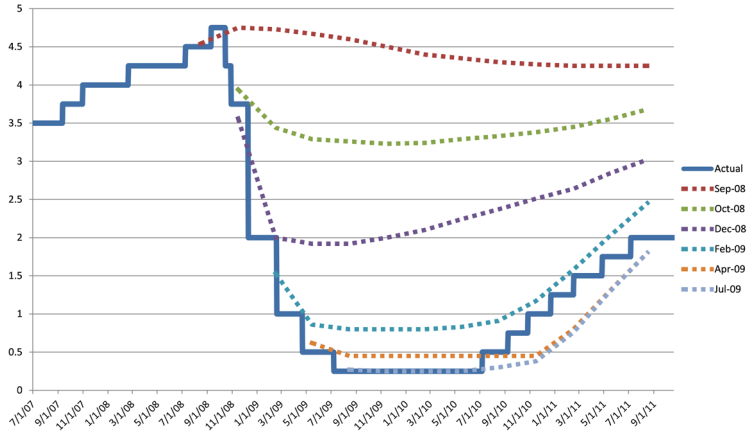
Expansionary policy actions in the neighborhood of the zero constraint can of course no longer rely, at least not readily, on rate reductions. Our second set of questions asks what substitute actions can be used if incremental expansionary actions are judged necessary. Large-scale purchases of assets to substitute for policy-rate reductions were being tried by other central banks during the crisis, notably the Federal Reserve and the Bank of England. We are inclined to the view that the Riksbank's behavior near the zero lower bound was more similar to the behavior of asset-purchasing central banks than is commonly appreciated.

When a central bank finds itself in the neighborhood of the zero lower bound, perhaps the most important complication stems from the need of policymakers to pay more attention than in normal times to the issues of "forward guidance." What should be said, and not said, about the likely evolution of monetary policy, especially the repo-rate path, in future periods? How should such comments be related to forward guidance about the forecasts for key target variable such as inflation and real GDP or employment? What are the preferred procedures for communicating forward guidance? And how should uncertainty about the future outlook and future policy be communicated? Our discussion here speculates about whether the Riksbank's approach to these issues might be somewhat modified in the future should another financial hurricane again buffet the Swedish financial system.

Figure 17 focuses on the repo rate for the 2008–2009 period. It shows the actual decisions for the level of the rate and the forward paths announced following each of the Executive Board's meetings from September 2008 through July 2009. Although the Board did reduce the rate dramatically beginning in October, and especially in December and February, the Board did not suggest that the future path of the rate consequent on its decisions might have to fall substantially further. As can be seen, the tendency in the announcements was to forecast the repo rate staying near its newly set level. The Board's hesi-

tancy in suggesting further falls is of course understandable, even taking into account the turbulent circumstances. It is only the wisdom of hindsight that tells us further major reductions were to be judged necessary.

Figure 17. Riksbank Repo Rate and Forward-Guidance Paths, Percent, 2008–2009



Note: Data for forward paths are quarterly averages of the forecast values.
Source: The Riksbank.

The Executive Board's announcements of its forecasted paths for the repo rate together with its forecasts for inflation and real GDP over the forthcoming several years are presumed to play a critically important role in shaping expectations about future interest rates and hence expectations for inflation and the real economy. Indeed, the practice of announcing the forward repo-rate path as *the intended forecast path of the Riksbank* began in early 2007. The primary rationale for that change was to give forward guidance that would directly influence the expectations of households, companies and the market regarding the future repo rate path. (The article announcing the change stressed that the Riksbank's previous procedures "gave no clear guidance as to how the Riksbank viewed future interest rate developments. This was a disadvantage since the general public's and the markets' expectations of the future interest rate path are just as important for the way monetary policy influences the economy as the expectations regarding the deci-

sion on the current level of the interest rate.") When the procedural change was made in 2007, of course, no one could foresee the global financial meltdown and how proximity to the zero lower bound might enhance even further the significance of Riksbank forward guidance.*

Market participants seem to have been somewhat less sanguine than the Riksbank in 2008–2009. Figure 18 reproduces some interesting charts drawn by the Riksbank for inclusion in the recent Goodhart-Rochet report.** The charts allow a comparison of the Riksbank's forward-guidance paths for the repo rate with expectations of short-term interest rates as embodied in market yield curves. Note that the market yield curves were below the Riksbank forward-guidance paths both prior to and after the dates of the September, October 8, October 23, and December 2008 meetings. For the February 2009 meeting, the market yield curve prior to the meeting was still well below the previous announced path; after the February 2009 meeting, on the other hand, the market yield curve showed only slightly lower rates relative to the newly announced path. By the time of the April and July 2009 meetings, the Riksbank's paths and market expectations were fairly close for the shorter run; for time horizons beyond six months ahead, however, market participants envisaged a significantly more rapid increase in the repo rate than those in the Riksbank's forecast path.

At the February 2009 meeting, there was unanimous support for the reduction in the repo rate by the full 100 basis points. At the April

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* The Riksbank was well ahead of many other central banks in emphasizing forward guidance, as it had been in other dimensions of flexible inflation targeting. Prior to early 2007, the forward paths of the repo rate were based on the implicit forward path of short-term yields, beyond the current level decided by the Monetary Policy Committee, derived from the market yield curve. (Still further in the past, prior to the autumn of 2005, the forecasts used the assumption that the repo rate remained constant during the forecast period.) For description of the change in procedures, see Riksbank, *Monetary Policy Report*, 2007:1 (p. 19ff). The 2007 decision to make the forward path for the repo rate the Riksbank's intended forecast path rather than a path derived from forward market yields was controversial at the time, and remains so, at least outside Sweden. Among the advantages of the new 2007 procedure is that it tends to eliminate most of the uncertainty in private expectations about the repo-rate expectations and intentions held by the Riksbank itself (intentions and expectations at the time the forecast path is announced).

** Goodhart and Rochet (2011).

meeting, the Board discussed two proposals to cut the repo rate, one by 50 basis points and the other by 75 basis points. Five of the Board members approved the reduction by 50 basis points; Svensson advocated the cut of 75 basis points. Evidence that the situation was improving in financial markets and perhaps even in the Swedish economy was beginning to be observed by the time of the July meeting. At that meeting, with majority support, the Board voted to cut the repo rate to 0.25 percent and to approve a forward-guidance path that would keep the rate at 0.25 percent for the forthcoming year. Svensson advocated cutting the rate all the way to zero and a guidance path that would keep the rate at that lower level for a year ahead; that guidance path was associated in the *Monetary Policy Report* for the meeting with the weaker-growth scenario. Wickman-Parak supported the rate cut voted by the majority but dissented about the guidance path; she held a more optimistic view of growth prospects and thus thought the Riksbank would need to raise the repo rate earlier than was forecasted in the main guidance scenario.

Differences of view about the desirability of an actual zero repo rate were attributable to two sources: differences of judgment about the likely current and prospective strength of the Swedish (and world) economy, and differences about the practicality of the repo rate being literally zero. The first source was undoubtedly the more important in the spring and summer of 2009. Yet the second source also contributed to the hesitancy to push the repo rate all the way to zero. The July 2009 *Monetary Policy Report* contained an article reviewing arguments about the practicality, and Riksbank staff members Söderström and Westermark published a paper.* Interestingly, although many at the Riksbank seem to have presumed a rate of literally zero was infeasible, both the February and July *Monetary Policy Reports* presented alternative, weaker-growth scenarios that were deemed to push the actual rate to zero and keep it there through mid-2010.** Thus in alter-

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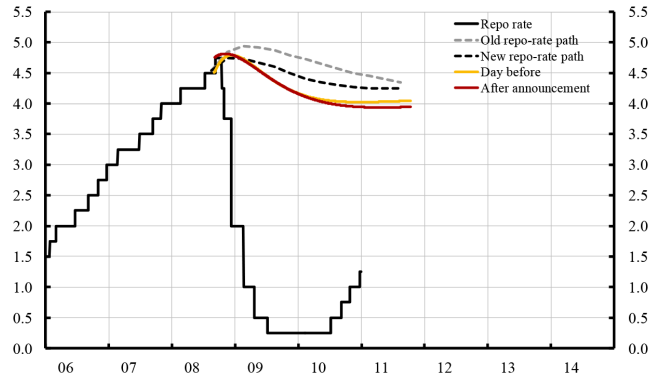
* Riksbank, *Monetary Policy Report*, July 2009, "Monetary Policy When the Interest Rate Is Close to Zero," pp. 48–52; Söderström and Westermark (2009).

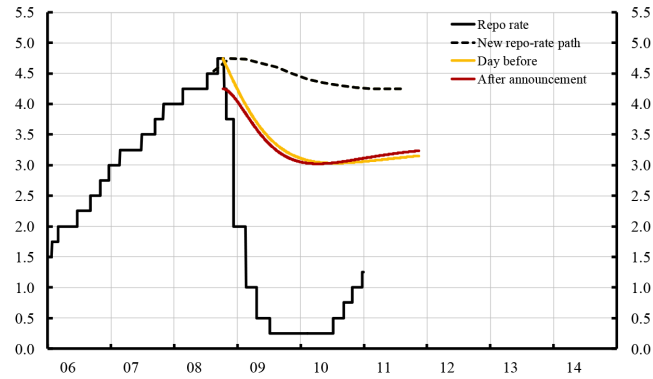
** Riksbank, *Monetary Policy Report*, February 2009, Figure 1.4. p. 26; and Monetary Policy Report, July 2009, Figure 30, p. 24.

Figure 18. Charts Copied from Goodhart-Rochet Report: Riksbank Repo Rate, Forward Repo Rate Paths, and Expected Market

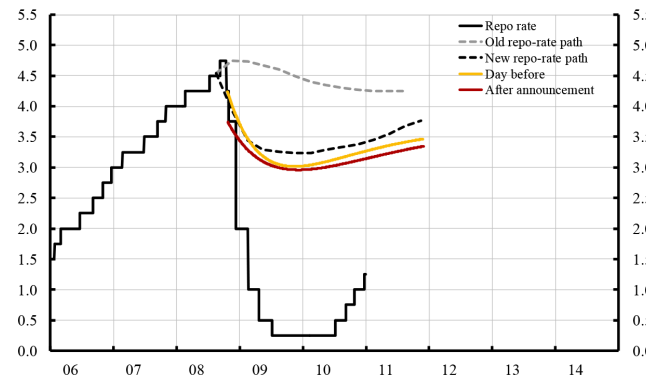
September 2008



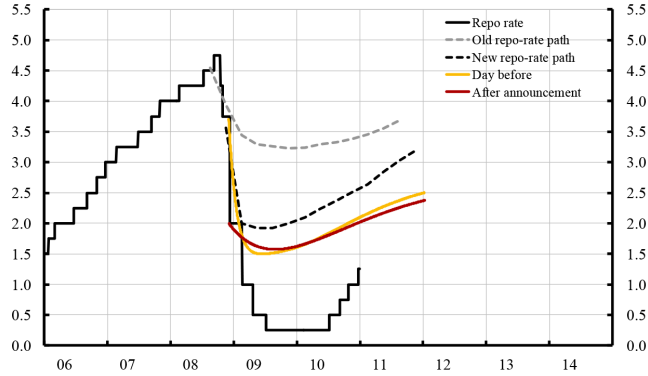
October 8, 2008



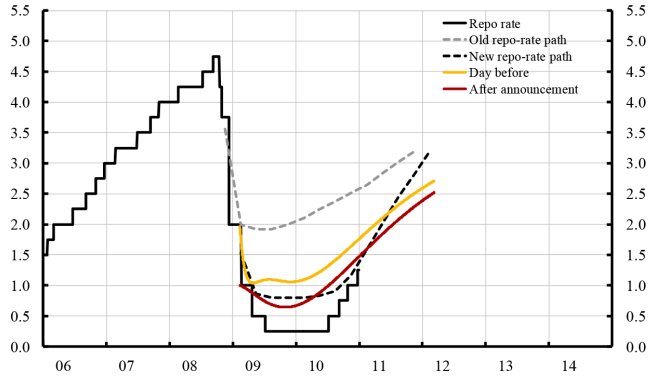
October 23, 2008



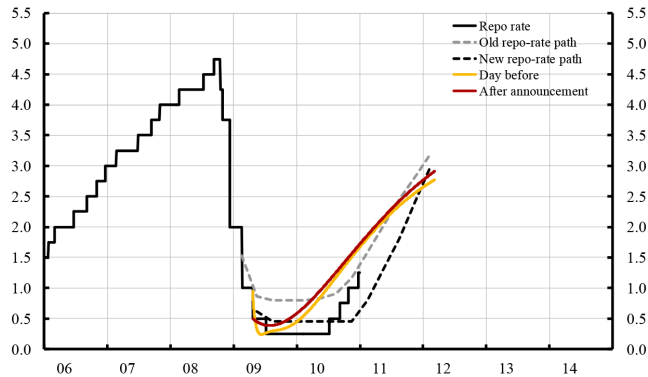
December 2008

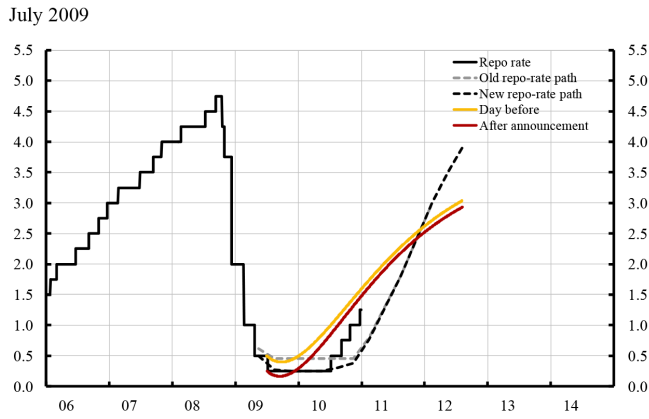


February 2009



April 2009





Source: Goodhart and Rochet (2011).

native scenarios, if not their main scenarios for the *Reports*, Riksbank analysts had no compunction about showing the repo rate moving literally to zero.

Various arguments are advanced for why an actual rate of zero could be problematic. Some market interest rates, such as the banks' deposit rates, are typically lower than the repo rate and would reach zero before the repo rate does. If intermediaries were to believe that they cannot reduce their deposit rates below zero, the margin between their lending and deposit rate could shrink, the intermediaries' profits could fall, and that fall—it is argued—could reduce the intermediaries' willingness to lend. Another argument focuses on administrative costs and technical disruptions that might lead financial markets to function less effectively; some argue, for example, that trading in financial markets might be impeded because some computer software programs have not been adapted to handle zero or negative interest rates. Still another consideration is how zero or negative interest rates could provide incentives for household and corporations to hold larger amounts of currency instead of claims on intermediaries. Most analysts who have discussed this last consideration doubt that it is a weighty argument. Holding large amounts of currency tends to incur significant transactions costs, thereby reducing the effective interest rate on currency even in non-crisis conditions; the repo rate might have to fall well below zero before the differential incentive to hold currency became consequential.

All analysis of the issues concludes that the transmission of monetary-policy when short-term interest rates are close to zero may be different, probably weaker, than in non-crisis conditions. Hence a reduction in the repo rate from 5.0 to 4.75 percent probably would have a larger impact on the economy than a reduction from 0.25 to 0 percent. That observation had little practical relevance, however, in the spring and summer of 2009. The relevant issues at that time were whether an additional cut in the repo rate from its already very low level would provide incremental expansionary momentum to the economy, and whether such incremental momentum would be desirable. On the first issue, perhaps the size—but not the sign—of the incremental expansion merited disagreement. On the second, differences of view were inevitable.*

As one looks in the rear-view mirror at the crisis period, the arguments for keeping the repo rate from falling below 0.25 percent fail to be fully convincing. Sweden and other countries accumulated—in 2011 are still accumulating—experience with very low short-term interest rates. The hypothesis that a literally-zero policy rate would create significant problems has not been tested. Nor does the recent experience with low rates appear to strengthen the arguments against a zero or even mildly negative rate. We believe that it would be worthwhile, in Sweden and elsewhere, to continue to study the issues raised by the zero lower bound, including whether innovative options might mitigate the hesitancy for central banks to cut policy rates all the way to zero. The zero-lower-bound issues may stay at the forefront of practical policymaking in 2012–2014 (if, for example, the Eurozone debt crisis continues to roil financial markets). Even if the issues recede into the background in the years immediately ahead, the issues could well re-emerge in a future financial crisis.

The Federal Reserve and the Bank of England have engaged in extensive programs of large-scale asset purchases, initiated during the height of the crisis in 2008–2009 and continued in 2010–2011. These programs, termed quantitative easing, have been shaped by the dilemmas of conducting monetary policy in the neighborhood of the zero lower bound. They have been exploring what types of expansionary

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* The issues are discussed in several speeches by the Riksbank Governor and Deputy Governors. See, for example, Svensson (2010a, 2010b, 2010c).

monetary-policy measures can be taken as substitutes for the more traditional cuts in policy rates that are impeded by the zero constraint.*

The common belief is that the Swedish authorities did not engage in large-scale asset purchases as part of their crisis response. Unlike in the United States and the United Kingdom, in any case, the topic of quantitative easing seems to have been given little attention in Swedish public discussion of the Riksbank's monetary policy. Should the authorities have considered that option more explicitly? And—a more subtle question—is it even a correct perception that they did not at all engage in asset purchases?

It is instructive to remember that the final months of the Riksbank's direct crisis lending in kronor took the form of three auctions of fixed-rate loans. On each of the dates July 2, September 3, and October 22, 2009 the Riksbank auctioned the large amounts of SEK 100 billion in loans with maturities of approximately twelve months. The relative importance of these loans in the second half of 2009 is evident in the earlier Figure 13. Those Riksbank's loans were not motivated, at least not primarily, by the provision of emergency liquidity support. Rather, as explained in several Riksbank documents, the loans were intended to serve more traditional monetary-policy objectives.

The proper interpretation of the second-half 2009 fixed-rate loans with long maturities may be slightly controversial. By and large, however, most commentators agree that their purpose was to enhance the expansionary stance of policy. Nyberg states definitely that "the extensive fixed-interest rate lending implemented during the later part of the crisis ... was largely motivated by monetary policy objectives. By this point, the Riksbank had already lowered the repo rate as far as was deemed possible (to a quarter of a percentage point), but deemed that further monetary policy stimulation was necessary." The July 2009 *Monetary Policy Report* observed that, normally,

> the current level of the repo rate and expectations of what it will be in the future in their turn affect other interest rates with longer maturi-

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* Joyce, Tong, and Woods (2011); Benford et al. (2009); Joyce et al. (2010); Klyuev, de Imus, and Srinivasan (2010); Sack (2011); Hancock and Passmore (2011); Krishnamurthy and Vissing-Jorgenson (2011).

> ties and, through these, activity in the economy. *However, the Riksbank can also more directly affect interest rates further along the yield curve* [with the fixed-rate, longer-maturity loans].

The Riksbank booklet describing Swedish financial markets comments that

> The loans, or credit, that the Riksbank offered the banks during the financial crisis can be roughly divided into two categories. First, loans were offered at variable and fixed interest rates with the aim of increasing the banks' access to credit and thus promoting financial stability. These loans were provided in both US dollars and Swedish kronor. Second, three loans of SEK 100 billion each were offered at a fixed interest rate to give monetary policy the desired effect in the form of lower interest rates for households and companies ... These loans were current for most of 2010 and were thus mainly provided for monetary policy reasons, in contrast to the loans where the sole aim was to safeguard financial stability.*

The *Minutes* of the July 2009 Executive Board meeting reveal differences of view among the members about the degree to which the longer-maturity loans would effectively lower longer-term interest rates to borrowing households and nonfinancial corporations. But the Board members nonetheless supported the action.

Formally, the SEK 100 billion auctions of longer-maturity loans were of course not asset purchases. They were loans made against collateral. But one could argue that, given the collateral arrangements, the credit risk and term risk to the Riksbank of the loans were not very different from the credit and term risks that would have been associated with direct purchases of comparable-maturity securities from the banks. The ultimate effects on interest rates paid by household and nonfinancial corporations of the two options, direct lending against collateral and explicit asset purchases, might not have been all that different either. Broadly speaking, the similarities between the two options may be even more important than the differences. To put the same point more provocatively, we contend that the Riksbank put its

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* Nyberg (2011b); Riksbank, *Monetary Policy Report*, July 2009, p. 21 (italics added); Riksbank, *The Swedish Financial Market* 2011, p. 28.

toes in the water with a policy having many effects similar to those of the quantitative easing pursued by the Federal Reserve and the Bank of England.

Our last set of questions returns to the Riksbank's forward guidance during the crisis. Forward guidance has in practice been given not only about the level of the forecast path for the repo rate, but about the degree of uncertainty associated with that path. Typically the guidance looks forward for some three years beyond the date of each meeting of the Monetary Policy Committee. Guidance about the uncertainty has been embodied in so-called "fan charts," which plot 50-percent, 75-percent, and 90-percent confidence intervals *symmetrically* around the forecast path. Fan charts are produced not only for the repo-rate path, but also for the main-scenario forecasts for the annual growth rates of real GDP and the CPI.

The following chart, Figure 19, copies the fan charts published following the Executive Board's monetary-policy meeting on October 22, 2008.

The procedures for developing and communicating forward guidance were revised, as noted already, in February 2007. Much of the attention during the days of any decision period (the preparation of the draft Monetary Policy report, its development of the main scenario and alternative scenarios, Executive Board discussion of the draft report, and the repo rate decision itself) is directed at the *level* of the rate (the current value of the rate from which the forward guidance path starts) and the *level* of the guidance path as it evolves over the forthcoming several years. As far as we have observed, the uncertainty bands around the forecast path and the length of the interval over which the path and the uncertainty bands extend into the future tend to receive secondary attention. It appears to be taken as given that the uncertainty bands will be *symmetrical* about the level of the path and that the time horizon will be set at a *standard interval of about three years* (12–14 quarters).

For each round of the policy cycle, the Riksbank staff creates the uncertainty bands for the forward paths. The primary inputs are the Riksbank's historical forecast errors. The bands are created for the forecast paths for the CPI index, real GDP, and the repo rate for the main scenario—as in the example in Figure 19. The method of calculation for the uncertainty bands, emphasizing historical forecast

Figure 19a. Repo Rate with Uncertainty Bands, Percent, Quarterly Averages

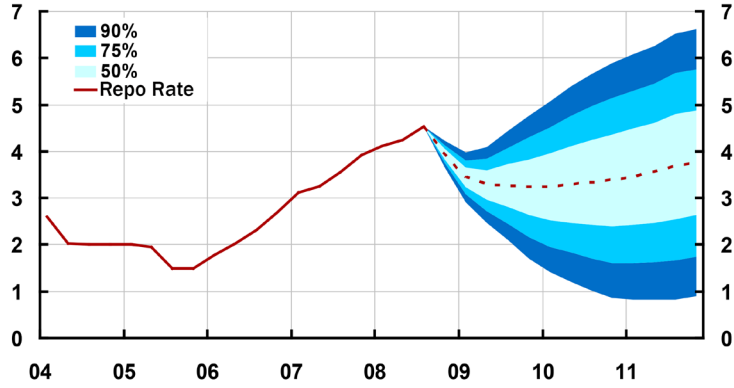


Figure 19b. CPI with Uncertainty Bands, Annual Percentage Change

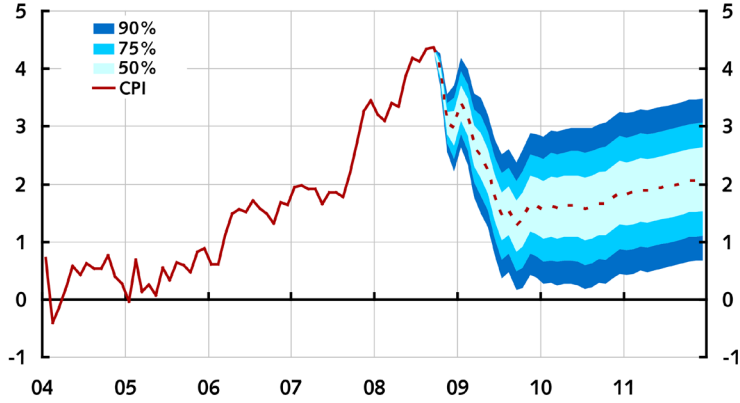
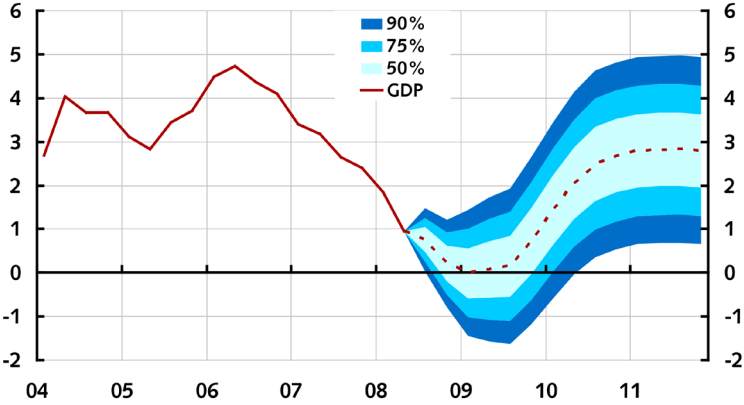


Figure 19c. GDP with Uncertainty Bands, Annual Percentage Change, Seasonally Adjusted



Sources: Statistics Sweden and The Riksbank.

errors, dates back to 2007.* The staff also typically prepares level paths for two alternative scenarios; the alternatives usually assume a stronger, faster-growing economy with an associated forecast higher repo-rate path, and a weaker-growth economy with its associated forecast lower repo-rate path. We have learned that the staff does not typically calculate uncertainty bands for the alternative-scenario forecast paths.

The Riksbank's announced forecast paths, for reasons already summarized, are the most influential method used to communicate the Riksbank's intentions about future policy to the public. The paths are at the heart of trying constructively to influence the public's expectations about policy decisions. Thus searching questions should be asked about the decisions on forward guidance. Can the substance of the procedures bear close scrutiny? Has the communication of forward intentions been well designed? Has it been bold enough and clear enough?

All central banks have been struggling with these forward-guidance questions. And the preoccupation with the issues has only increased because of the proximity of official policy rates to the zero lower bound.**

In our view, most central banks have insufficiently focused on the uncertainty aspects of forward guidance. Nor have they given enough attention to how to incorporate their judgments about forward-looking uncertainty into their communications with the public. We believe that these criticisms apply to the Riksbank. For example, in the Executive Board's monetary-policy meetings, members frequently address the details of the levels of alternative paths for the repo rate, or for levels of the paths for key target variables. Much emphasis is placed, appropriately, on how the paths may or may not help in shaping expectations

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* *Monetary Policy Report* 2007:1 (February), "Calculation Method for Uncertainty Bands" (p. 22) and "Riksbank to publish its own forecast for the repo rate" (pp. 19–21). The uncertainty bands for the CPI index and real GDP are dependent on historical forecast errors for those variables themselves. When calculating the bands for the repo-rate path, the staff bases the bands on the historical forecast errors for implied forward rates adjusted slightly to take into account the existence of risk premiums.

** In the U.S. case, both Federal Reserve Board Chairman Bernanke (2011) and Vice Chair Yellen (2011a, 2011b) have given recent speeches highlighting "forward guidance" and alternative procedures for communicating it. Bernanke remarked that "... for central banks with policy rates near the zero lower bound, influencing the public's expectations about future policy actions became a critical tool."

about Riksbank policy. Uncertainty about the future is stressed generally. But the uncertainty bands to be included as part of the forward guidance and the manner in which to discuss the bands in public communications receive much less emphasis.

It might be helpful in thinking about the uncertainty aspects of forward guidance to differentiate between non-crisis and crisis conditions. To be sure, there can be no clear dividing line between crisis and non-crisis times. And yes, when making forecasts there is an understandable proclivity to assume that the current degree of uncertainty is greater than usual. When statisticians have studied historical forecast errors, it is sometimes found that the track record of forecasts is not as bad as one might suppose from evaluating the uncertainty inherent in statistical or econometric models. Even so, periods such as 2008–2009 were so exceptionally uncertain that they probably justify atypical responses. For sailors and non-sailors alike, the global crisis was a hurricane, not merely a storm!

We take it as given that the levels of forward-guidance paths and what is said about the degree of uncertainty associated with them are both fundamental aspects of the communication problem. And our predisposition is that—*during crisis times of severe financial stress*—the uncertainty aspects of forward guidance should be emphasized perhaps even more than forecast levels.

The Bank of England is an interesting case because it has emphasized uncertainty considerations more than most central banks. It early emphasized fan charts for its inflation and real GDP forecasts. And it has applied considerable technical sophistication to the construction of the uncertainty bands around their forecasts. For example, the Bank of England staff uses procedures for weighting the risks associated with the various different shocks in their models. Their procedures accommodate the likelihood that revisions will be made to the historical data available at the time of a Monetary Policy Committee meeting. Their uncertainty bands need not be symmetric about the mode or mean of the forecast paths. Their analytical procedures and public communications appear to embody a treatment of the uncertainty aspects of forward guidance more nuanced than at other central banks.*

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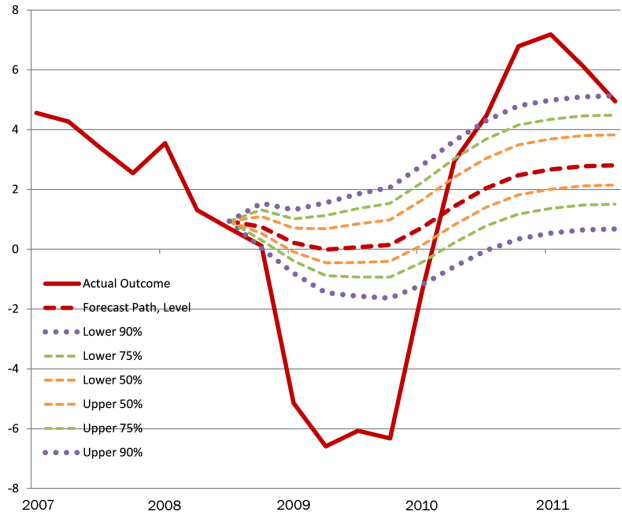
* Elder et al. (2005); Britton, Fisher, and Whitley (1998).

Notwithstanding that more nuanced approach, the Bank of England has not chosen to announce an intended path for an own forecast of their official policy rate. In that respect, the Bank of England relative to the Riksbank is less transparent—less open and less clear—in their communication with the public.

When we focus on the Riksbank's forward guidance in the period 2008–2009, we are inclined to believe that too little was publicly said about the possible consequences of the severe uncertainty for the target variables of monetary policy. And we wonder if it might have been helpful to amend the procedures for presenting the uncertainty bands. Use of a fan chart in communications with the public encourages the tendency to focus on uncertainty about the levels of forward paths. At best, the fan chart can call vivid attention to the risks in the economic outlook and thereby promote a more reasoned debate about policy decisions. But if the procedures for calculating and presenting the uncertainty bands in the fan chart seem relatively mechanical and receive little or no textual exposition, the chart may not catalyze a better debate. The difficulties of understanding for the public are especially great in times of crisis.

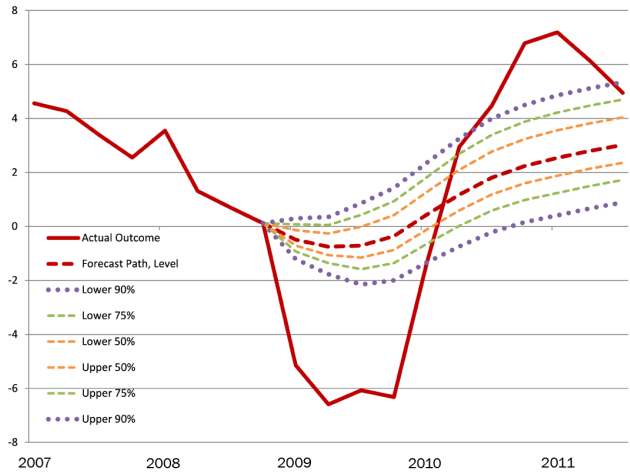
To illustrate, consider again the fan chart for the annual percentage change in real GDP from the October 2008 *Monetary Policy Report* (Figure 20). The chart shows the level of the forecast rate of change falling to 0 percent and remaining there until the second half of 2009; the worst outcome envisaged in the October report, at the edge of the 90 percent confidence interval, is a negative rate of change of one and one half percent. The fan chart is supposed to be constructed so that in any quarter of the forecast period, the rate of change of real GDP is expected to lie somewhere within the fan on 90 out of every 100 occasions.

Figure 20. The Riksbank Monetary Policy Report October 2008: Swedish Real GDP Growth Rate, Forecast Path and Uncertainty Bands, Actual Outcome, Annual Percentage Change, Seasonally Adjusted



Source: The Riksbank.

Figure 21. The Riksbank Monetary Policy Update December 2008: Swedish Real GDP Growth Rate, Forecast Path and Uncertainty Bands, Actual Outcome, Annual Percentage Change, Seasonally Adjusted



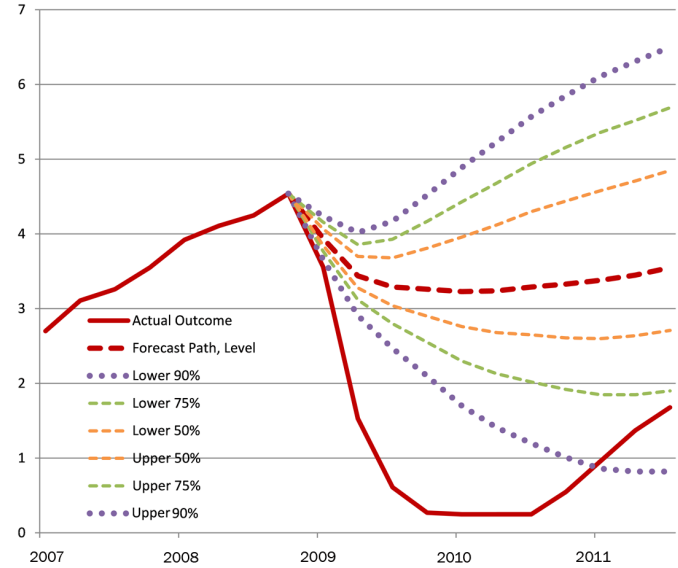
Source: The Riksbank.

Only in 10 out of 100 occasions would the rate of change be expected to fall outside the fan, and only half of those would be outside the fan on the downside. In reality, in subsequent months the crisis turned out to have dramatically worse implications for Swedish exports and for Swedish GDP than was expected in October 2008, even though the financial hurricane had started a month before the October monetary-policy meeting. As of 2011, the actual rates of change during the fourth quarter of 2008 and the first two quarters of 2009, respectively, turned out to be negative rates of minus 5½, minus 6½, and minus 6 percent. Those values are very far below the fan chart from October 2008—outside of the fan by a huge distance, meaning of course far outside the range of historical forecast errors.

The uncertainty bands for the rate of change in real GDP presented in the December 2008 *Monetary Policy Update* (the meeting being held in early December) acknowledge the uncertainty of likely outcomes a bit less badly than the bands constructed in October. But as can be seen in Figure 21, the December fan chart constructed with historical forecast errors still badly failed to convey the true magnitude of the uncertainty that lay ahead. The bottom edge of the 90 percent confidence range in the December fan chart—close to the worst that was imagined—never falls below a negative rate of slightly less than 2 percent. The rates actually observed in the summer of 2009 for three quarters in a row were, again, on the order of negative 6 percent.

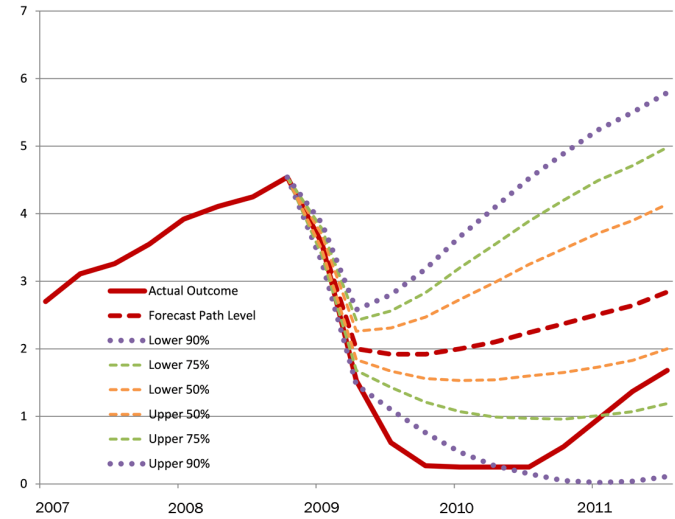
Figure 22 shows the fan chart for the repo rate from the October 2008 Report. The *bottom edge* of the October fan chart indicates quarterly-average repo rates of 3.29 percent and 3.26 percent for the second and third quarters of 2009. The actual quarterly averages for the second and third quarters of 2009 turned out to be 0.61 percent and 0.27 percent, far outside the fan chart uncertainty bands presented in October. The December 2008 fan chart (see Figure 23) moved the uncertainty bands considerably lower. The bottom edge of the December fan chart for the second and third quarters of 2009, however, still indicated quarterly-average repo rates as high as 1.92 percent. So even by December, the repo-rate fan chart failed to suggest well the intensity of the uncertainty that was in the pipeline.

Figure 22. The Riksbank Monetary Policy Report October 2008: Repo Rate, Forecast Path and Uncertainty Bands, Actual Outcome, Percent, Quarterly Averages



Source: The Riksbank.

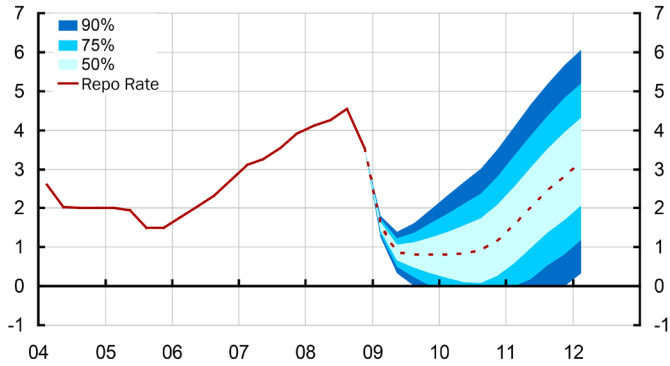
Figure 23. The Riksbank Monetary Policy Update December 2008: Repo Rate, Forecast Path and Uncertainty Bands, Actual Outcome, Percent, Quarterly Averages



Source: The Riksbank.

By the December 2008 *Monetary Policy Update*, the 90-percent bottom edge of the fan chart for the repo rate was shown as asymptotically touching zero, but not until the end of 2010. By February 2009, the repo rate had been reduced much further and the awkward question came to the fore of whether the fan chart uncertainty bands should be shown as constrained by the zero lower bound. The procedure in place for calculating the uncertainty bands, based on historical forecast errors, indicated that the 90-percent lower edge of the fan would enter negative territory in the middle of 2009. But the decision was made that the fan chart should not pierce the zero lower bound (Figure 24).

Figure 24. The Riksbank Monetary Policy Report February 2009: Repo Rate with Uncertainty Bands, Percent, Quarterly Averages

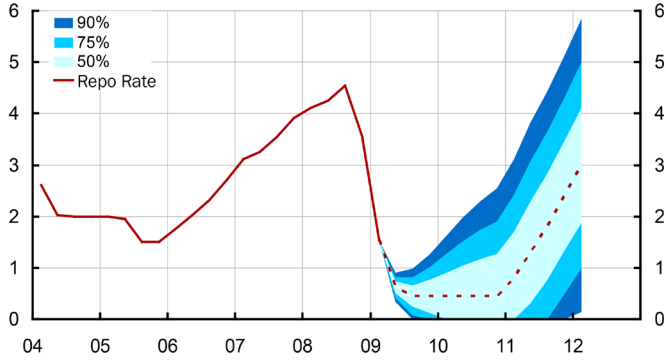


Source: The Riksbank.

A reluctance to show a piercing of the zero lower bound continued in the April 2009 *Update* (Figure 25) even though the customary calculation of the fan's uncertainty bands heightened the dilemma further.

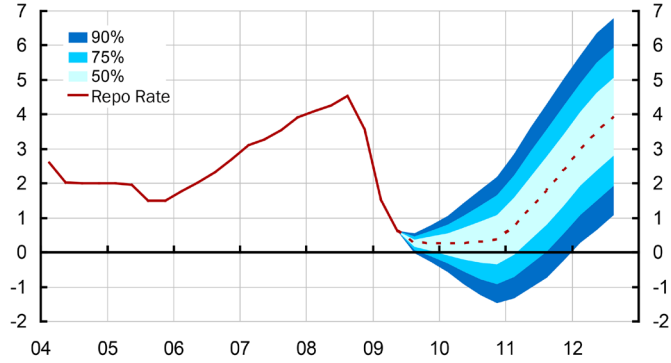
The Riksbank decided to treat the zero lower bound issue in the fan chart differently only at the early July meeting and in the publication of the July 9 *Monetary Policy Report*. Thereafter the lower portions of the fan chart showed negative rates to the extent that the customary calculation procedures produced a piercing of the zero bound.

Figure 25. The Riksbank Monetary Policy Update April 2009: Repo Rate with Uncertainty Bands, Percent, Quarterly Averages



Note: The uncertainty interval does not take into account the zero interest rate bounds.
Source: The Riksbank.

Figure 26. The Riksbank Monetary Policy Report July 2009: Repo Rate with Uncertainty Bands, Percent, Quarterly Averages



Source: The Riksbank.

Could the difficulties just discussed about communicating the uncertainty aspects of forward guidance in severe crisis conditions be mitigated by modifications or refinements to the procedures? We are not confident that the question can be answered yes. But we can imagine that further study of the possibilities is justified. One candidate for review is the calculation of uncertainty bands dependent only on historical forecast errors. In the heat of a crisis, when many aspects of the evolving situation may be radically different from past non-crisis

conditions, historical forecast errors may be much less relevant than in normal times. A temporary abandonment of the customary procedures, introducing elements of discretionary judgment and contemporaneous conditions into the construction of the uncertainty bands, might be appropriate.*

One might also study the pros and cons of a temporary shortening of the time horizon over which forecast levels and uncertainty bands are to be presented. Even for non-crisis conditions, the further ahead is the time horizon for a forecast, the greater is the uncertainty about outcomes; hence analytical procedures typically widen the uncertainty bands.** But for severe crisis conditions, could a temporary shortening of the horizon—not presenting any forecast path at all beyond, say, four quarters—send an even stronger signal about the heightened degree of uncertainty?

It would also be appropriate to consider abandoning—temporarily, and perhaps even permanently—the presentation of bands that are symmetric about a forecast path. Allowing asymmetric bands might better capture the skewed uncertainty often present in severe crisis situations. Asymmetric bands would have to embody significant elements of discretionary judgment that depart from historical forecast errors. But on balance that departure in crisis conditions might well be justified.

A final suggestion for study is to consider an enhancement of the textual discussion of uncertainties in the *Monetary Policy Reports* and *Updates*. If the Riksbank Board and staff are extremely worried about some possible developments in severe crisis conditions, they should perhaps provide a more detailed discussion of those possibilities in

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* We learned of a Riksbank staff study of which we had previously been unaware just prior to finishing our report: Kjellberg and Villani (2010). The Kjellberg-Villani paper demonstrates that the Riksbank staff has already been focusing on several aspects of the uncertainty issues we identify, in particular the manner in which to use historical forecast errors. This work and our own thinking both support the objective of improving the Riksbank's communication of uncertainty in its forward guidance.

** This tendency can to some degree be seen in the Riksbank fan charts illustrated earlier. In the October 2008 *Monetary Policy Report* and December 2008 *Update*, for example, the fan charts for the repo rate and the rate of change in real GDP widen substantially as the time horizon lengthens.

their forward-guidance communication. In practice, such enhancements might be folded in with the typical analyses of alternative scenarios. As always, policymakers must find a judicious tradeoff between saying too little and too much. Enhanced discussion of uncertainties runs the risk of unduly exacerbating public fears and expectations (crying "FIRE" in a crowded theater). But saying too little risks non-transparency for policy decisions and will fail to advance a more reasoned, sober public discussion.

We of course realize that the suggestions we have made here are contentious. Simple procedures, even if mechanical and inadequate, can be objective and explained. Introducing a greater degree of judgment and flexibility would undermine continuity and might hamper public understanding. Hence on this dimension too, a complex tradeoff needs to be faced. Policymakers confront a subtle challenge in trying to strike a balance between objectivity and consistency of presentation versus flexibility to incorporate major changes in the forecasting environment.

Exiting from Crisis Conditions in 2010–2011

We have so far been examining Sweden during the period of global financial crisis. But before going on, it seems timely to comment briefly on more recent financial developments and policy choices in the years 2010–2011. This recent period, when the severe strains of the crisis were somewhat dissipating, has been characterized by a debate within the Riksbank about the most appropriate stance for the Riksbank's forward guidance for the repo rate. Differences of view about actual choices for the forecast levels of the repo rate have in turn been influenced by differences of view about the analytical techniques to be used for framing the choices.

The uncertainty dimensions of forward guidance, we have argued, were probably unusually important during the peak months of the crisis. Yet they seem likely to have continued to be important as Sweden began to emerge from crisis conditions. The debate about forward guidance within the Executive Board and the staff of the Riksbank, moreover, seems to have turned in part on how the framing of *alternative* policy paths should take into account the uncertainty aspects of the economic and financial outlook.

Was Sweden actually leaving crisis conditions behind in July 2010? Was it not time to begin the process of raising the repo rate gradually back toward more "normal" conditions? Much of the incoming evidence about the Swedish economy seemed to point in that direction. Conditions in money and credit markets had been gradually less strained, in several ways moving back towards calmness. Export demand was recovering sharply and other demand sectors showed strength. The bounce back in the rate of growth in real GDP was dramatic and encouraging (see, for example, the actual outcome for real GDP growth in late 2009 and in 2010 plotted in Figures 20 and 21).

At the June/July 2010 Monetary Policy Meeting, the issue was actively debated whether it would be inappropriate to continue the repo rate at the low level of 0.25 percent (first set in July 2009 and kept in force for the year since then). Amid some controversy, a majority of the Executive Board voted to begin a gradual process of raising the repo rate; the rate was increased by 0.25 percent to a level of 0.50 percent with the forward-guidance main-scenario path projecting gradual further increases over the next three years. Two Board members dissented. They preferred a forward-guidance path that kept the repo rate at 0.25 percent for several more quarters and then raised it gradually toward the main-scenario path.

The *Monetary Policy Report* approved at the June/July 2010 meeting stated that "The Swedish economy is developing strongly following the severe downturn. The repo rate now needs to be raised gradually towards more normal levels to attain the inflation target of 2 per cent and to ensure stable growth in the real economy." In addition to the main forecast scenario, the Report identified, as always, two alternatives, one weaker and the other stronger relative to the main scenario: "If the uncertain situation in Europe deteriorates, resulting in increased unease on the financial markets, monetary policy may need to be more expansionary than is forecast in the main scenario. The strong growth in the Swedish economy may on the other hand turn out to be more powerful than expected, and then the repo rate may need to be raised at a faster pace in the period ahead."*

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* Riksbank, *Monetary Policy Report*, July 2010, main summary page.

The differences of view about the June/July 2010 decision, and indeed the typical division of the Executive Board into majority and minority views throughout Board meetings since 2008, can be explained in large part by differences of judgment about the appropriate analytical approach for making decisions. In particular, the differences arise when comparing, and choosing among, alternative forecast paths.

The minority Board members, Lars Svensson and Karolina Ekholm, favor an approach based on forecasts of the two standard target variables of flexible inflation targeting, price stability and "normal" resource utilization. In a typical forecasting round, the Riksbank staff in consultation with the Executive Board develops a main scenario and (usually in less detail) two alternative scenarios whose assumptions depart in opposite directions from those used to prepare the main scenario. For each of the three scenarios, the minority asks the staff to calculate the mean of the cumulative squared deviations over the forecast horizon for (i) forecasted inflation around the specified target path for inflation and (ii) forecasted resource utilization around the specified target path for resource utilization. These measures are labeled, for short, "mean squared gaps (MSGs)."*

The Board minority's analytical approach compares the alternative scenarios in terms of their MSGs for inflation and resource utilization. In cases for which the MSGs for *both* inflation and resource utilization are smallest for one scenario, the policymaker should, it is argued, unambiguously choose that scenario.** In other cases, if one scenario has a smaller inflation MSG but a larger resource-utilization MSG relative to the other scenario, the policymaker must choose between scenarios on the basis of preference weights for the MSGs of the two target variables. Beginning in October 2008 and continuing up through

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* Some details of these calculations are second-order controversial (for example, whether to focus on output or employment measures of normal resource utilization, and how to discount deviations further out in the future relative to near-term deviations). But by and large the calculations are straightforward once the measures and targets for inflation and resource utilization have been chosen.

** See, for example, Svensson (2010c, 2010d).

September 2010 (with an exception in July 2009), the main scenario path for the repo rate showed inferior mean-squared-gap performance for both inflation and resource utilization.* The Board minority based their dissents on these MSG calculations.

The Board majority—Stefan Ingves, Lars Nyberg, Svante Öberg, and Barbro Wickman-Parak—had differences among themselves on numerous issues. But they had in common a tendency not to want to choose among alternative scenarios primarily on the evaluation of the mean squared gaps. It is therefore important to understand what other considerations they took into account and what analytical approach or approaches were adopted for their choices. Board members might have been emphasizing target variables in addition to inflation and resource utilization. In the Board Minutes, for example, concerns were often expressed that credit expansion to households was likely to grow too rapidly. Some majority members emphasized that a very low level of interest rates could adversely affect long-run expectations.** Other majority members spoke of unexpectedly robust growth in exports, unusual buoyancy in wage bargaining rounds, or excessively rapid recovery rates in GDP growth. Others expressed lack of confidence in the alternative forecasts underpinning the MSG calculations. That position probably reflected doubt about whether prospective inflation pressures were being adequately captured in staff-generated analyses.***

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* Mean squared gaps for all of the *Monetary Policy Report* dates from June 2007 through December 2010 are charted on pages 66–69 in the Goodhart-Rochet report (2011).

** In the Minutes for the June 30, 2010 Meeting at which the Board began the process of raising the repo rate, for example, Öberg remarked that "A further reason for beginning to raise the repo rate ... was that it will mark that interest rates will in the long run be much higher than they are now. If companies and households base their decisions on unrealistically low long-term interest rate expectations, this may lead to unsustainably high loan levels and distorted investment decisions, which in turn can have negative effects on production and employment."

*** Wickman-Parak commented at the June 30, 2010 meeting: "The gap analyses have been discussed on several occasions, as has the uncertainty they are burdened with. This means that the calculations cannot be regarded as absolute truths ... Ms. Wickman-Parak went on to say that her decision to support the repo-rate path in the main scenario was influenced by the fact that she could not relax entirely with regard to inflation further ahead. Although resource utilisation is low and unemployment is

To frame the situation more abstractly, the majority and minority Board members may well have somewhat different loss functions in mind. Or they may have a different level of confidence in the analytical models used by the staff to develop the main scenario and the alternative scenarios. Or perhaps they favor a different treatment of uncertainty in how policy choices should be made.

The differences of view among Board members during 2009–2011 about the substance of forward guidance are a first-order issue. Modestly different projected levels for the repo-rate forward-guidance path are associated with likely significant differences in possible outcomes for the economy. A difference of 25 basis points between two alternative paths maintained over several future quarters, for example, could have significant consequences for inflation, output, and other key Swedish variables.*

The differences in analytical approaches among Board members were present before July 2010 when the repo rate was first raised from its low crisis level of 0.25 percent. The different approaches have persisted, perhaps even intensified, since July 2010. A convergence, let alone a resolution, does not yet seem in sight.

Neither the majority nor the minority in the debate has placed substantial emphasis on the uncertainty bands that in principle surround forecast path levels. As noted earlier, the Riksbank staff apparently does not calculate uncertainty bands for the alternative low and the alternative high scenario paths. An incrementally helpful step would be to ask the staff to prepare uncertainty bands, at least roughly, for the alternative scenarios as well as the main scenario.

Should the analytical treatment of uncertainty in the preparation of forward-guidance paths help to determine the choice among the

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high now, what will happen when the demand for labour accelerates; is it certain that companies will be able to find suitable labour? ... A lower repo-rate path ... would accentuate the risks mentioned regarding inflation."

* The estimated sizes of the effects depend in principle on whether newly announced paths are unanticipated or largely anticipated, and more generally on the credibility of forward-guidance communications.

paths? That question is subtle and unresolved.* It is subtle because the existence of uncertainty, great or small, does *not* by itself constitute persuasive grounds for relying on one or another particular analytical approach. All approaches whether model-based or judgmental should try, systematically or at least judgmentally, to incorporate sensitivity to uncertainty. It is definitely true that all existing models are unable to capture adequately the uncertainty dimensions of financial strains, whether severe or moderate. This unfortunate situation does not imply as some outside commentators have done—deliberately or inadvertently—that analysis stemming from the existing models should simply be set aside. Rather it implies that all model-based analysis must be cautiously amended by judgmental adjustments. The difficult tasks are to determine how best to combine model-based and judgmental analysis and how best to explain the process to the public. The current debate is a prime example of how very difficult these tasks can be.

* Svensson (2011) argues that, in most cases, policymakers should base their decisions on mean forecasts alone without any allowance for uncertainty as is implied by certainty equivalence: "One can go further and discuss to what extent mean forecast targeting (relying on certainty equivalence and hence only on mean forecasts) is still a good approximation when there is model uncertainty, multiplicative uncertainty, and so on—in practice there is usually not sufficient information to know if a policy should be more or less aggressive than the certainty-equivalent one, so that [a certainty-equivalent policy] is still usually warranted (the main exception is the nonlinearity caused by the lower bound for nominal interest rates)."

Swedish Financial Policies Looking Ahead

THE PRECEDING PART of the report reviews Swedish financial policies during the global financial meltdown. In this part, rather than looking in the rear-view mirror, we look beyond the past crisis to discuss the conduct of financial policies in non-crisis, or at least more normal, conditions.

True, at the time this report was drafted, it remained unclear whether world and especially European financial markets—and hence even Sweden itself—really had left the 2007–2010 crisis behind. On those days during the fall of 2011 when European sovereign debt problems roiled markets, analysts were even speculating about a new severe crisis. Being optimists, we hope Sweden will experience a more tranquil world environment in future years. Regardless of bumps in the road ahead, however, it makes sense to clarify appropriate behavior for non-crisis conditions. (By "non-crisis conditions" we do not mean periods in which financial stresses are completely absent, but rather periods that at least are not dominated by severe strains.)

We take the objectives of financial policies to be stability of the real economy and the financial system—for short, economic and financial stability. It is commonly assumed that economic stability can be adequately represented by a combination of inflation stability and employment (or output) stability. No such consensus exists about the representation of financial stability. Agreement does exist that reducing distortions in the financial system promotes financial stability as well as increasing efficiency.

The global financial crisis has altered the debate about how to conduct financial policies in at least four important ways. First, central banks, market participants, and analysts in general are taking much more seriously the view that traditional monetary policy should give higher priority to financial stability. Second, they are according new urgency to making improvements in prudential policies. Third, they are recognizing that traditional monetary policy and prudential policies have important implications for one another so that they probably should be coordinated if they are to be used to best advantage. Fourth, given these new preoccupations, government authorities and outside observers are focusing anew on the institutional allocation of the responsibilities for the various financial policies—both within national governments and among international institutions. The following sections take up all four of these themes in turn, concentrating on implications and applicability for Sweden.

Possible Modifications for Traditional Monetary Policy?

Policymakers and analysts take it for granted, in Sweden and elsewhere, that traditional monetary policy will continue to give high priority to economic stability. The open question is how much priority they should give to *financial* stability. Although that issue has long been the subject of debate, the discussions have grown more intense following the severe crisis in 2008–2009.

The debate often focused on whether a central bank's policy rate should respond to some measure of financial stress. Before the global financial crisis, a majority of policymakers held the view that it should not. The conventional wisdom, especially at inflation-targeting central banks, argued for paying attention to financial developments such as credit-financed exuberance in real estate markets only insofar as such a boom directly affected the prospects for price stability or a balanced utilization of real resources. Such analysts opposed using monetary policy for "leaning against the wind" and instead advocated a posture of being prepared to "clean up afterwards." Furthermore, participants on both sides of the debate downplayed the possibility that prudential regulations might play a significant role in maintaining financial stability.

There are at least two reasons why a central bank might want to take account of measures of financial stress. It might want to respond to changes in interest-rate spreads and lending terms. As cyclical conditions worsen, for example, spreads between the policy rate and the rates that affect spending decisions may increase and lending terms might tighten. As a result the central bank might choose to lower the policy rate more than it otherwise would so as to achieve desired decreases in private borrowing rates and the resulting increases in lending. As discussed earlier, the central bank would certainly feel pressure to do so in severe crisis conditions. But it might feel justified in trying to take account of changes in spreads and lending terms even if the stress were mild rather than severe.

A second possible reason would be to attempt to lower the probability of a future financial crisis. For example, asset price increases or credit growth might be more rapid than seems justified on the basis of fundamentals. Policymakers might be concerned that a "bubble" in asset markets could burst causing a financial crisis. Policymakers might thus choose to raise the policy rate more than they otherwise would to try to slow asset price increases or credit growth by "leaning against the wind." Such behavior would constitute ex ante "crisis prevention."

In our earlier discussion of interest-rate spreads and crisis management, we noted that in non-crisis conditions it tends to be assumed that changes in spreads are small enough that they can safely be ignored. Indeed, the standard pre-crisis specifications of interest-rate rules typically used to judge whether monetary-policy decisions are appropriate relied implicitly on that assumption. But it quickly became clear when the crisis erupted that the assumption of constant spreads was untenable.

We reported in the earlier discussion that several academic studies have suggested the possible merits of policymakers focusing on changes in spreads in times of financial crisis. Those studies modify the policy reaction function to incorporate changes in the spread between a relevant private interest rate and the official policy rate. With a coefficient of unity on the spread term in the interest-rate rule, changes in the spread brought about by crisis conditions would be fully offset by changes in the policy rate.

If such a pragmatic fix-up might prove a helpful guideline during a

crisis, is there a case for using a spread fix-up in non-crisis conditions to compensate for the effects of milder financial stress? Several studies pursue this line of inquiry.* If policymakers can entertain the addition of spread variables to their reaction function to foster ex ante crisis prevention, why not other measures of financial conditions as well? The essence of the proposal can again be summarized with abstract representations of the central banks' preferences and its interest-rate reaction function. Assume that the loss function, the shortcut way of expressing policymakers' preferences, is now defined over three target variables, again in deviation form: the deviation of inflation (π_t) from a target value (π_t^*), the deviation of output (y_t) from a target value (y_t^*), and the deviation of a measure of financial stability (f_t) from a target value (f_t^*):

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[\left(\pi_t - \pi_t^* \right)^2 + \lambda_y \left(y_t - y_t^* \right)^2 + \lambda_f \left(f_t - f_t^* \right)^2 \right]$$

For the measure of financial stability (f_t), imagine that the policymakers choose the ratio of bank (financial intermediary) credit to output. This measure is one of those being actively discussed by policymakers. Other possible measures of financial stability include, in addition to interest-rate spreads, asset prices or indexes comprising several variables. Then the corresponding reaction function would be represented as:

$$i_{p,t} = i_{p,t}^* + \alpha_\pi \left(\pi_t - \pi_t^* \right) + \alpha_y \left(y_t - y_t^* \right) \pm \alpha_f \left(f_t - f_t^* \right)$$

and the policymakers would be described as seeking the best possible outcome for the economy by minimizing the squared deviations of the forecasted paths of π_t, y_t, and f_t from the desired paths for the target variables π_t^*, y_t^*, and f_t^*. The sign before the coefficient α_f is negative if f_t represents a spread and positive if it represents, for example, a credit variable.**

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* One example is Cúrdia and Woodford (2009).

** Aydin and Volkan (2011) present a DSGE model with a financial sector. They show that, depending on the source of shocks to the economy, outcomes may be improved by including a financial stability variable in the interest rate reaction function *even when the only deviations that enter the loss function are those for inflation and output.*

Participants in the debate about how much attention monetary policy should pay to measures of financial stability tend again to fall into two groups. One group, contrary to the former conventional wisdom, argues that the central bank should respond not only to deviations of inflation and output from desired values but also—as in the previous example of the bank's reaction function—to deviations of a financial-stability indicator from a desired value, taken to be some "normal" value. Normal values are those deemed consistent with "fundamentals." Large deviations from normal values are sometimes referred to as "bubbles." According to this group the central bank should incur the costs of "leaning against" or even "pricking" bubbles at an early stage because the costs of dealing with the aftermaths of the later crashes associated with the "bursting" of bubbles are greater.

In contrast, the other group, holding the former majority view, argues that the monetary authorities should not respond to bubbles but instead should stand ready to help mitigate the effects of the asset-price declines and credit losses that occur when they burst. It is preferable for the central bank to wait "to clean up afterwards," asserts this view, because bubbles are too difficult to recognize and the interest-rate increases required to prick them do too much damage to the rest of the economy.

Those opposed to leaning against the wind to foster ex ante crisis prevention have specified three conditions that should be satisfied, they say, before raising the policy rate by an extra amount to counter a bubble. First, policymakers must be able to identify bubbles with reasonable accuracy and at an early stage to avoid taking actions that unnecessarily slow the economy or that reinforce the negative effects of an ensuing crash. Second, there must be a good chance of damping speculative activity with policy-rate increases that do not take too heavy a toll on the rest of the economy. Third, the costs of ending the bubble early must be less than the costs of waiting to take action until after the crash.* But these conditions are stringent and were first enunciated

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* These conditions are paraphrased versions of those in Kohn (2008). See also Kohn (2006).

before the global crisis. The conviction that all three must hold may have softened somewhat. And there may be a growing sentiment that, in a highly uncertain world, the conditions might even be satisfied so as to justify extra action against incipient bubbles.

When some analysts have framed the issue of fostering financial stability, perhaps they have been excessively preoccupied with the possibilities of blocking bubbles in market asset prices. It is often argued that policymakers cannot expect to judge whether asset prices are out of line any better on average than market participants. Even if this is so, policymakers will often have a comparative advantage in judging whether systemic risks are becoming excessive, whether market participants are on average indulging in overly optimistic levels of leverage and maturity transformation.

Before the global financial crisis, the discussion on these issues was relatively narrow: it was asked whether the policy rate should respond to a financial-stability variable in addition to responding to the usual output and inflation variables. But after the crisis, the debate has shifted ground. The debate now is broader, more about how to inhibit systemic financial strains and how to support financial stability more generally. The strong opposition to the general idea of leaning against the wind, interpreted loosely as putting greater emphasis on financial stability, has softened. And even though crisis tensions have partially dissipated, the still vivid memories of the meltdown turmoil have encouraged more sympathy for attempts to reduce the probability of future crises.

For example, according to Michael Woodford

> ... central banks should admit that monetary policy may well have consequences for financial stability, rather than pretending that the issue should not be their responsibility because they have no influence over it; and ... they should recognize that it would require considerable luck for the policy that best serves their traditional stabilization objectives to turn out always to coincide perfectly with the one that is best from the standpoint of financial stability. Accordingly, I believe that it is appropriate for a 'flexible inflation targeting' central bank to endeavor to balance financial stability objectives against both its price

stability objective and its concern for output-gap stabilization, when choosing among alternative short-run paths for the economy at a given conjuncture.*

Policymakers charged with traditional monetary policy will understandably look to prudential instruments for a major part of the task of ex ante crisis prevention. That proclivity, however, should not rationalize a complete neglect of the issues of financial stability when making monetary-policy decisions. There is increasing agreement that it is unwise to rely solely on prudential instruments for reducing the risks of financial instability.

Prudential Instruments and Financial Stability

DEFINITIONS, RATIONALES, CLASSIFICATION

Prudential financial policies are designed to avoid externalities generated by the behavior of financial institutions. Many prudential instruments can be used for both microprudential purposes, those related to individual institutions, and macroprudential purposes, those related to whole sectors of the financial system. The report "Central Bank Governance and Financial Stability," by an international study group, addresses the question of how to set a prudential instrument for a given financial institution at a given time.** It observes that the appropriate setting depends on three types of considerations: structural, cross sectional, and cyclical. An additional consideration is whether the institution is a SIFI.

We use (risk-based) capital requirements to illustrate the use of these definitions and to explain their rationales. In the language of the study group report, structural capital requirements might be augmented by "overlays" of cross-sectional, cyclical, and possibly SIFI requirements.*** The overlays and considerations that might lead to

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* Woodford (2011), p. 7.

** BIS (2011) [Ingves Report]. See also Ingves (2011a); Wickman-Parak (2010); BIS, Basel Committee on Banking Supervision (2011).

*** Requirements that are structural or cross-sectional are typically changed infrequently, so infrequently that they are sometimes labeled "set and forget" require-

imposing them are illustrated in Table 4. The illustration follows the general guidelines proposed in the new Basel III regulations.*

A motive for the basic structural capital requirement is to counter a financial intermediary's incentive (created by government explicit or implicit guarantees) to hold too little capital of its own. This consideration might suggest setting a structural capital requirement of, say, 7 percent for any financial institution that is eligible to benefit from state support of the financial system (deposit insurance and the lender of last resort).

A possible cross-sectional consideration is the fraction of a bank's loans that are made by its affiliates located abroad (in Sweden's case, the branches and subsidiaries outside Sweden that are supervised not only by the Swedish authorities but also by host-country supervisors). This consideration might suggest overlaying a cross-sectional capital requirement of, say, 2 percent that applies just to banks whose foreign affiliates make more than twenty-five percent of the loans on the consolidated balance sheet of the group.

At least two considerations might suggest overlaying additional capital requirements. One consideration is that financial intermediaries find it less expensive and difficult to raise additional capital in good times. Capital is more needed in bad times to cover losses. This consideration might suggest overlaying a countercyclical capital requirement. A capital requirement of say 2.5 percent could be added in good times to require institutions to build up capital but removed in bad times so that institutions could draw down their required capital to cover losses. A second consideration could be a conviction of the supervisory authorities that policy should limit the systemic negative

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ments. That labeling is potentially misleading, however, since structural and cross-sectional requirements could be varied through time (though probably to a lesser extent than cyclical requirements). For example, policymakers with responsibilities for microprudential and macroprudential policies could be assigned the authority for time variation of structural and cyclical requirements, respectively. Both types of requirements could exhibit cross-sectional variation. When the word "cyclical" appears by itself, it usually means "countercyclical." The term "time-variable" could be used to refer to requirements that can be varied over time without an explicit countercyclical motive for the variation.

* The text of the Basel III capital rules was issued at the BIS in December 2010. A revision was published in June 2011. See BIS, Basel Committee on Banking Supervision (2011).

externalities that can be generated by troubled SIFIs because of their size and interconnectedness. This consideration might suggest overlaying an additional capital requirement of, say, 2.5 percent that applied just to SIFIs.

Adding up all the overlays in this illustration, a SIFI in good times with more than twenty-five percent foreign-affiliate loans could have a capital requirement as high as 14 percent of its total consolidated assets.

Table 4. Illustration of Possible Layering of Capital Requirements

Type of Requirement	Consideration for Imposition	Requirement (Percent of Assets)
Structural	Capital too low	7.0
Cross-sectional	Foreign-affiliate loans exceed 25%	2.0
Cyclical	Cost of and need for capital	2.5
SIFI	Size & connectedness externalities	2.5
	Maximum requirement	14.0

By now it is well recognized that pre-Basel III capital requirements can have adverse procyclical effects on both individual financial institutions and the financial system as a whole. In a recession loan losses go up. If there is a constant capital requirement, intermediaries must either cut lending or raise capital. In either case, credit conditions are tightened rather than being loosened, thereby amplifying the cyclical behavior of credit. Higher average capital requirements may well be needed for prudential reasons, but procyclicality is to be avoided.

Indeed, cyclical considerations have been taken into account in the design of the basic Basel III capital requirement by including a "capital buffer." The minimum capital requirement for an institution is 4.5 percent; but each institution is required to hold a 2.5 percent "capital buffer," bringing the total structural capital requirement to 7 percent. During bad times an institution can allow its capital to fall below 7 percent. If an institution falls below the seven percent limit, however, its entitlement to pay dividends and to conduct share buy-backs will be restricted. The proportion of profits that must be retained within the institution increases the more the institution falls below the seven percent limit.*

* It may be that these new regulations are simply a way of institutionalizing what

Table 5a. Prudential Instruments Affecting Individual Transactions

		Type of Obligation	Currency		Borrower		Lender	
			Home	Foreign	Home	Foreign	Home	Foreign
Lending	Loan to value (LTV) ceilings	mortgage	X		X		X	
	Loan to income (LTI) ceilings	mortgage		X	X			X
	Minimum haircuts or margins on secured lending	broker loans	X			X	X	
Borrowing	Reserve requirements on deposits	demand	X		X			X
	Reserve requirements on non-deposit borrowing[a]	overnight		X	X			X
Capital Movements	Capital controls	stock	X		X			X

[a] An alternative is taxes on non-deposit borrowing

Table 5b. Prudential Instruments Affecting the System as a Whole

Balance Sheet Requirements for	Risk adjusted capital
	Type of capital counted
	Leverage
	Provisioning
	Loan to deposit ratio
	Total lending
	Geographic, industrial, and institutional concentration
	Liquidity (aggregate and by currency)
	Foreign-exchange mismatch
Rules for	Deposit insurance
	Guarantees (home and foreign currency)
	Lender of last resort facilities (home and foreign currency)
	Resolution of insolvent institutions
	Breaking up institutions to reduce systemic risk
	Foreign affiliations and affiliates' dealings
Subject to	Monitoring and Enforcement
	Stress tests (individual and systemic)

many institutions were doing already when there was no required buffer. They would voluntarily hold more than the required minimum capital to have a buffer to use in bad times avoiding a violation of the minimum capital requirement.

Table 5 lists a wide range of prudential instruments that might be used in some or all countries with extensive financial systems. In the upper panel, instruments are shown that affect individual transactions. For example, in the top row a loan-to-value ceiling might apply to a home-currency-denominated mortgage for a home-country borrower originated by an intermediary located in the home country. The lower panel lists instruments that affect the system as a whole.

COUNTERCYCLICAL CAPITAL REQUIREMENTS

According to the Basel III agreements countries are permitted to impose countercyclical capital requirements (CCR) subject to some guidelines. Two related considerations have led to interest in CCR. The first consideration is inducing capital management that is appropriate from a societal point of view. An important objective of capital requirements is to reduce the moral hazard associated with explicit and implicit guarantees of bank liabilities. For this objective to be met efficiently capital should be built up in good times when it can be raised more cheaply and allowed to run down in bad times when it is needed to cover losses. Eliminating procyclicality of capital management was a central consideration in the Basel III deliberations. Introducing countercyclicality was approved but left as voluntary.

The second consideration is that it may be desirable to moderate credit fluctuations for stabilization purposes. There are at least two possible related but separable stabilization purposes. One purpose is to be used along with other macroeconomic policies to promote economic stability. Another purpose is to discourage credit fluctuations, either sectoral or more general, that seem unjustified by "fundamentals" and, therefore, possibly "unsustainable." Identifying the stabilization potential of CCR was regarded by many as a bonus from the Basel III deliberations.

For many the main purpose of CCR was the capital management one. The BIS has been in the forefront of studying the use of CCR for this purpose.* To be concrete, consider the illustrative CCR reaction

* The discussion in the section draws heavily on Drehmann et al. (2010).

function:

$$k_t = k_t^* \pm \gamma_f \left(f_t - f_t^* \right)$$

where k_t is a required capital to asset ratio, and k_t^* is its target value; f_t is an indicator of financial instability, and f_t^* is its normal value; and γ_f is a positive adjustment coefficient.* As before, the sign in front of γ_f depends on the indicator variable. The approach used by the BIS and others has two steps. The first is to look for an indicator (conditioning variable) that is a good predictor of financial difficulty.** The second is to look for an adjustment coefficient (adjustment factor) appropriate for achieving the target capital to asset ratio. Considerable research effort has been devoted to evaluating candidate conditioning variables, but much less has been devoted to choosing adjustment factors.

A good example of analysis of using CCR for capital management is a recent BIS study.*** It begins by considering alternative conditioning variables. It finds that the gap between the ratio of credit to GDP from its trend is the best conditioning variable and that property prices are also useful. However, there is still disagreement about the relative merits of different conditioning variables.**** For example, another study finds that the deviation of credit growth from its long-term average is a better indicator variable than the credit-to-GDP gap variable.*****

Several papers have by now examined how various indicators fared

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* For simplicity we refer to "assets" rather than "risk-weighted assets."

** The search for a conditioning variable uses the methodology pioneered by Kaminsky and Reinhart (1999).

*** The study is Drehmann et al. (2010).

**** Conditioning variables for macroprudential policy are closely related to variables used in early warning systems for several kinds of economic crises. For a discussion of this relationship and some relevant studies see the Annex: From Early Warning Systems to Indicators for Macroprudential Supervision.

***** The study is Repullo and Saurina (2011).

in predicting the cross-country incidence of the 2008/09 crisis.* Although the definitions of crisis and the methods of analysis differ, most papers find that some measure based on credit (credit growth, deviation from trend, or leverage) predicted the 2008/09 crisis. For advanced countries, increases in real estate prices were also associated with poor economic performance or crisis. Current account deficits, exchange rates and international reserves get more mixed reviews as signals. One problem that must be faced when interpreting these empirical studies is that we have not really seen the end of the crisis that started in 2008. Therefore, these results are preliminary at best.

An important finding of the BIS study is that, for the countries it considers, variables that are best at signaling when to build up capital are not the best at signaling when to release it. Leading indicators like measures involving credit are better at signaling when to build up capital. Credit continues to rise for a time during a downturn because nonbanks draw on their lines of credit at banks when they can no longer finance themselves in other ways. It might be useful to determine whether the situation is the same in Sweden. Another important finding is that including one or more additional conditioning variables does not seem to improve predictions by much. Perhaps results would be different if an index based on several variables was used instead of one or another single variable. Contemporaneous indicators of financial stress like loan losses are better at signaling when to release capital. For Sweden it might be useful to compare the release-signaling properties of the Riksbank stress index (or the non-stock-market components of it) with that of aggregate loan losses. The BIS study ends on a note of pessimism about the desirability of adopting a rule under which a capital requirement changes automatically with movements in a single variable.

Analysis of using CCR for macroeconomic stabilization purposes is well under way. For there to be an interesting financial-policy stabilization problem, the economy in question must be a monetary economy. In many of the discussions of having monetary policy take account of financial stability, no macroprudential policy instrument is

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* See for example Berkmen et al. (2009); Lane and Milesi-Ferretti (2010); Frankel and Saravelos (2010); Barrell et al. (2010); and Becker (2012 forthcoming).

required and often none is included. However, in discussions of macroprudential policy it is necessary to make some assumption about monetary policy. Often it is assumed that monetary policy is governed by a Taylor-type interest rate rule.

Angeloni and Faia (2010) consider the effects of capital requirements of the types of Basel I, Basel II, and Basel III. A modified version of their capital-requirement reaction function is*

$$k_t = k_t^* + \gamma_y \left(y_t - y_t^* \right)$$

where y represents output and y^* represents its desired value. When $\gamma_y = 0$ the reaction function mimics the Basel I constant capital requirement; when $\gamma_y < 0$ the reaction function mimics Basel II with its procyclical capital requirement; and when $\gamma_y > 0$, it mimics the projected Basel III countercyclical capital requirement. As might be expected on the basis of recent international discussions, countercyclical capital requirements lead to better outcomes than constant or procyclical requirements.

Christensen, Meh, and Moran (2011) consider an alternative capital-requirement reaction function in which the capital requirement responds to the credit-to-GDP gap as suggested by the BIS study discussed above. A modified version of their capital requirement reaction function is

$$k_t = k_t^* + \gamma_y \left(b_t / y_t - \left(b / y \right)_t^* \right)$$

where b_t/y_t represents the ratio of bank credit (b_t) to output (y_t), $(b/y)_t^*$ is its desired value, and $\gamma_y > 0$. They find that countercyclical bank leverage regulation is likely to have beneficial stabilization properties, particularly when shocks to bank capital are a significant source of economic fluctuations.

As we argue below, there is a case for considering the effects on all the target variables when choosing a capital requirement. If this approach is adopted the capital requirement reaction function might look like the following:

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* The actual formulation used by Angeloni and Faia is $k_t = b_0 + \left(\frac{y_t}{y_t^*} \right)^{b_1}$ where k_t represents the ratio of bank capital to total loan exposure.

$$k_t = k_t^* + \gamma_\pi(\pi_t - \pi_t^*) + \gamma_y(y_t - y_t^*) \pm \gamma_f(f_t - f_t^*)$$

where, as before, f_t is an indicator of financial stability and π_t is inflation. In this case the capital requirement would be set taking both economic stability and financial stability considerations into account.

Related to but separable from using CCRs for macroeconomic stabilization is using them to discourage or halt credit growth or asset price increases thought to be unsustainable. That is, CCRs can be used to deal with "bubbles." One example is often used when discussing this purpose. Suppose there is a rapid run up in mortgage lending and housing prices but the rest of the economy shows no sign of overheating or is even in a recession. Suppose also there is at least a case to be made that the boom in the housing market is not justified by fundamentals. In this situation, a capital requirement on mortgage lending could be increased in an attempt to slow down or stop the increase in mortgage lending.* Of course, raising capital requirements on all kinds of lending would be a distant second best. As another example, suppose that banks are increasing their lending in a foreign economy which is overheating. Again, raising a specific capital requirement on that kind of lending would be one way of discouraging it.

Knowledge about the properties of countercyclical capital requirements is still quite limited. For this reason, policymakers are still rightfully cautious about adopting them. The number of studies of the likely effects of capital requirements is increasing, however, so more is likely to be known about them soon.

LOAN-TO-VALUE RATIO REGULATORY CAPS

A regulatory cap (maximum permitted values) on loan to value (LTV) ratios is one of the prudential instruments that has received more attention following the financial crisis. Effective October 1, 2010 Finansinspektionen imposed a cap of 85 percent on LTV ratios for newly originated household mortgage lending.** In response to a continued rise in

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* Of course, other macroprudential tools, such as an LTV cap, could be used instead.

** This cap had been proposed May 5, 2010 and was announced on July 9, 2010 when

household debt and the unstable macroeconomic situation, FI undertook a review of the mortgage market in the winter of 2009. From this review it concluded that the risks to the financial system as a whole were low, but that the high loan-to-value ratios for some households were a cause for concern.*

In explaining why it chose an LTV cap, the FI discussed alternatives.** It noted that mortgage insurance of the type used in other countries is not available in Sweden and argued that amortization rules are a "blunt instrument" and are easily circumvented. The purpose of the LTV cap is "to stem an unsound trend in the credit market where credit institutions would use ever-increasing loan-to-value ratios to compete" and households would become over indebted.***

The FI discussed the likely effects of the cap in several places.**** It thought that the share of high-LTV mortgages would go down. It recognized that, to get around the regulation, financial firms might lend additional amounts against collateral of lower quality than houses and at higher interest rates. Consumers would experience higher interests costs and there might be a one-time reduction in house prices. This reduction would be small except where there were concentrations of high LTV mortgages.***** It also acknowledged that some customers might not be able to obtain loans.

In order to get a first look at the effects of the cap, Finansinspektionen conducted a qualitative survey of credit managers at a number of banks.****** According to FI, the survey showed that the cap had

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the rationale was given.

* Finansinspektionen (2010b).

** Finansinspektionen (2010d).

*** Finansinspektionen (2010a).

**** For example, Finansinspektionen (2010d) and Finansinspektionen (2010a).

***** In Finansinspektionen (2010c) the FI says it believed there would be no significant effects on house prices.

****** Finansinspektionen (2011).

had an effect. There was a reduction in the number of mortgages with extremely high loan-to-value ratios. However, FI notes that the cap had only been in place for a short time and that other factors, such as higher interest rates and the uncertainty regarding the development of the world economy, may also have affected household behavior.

There can be at least two related motivations for imposing LTV ratio caps. One is for consumer protection, to deter consumers from taking on more debt than they can manage. The other is macroprudential, to slow excessive credit growth before there is a sudden cut off leading to financial turmoil. Some observers thought the macroprudential motivation justified a cap.* FI usually emphasized the consumer protection motivation but also mentioned the macroprudential motivation.** It is not yet clear whether the motivation for an LTV cap should affect its design.

There is some disagreement among experts about the effects of alternative measures for slowing the growth of housing credit. In its report the National Housing Credit Guarantee Board (BKN) reached conclusions that were the reverse of those of FI. It argues that the LTV cap did not work, finding that the average LTV increased after the cap was introduced.*** Of course, an increase in the average LTV ratio is not necessarily inconsistent with having a decrease in the number of mortgages with extremely high LTV ratios. Furthermore, in its view LTV caps are easy to circumvent and amortization rules would be better. It also suggests using more fixed-rate mortgages to reduce household risk.

Peter Englund, a long time student of housing finance in Sweden, believes that LTV caps and amortization rules that apply to the part of

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* Nyberg, in *Minutes* of the Executive Board's Monetary Policy Meeting, No. 1, 2010, and Ingves (2007, 2011b) both express concern over rising housing prices. Nyberg explicitly mentions the possibility of imposing an LTV cap.

** In Finansinspektionen (2010d) it stated that by counteracting "unhealthy" credit for housing the cap would protect consumers and help "maintain trust in the banking market." (Our translation.)

*** BKN (2011).

loans that exceed high LTV ratios have more or less the same effect.* In his view both can be circumvented at the cost of higher interest rates by borrowing against collateral other than a house or by borrowing without collateral.

FI has said that it will conduct a more comprehensive evaluation of the effects of the mortgage cap during the autumn of 2011. This evaluation is quite important. It will contribute to a better understanding of the effects of the LTV cap in Sweden. Furthermore, experience with LTV caps in countries like Sweden is limited, and there is great interest in learning how effective such caps can be.

LIQUIDITY REGULATION: STANDARDS AND MONITORING RATIOS

In the Basel III framework, liquidity concerns are given considerable attention, much more than they were given in the Basel I and Basel II frameworks.** The Basel III framework has two minimum regulatory standards for funding liquidity, a short-horizon standard called the Liquidity Coverage Ratio (LCR) and a longer-horizon standard called the Net Stable Funding Ratio (NSFR).

The LCR is designed to promote short-term resilience by requiring banks to maintain a stock of "high-quality liquid assets" sufficient to cover net cash outflows over a 30-day period under a "significant stress scenario." The formula for the LCR is

$$\frac{\text{stock of high quality liquid assets regardless of currency}}{\text{net cash outflow over a 30-day time period regardless of currency}} \geq 100\%$$

Net cash outflow is calculated by applying run-off rates to different sources of funding (e.g., repos, unsecured wholesale, etc.). So the two most important elements are (1) the definition of "high quality liquid assets," and (2) the choice of the run-off rates used to calculate "net cash outflows." The BCBS has come up with very detailed instructions

* View expressed in private conversation.

** BIS, Basel Committee on Banking Supervision (2010).

about how to construct these measures.

Many analysts have argued that banks should be induced or required to rely more heavily on stable (core) funding. The NSFR is designed to do just that. It requires banks to fund their activities with more stable sources of funding over a horizon of one year thereby establishing "a sustainable maturity structure of assets and liabilities." Meeting the NSFR standard involves keeping the ratio of stability-weighted funding sources to stability-weighted assets greater than unity. The formula for the NSFR is

$$\frac{\text{available amount of stable funding regardless of currency}}{\text{required amount of stable funding regardless of currency}} \geq 100\%$$

"Stable funding" is defined as the portion of those types and amounts of equity and liability financing expected to be reliable sources of funds over a one-year time horizon under conditions of extended stress. The amount of such funding required depends on the liquidity characteristics of various types of assets held, off balance sheet contingent exposures incurred, and/or the activities of the institution. Funding sources and assets that are very stable, such as retail deposits, receive weights that are high (close to one) and those that are less stable receive lower weights.

It is noteworthy that neither the LCR nor the NSFR takes into account currency of denomination. Of course, those involved in setting up the Basel III framework were not unaware of the consideration of currency denomination. The framework includes not as a regulatory standard—but as a *monitoring tool*—a Liquidity Coverage Ratio by significant currency. The foreign currency LCR is the ratio of the stock of high-quality liquid assets in each significant currency to total net cash outflows over a 30-day time period in that currency. For any significant currency x the formula is

$$\frac{\text{stock of high quality liquid assets in currency x}}{\text{net cash outflow over a 30-day time period in currency x}} \geq \text{no standard}$$

Note: foreign exchange cash flows net of foreign exchange hedges

The definitions of the stocks of high-quality foreign exchange assets and of total net foreign exchange cash outflows is the same as those for the basic (all currency) LCR. A currency is "significant" if the aggregate liabilities denominated in that currency are 5 percent or more of the bank's total liabilities. Since a foreign-currency LCR is not a regulatory standard but only a monitoring tool for the discretionary use of supervisors, it does not have an internationally defined minimum. The Committee notes that supervisors in each jurisdiction could set minimum monitoring ratios for the foreign exchange LCRs. It says that the ratios might vary across currency and should depend on a bank's ability to raise funds in foreign-currency markets and its ability to transfer liquidity surpluses between currencies.

For Sweden, it is important to note that covered borrowing in dollars would not included in a foreign currency LCR for dollars and should not be. However, it is not the exact equivalent of borrowing in kronor because it depends on smooth functioning not only of the dollar lending market but also of the dollar/kronor swap market. Perhaps there should be a separate LCR for covered dollar borrowing.

Because foreign-currency LCRs are only discretionary monitoring tools in the Basel III framework, they will probably not play—at least initially—a major role in international cooperation about regulatory liquidity standards. Eventually they may come to have a greater importance. Of course it will be open to Sweden to adopt a more ambitious stance within its own jurisdiction. Our conjecture is that Swedish authorities might well lead a movement to set a regulatory standard for the foreign currency LCR. It would be desirable to define a foreign currency NSFR for use as a monitoring tool and eventually to set a regulatory standard for it.

From the perspective of external vulnerability, the range of potential macroprudential instruments meriting consideration is in fact quite wide. Think of the potential instruments in terms of a harbor metaphor, as *financial breakwaters*. The instruments are designed to interpose frictions between the national financial system and the outside world. The instruments should not to pose major obstacles to cross-border financial transactions but should provide modest, partial protection against some of the potential risks and costs.

As mentioned above a promising example might be to reinforce the

Basel III monitoring of financial institutions' liquidity coverage ratios currency by currency—and eventually to elevate them to required standards for each of the major international currencies. Another example might be a prudential restraint requiring individual banks and nonbank financial institutions to limit their open (net) position in foreign currencies to no more than a given, modest percentage of their total capital. That restraint is in fact not really a breakwater measure *per se* but rather a component of the prudential-oversight regime in which government supervisors require financial institutions to hold minimum capital in relation to their total balance sheets. Yet a further example might be the imposition of reserve requirements on the shorter-term foreign-currency liabilities to foreigners of Swedish financial intermediaries (possibly excluding covered wholesale borrowing in foreign currencies). One of many issues to be worked out would be whether the reserve requirements would apply just to the foreign-currency borrowings of the domestic offices of financial institutions or whether they might also be applied to liabilities at the foreign affiliates of Swedish banks (requiring Swedish authorities to cooperate explicitly with the foreign host-country supervisors). The rate of reserve requirement on these shorter-term foreign-currency liabilities would be set higher than the rates of reserve requirements, if any, on domestic currency liabilities.*

Just as there is a case for a modest and carefully circumscribed use of prudential financial breakwaters, the Swedish financial authorities might also consider upgrading their ability to assess the risk and liquidity exposures of the financial system and the economy as a whole. Such assessment is an integral part of maintaining strong financial standards and prudential oversight; upgrading could require substantial additional human resources to carry it out. Upgraded analysis would be charged with, among other things, improving the identification and monitoring of the various channels through which external shocks can adversely influence the economy and financial system. It might be asked to prepare enhanced probability estimates of the most

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* If existing legislation would not permit the Swedish authorities to adopt such reserve requirements, new legislation would obviously have to be enacted.

important shocks and adverse effects. Excessive exposures to liquidity drains and to losses from exchange-rate changes could be two of the most important sources of vulnerability to be monitored. Sweden as a whole, such assessment would stress, should not develop an excessive reliance on short-term capital flows nor permit a highly risky buildup of other types of concentrations in external exposures. Upgraded analysis would be charged with detecting significant shifts in vulnerability over time. Subject to higher-level guidance, the analysis might also be directed to develop contingency plans for managing, and ultimately correcting, increases in vulnerability judged to be excessive.

The broad approach we are suggesting to potential macroprudential instruments aimed at external vulnerability is of course not a new idea to Swedish authorities. Here is a revealing quotation from the Riksbank's financial-stability assessment in its spring 2011 *Financial Stability Report*: "The Riksbank's [recent] stress tests indicate that the banks have a good capacity to handle higher loan losses, but that they are *taking larger liquidity risks than many other European banks*. The Riksbank therefore recommends that the Swedish banks should retain or increase their capital ratios and *reduce their liquidity and financing risks*. In this way the banks will have better resilience if developments in the real economy worsen or if the turbulence on the financial markets increases. The banks should also improve their public reporting of their liquidity status." *

We observed at the beginning of the report that Sweden's financial system is significantly vulnerable to financial shocks originating abroad. The reliance of Swedish financial intermediaries on extensive cross-border and cross-currency relationships is beneficial to Sweden, but also exposes it to difficult times when future crises occur. For a smaller open economy like Sweden, the development of macroprudential tools aimed at external vulnerability of the financial system seems a logical priority. True, the entire enterprise of trying to use macroprudential instruments to foster system-wide financial stability is in its infancy. Many practical aspects of the effort remain to be worked out. Proposed measures and procedures are largely untested. But the issues

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* Italics added. Riksbank, *Financial Stability Report* 2011:1, p. 7.

of external vulnerability are a priority matter for Sweden. If macroprudential financial policies have a promising future at all in Sweden, the prospects ought to be bright for those aimed at external-sector vulnerability. In any case, that is where the challenge may be greatest, and perhaps the payoff greatest, for successful measures and procedures.

TO WHAT DEGREE SHOULD THE FINANCIAL SYSTEM PAY FOR ITSELF?

In this section we address the question of whether the financial system should be made to pay for at least some of the support provided to it by the government.* ** In particular we consider the holding of foreign reserves and the Financial Stability Fund set up for recapitalizing solvent banks and winding up insolvent banks.

Foreign Currency Reserves. The Riksbank now holds foreign exchange reserves for reasons quite different than in the past. When Sweden had a fixed exchange rate the Riksbank held foreign exchange reserves so that it could intervene to support the exchange rate if necessary. Now it holds them primarily to provide liquidity support in foreign currencies mostly in dollars.

Liquidity risk in dollars arises when short-term dollar borrowing is used to finance longer-term dollar lending. According to Riksbank Deputy Governor Nyberg, a very rough estimate of this short-term dollar borrowing is SEK 900 billion, of which roughly half is covered and other half is used to finance dollar lending to companies. This would

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* The Swedish government incurs many costs in its dealings with the financial system. Many of these costs are incurred to limit behavior associated with moral hazard. The moral hazard arises in large part because of the support system made available to the financial system by the government. The government spends considerable sums on supervision and regulation. It is natural to ask whether the financial system should pay these costs. We do not address that question here.

** In this section we focus on the narrow question of whether banks should pay the budgetary costs associated with their operations. In many cases the costs of financial instability are far greater than the budgetary costs incurred by the government because of the reduction in output and employment.

put the lending potentially linked with a dollar liquidity risk in the magnitude of SEK 450 billion. Earlier we called attention to Nyberg's judgment that Sweden needs to deal with the dollar liquidity risk of its banks by itself because it cannot definitely count on borrowing from the Federal Reserve.*

There are least two ways to deal with this risk so that the banks bear the costs. One is to impose liquidity requirements in dollars on the banks so that less of their lending is funded by short term borrowing. The other is for the Riksbank to hold foreign exchange reserves and charge a fee for dollar credit lines scaled on the banks' uncovered short-term dollar borrowing. The Riksbank would have to borrow at relatively high long-term rates to be sure to have funds and to invest at relatively low short-term rates to have these funds available at short notice. Both solutions would raise the cost of doing dollar business and presumably would cause the banks to do less of it. Yet such an outcome might be in Sweden's best interest. An alternative essentially the same as the second approach would be the imposition of a tax on uncovered short-term dollar borrowing with revenues used to finance reserve holdings. The Minister of Finance has mentioned this possibility.

When is it efficient for the Riksbank itself to hold larger foreign-currency reserves and charge fees rather than imposing dollar liquidity requirements on banks? If there are many banks with uncorrelated dollar liquidity needs, it will be significantly cheaper for the banks if the Riksbank holds reserves. Foreign reserves and the fee can be relatively low because only a few banks will need to borrow dollars at any given time. However, if the dollar liquidity needs of banks are highly correlated as they often have been, there is much less to gain from having the Riksbank hold reserves. There remains the consideration that it might be cheaper for the Riksbank to hold reserves because it can borrow at a relatively low rate.

The Financial Stability Fund. The Government Support to Credit Institutions Act enacted in October 2008 authorized the establishment of a Financial Stability Fund. The Swedish National Audit Office has produced a report on the Financial Stability Fund with a title that

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* The rough estimate of SEK 450 billion for dollar lending to companies is in Nyberg (2011b).

asks whether the Fund deserves its name.* The report describes the plans for operating the Fund and tries to relate these plans to what the government said the fund would do. It addresses two key questions:

- Does the Fund strengthen the government's financial position?
- Will the Fund be financed entirely by the banks or will taxpayers bear part of the cost?

It also asks whether the fund is large enough and flexible enough. In providing its answers to these questions, the report raises several important issues.

The report's answer to the question about the effect on the government's financial position begins with a description of how the stability fund works. The stability fund is actually a "pay as you go" arrangement. An account exists with the national debt office. In normal times, inflows to the fund can potentially be used to reduce public debt rather than to accumulate assets. In the event of a crisis, the SNDO can borrow whatever funds it needs.

The report notes that Sweden has a fiscal rule that requires achieving a surplus target over the cycle. Since the stability fees are included in regular government revenues in calculating the surplus, they are really a substitute for regular taxes (or decreased spending) and, therefore, do not affect the public debt level. According to the report, the IMF says that investing the stability fees in domestic government debt is equivalent to treating them as regular government revenues since government assets and liabilities are increased by an equal amount. Also, the recommendation of the EU is that fees be put in a fund that is invested in a geographically diversified portfolio of liquid papers. Investing in this way actually increases government assets.**

Whether it will be possible for the SNDO to borrow the necessary amounts at reasonable cost during a future crisis is an open question.

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* Riksrevisionen (2011).

** Such an approach could be consistent with an optimal debt management strategy in which bailout costs are explicitly addressed and in which the potential bailout is related to firms with foreign liabilities in their portfolios; see Becker (1999).

The report is skeptical. It notes that in Ireland the government debt prior to the crisis was only 29 percent of GDP with a 10 basis point spread over German Bunds but when Ireland had its banking crisis, spreads increased to 1100 basis points. Sweden's situation, of course, is quite different from Ireland's. In the financial crisis, the SNDO borrowed in foreign currency at reasonable rates on several occasions not only to support the financial system but also to finance part of the government deficit.* There are at least three reasons why the SNDO was able to borrow so cheaply. First, Sweden's "ordinary" fiscal house is in order (but so was Ireland's). Second, Swedish banks were managed so that, for the most part, they did not incur large losses (but Irish banks were not). Third, Sweden guaranteed only new bank debt (but Ireland's government guaranteed all bank debt). It is important to ask how likely it is that Sweden will be in a similar position in future crises. This question is closely related to the question of how large the foreign-currency holdings of the Riksbank should be. Of course, Riksbank liquidity support has to be available more quickly than support from the stability fund, so the SNDO would have more time to arrange for external funding.

It is not yet clear whether the cost of the fund will be borne completely by the banks. The government started the fund by putting in SEK 15 billion, which is around 0.5 percent of GDP. According to the report, the fund is forecast to reach 2.5 percent of GDP in 2025 with a balance of SEK 156 billion. Of this, accumulated fees from the banks would amount to 53 billion and when interest on these fees is added, the total would account for 48 percent of the fund's capital. Unless arrangements are made for the banks to replace the government's initial contribution with interest, the banks will have supplied less than half of the fund's capital.

Currently the target size of the fund is scaled on GDP. The stated objective is for the stability fund to reach 2.5 percent of GDP on average over the next fifteen years. As we have confirmed earlier in the report,

* The SNDO even made a sizeable profit on its foreign currency borrowing because it borrowed when the kronor had depreciated significantly and rightly predicted that the kronor would recover. This time, taking a position in foreign currency was consistent with minimizing the cost of servicing government debt.

the Swedish financial system has been growing much more rapidly than GDP over the last decades. The audit report stresses that if this growth continues, defining the fund relative to GDP does not reflect the increased risks that come with increasing the relative size of the financial system.

Interaction of Monetary Policy and Macroprudential Policies: Principles

We commented earlier on the pros and cons of asking monetary-policy decisionmakers to pay greater attention than in the past to financial stability. Notwithstanding the somewhat shifting views described there, we discern a rough consensus about basics. Monetary policy is relatively better suited for achieving stability of inflation and resource utilization, and macroprudential policies are relatively better suited for achieving financial stability. However, all the target variables are affected by both kinds of policies. Hence the logical question: to what degree, and how, should interactions be managed among monetary policy and macroprudential policies? Should there be integration and coordination of the decisions?

This question comes up for all countries, increasingly as national governments look ahead and ask how best to avert crisis situations such as the one that they have been living through. It is now high on the agenda in Sweden.

To address this question, we initially turn to existing theory and general principles. Identifying a conceptual framework within which clearly to ask the question and establishing some principles for analysis are only a first step. But seeking guidance by examining principles is a helpful place to start. Then in a subsequent section we focus on Sweden and how in practice Swedish policymakers have managed, and prospectively might manage, the interactions among monetary policy and macroprudential policies.

As an example, assume that policymakers have three macroeconomic-stability target variables and at most two financial-policy instruments. The three target variables are price stability, resource-utilization stability, and some indicator of financial stability. Suppose a social loss function ($L_{s,t}$) summarizes society's true preferences about the tar-

get variables in terms of deviations from target values, the deviation of inflation (π_t) from a target value (π_t^*), the deviation of output (y_t) from a target value (y_t^*), and the deviation of the financial-stability variable (f_t) from a target value (f_t^*)*

$$L_{s,0} = E_0 \sum_{t=0}^{\infty} \beta^t \left[\left(\pi_t - \pi_t^* \right)^2 + \lambda_y \left(y_t - y_t^* \right)^2 + \lambda_f \left(f_t - f_t^* \right)^2 \right]$$

and that policymakers know this social loss function. Further, suppose that the monetary-policy instrument is the monetary policy rate, $i_{p,t}$, and that the macroprudential instrument is the required capital-to-asset ratio, k_t.** The important thing is that policymakers decide about only two instruments, the traditional monetary-policy instrument and the macroprudential instrument.

For simplicity of exposition, assume that the instrument-choice behaviors of the policymakers can be represented with reaction functions. For monetary policy, assume the reaction function is an interest-rate rule of the familiar form:

$$i_{p,t} = i_{p,t}^* + \alpha_\pi \left(\pi_t - \pi_t^* \right) + \alpha_y \left(y_t - y_t^* \right) \pm \alpha_f \left(f_t - f_t^* \right)$$

And for the macroprudential instrument k_t, assume an analogous reaction function:

$$k_t = k_t^* + \gamma_\pi \left(\pi_t - \pi_t^* \right) + \gamma_y \left(y_t - y_t^* \right) \pm \gamma_f \left(f_t - f_t^* \right)$$

When addressing the principles of decisionmaking, it is revealing to consider two polar cases, call them *centralization* and *decentralization*. With centralization, it is assumed that, in effect, a single policymaker controls both instruments. Decentralization is the case in which each instrument is controlled by a separate policymaker.

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* The assumption that there is a "policymaker loss function" of this type is common in macroeconomic policy analysis. One justification for proceeding in this way is that, in a class of simple models, variables in the policymaker loss function are directly related to variables of direct welfare concern to individuals such as consumption and work effort.

** The macroprudential instrument could have been a loan-to-value ratio, an external-vulnerability financial breakwater, or one of the other macroprudential tools discussed earlier.

According to the familiar Tinbergen principle, if there are as many instruments as there are target variables, the desired values for all target variables can be achieved. That is, policy decisions can achieve an ideal outcome (sometimes referred to as "bliss").* The Tinbergen principle has an important corollary. Suppose, for example, that there are two target variables and two separate policymakers, each with one instrument. It is possible for each policymaker to be assigned a single target and to be instructed to pursue only that target variable (decentralization) and yet still find that decisionmaking achieves the ideal outcome. Bliss, in other words, is achievable even with decentralized "non-cooperative" behavior.**

In practical decisionmaking problems, however, there are almost always fewer instruments than target variables, a situation referred to as "instrument scarcity." In such a situation, an ideal outcome is not attainable; the desired values of all target variables cannot be achieved. In general, there will be deviations in all target variables from their desired values.

The efficient outcome, the best possible mixture of target-variable deviations, can be achieved only when values for both instruments are simultaneously and jointly chosen to minimize the social loss function (L_s). In the centralization case, a single policymaker would certainly behave in this way.

In principle, it would not be literally necessary for there to be a single policymaker. Under decentralization with separate policymakers in control of each instrument, the policymakers could "cooperate" to achieve the efficient, ideal outcome. But for that efficient outcome to occur, what cooperation would mean in practice is that both policymakers must choose their instruments to minimize the same loss function and that loss function must include all the target variables. In our example, both must choose their instruments to minimize L_s.

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* Tinbergen (1956, 1963). The Tinbergen principle holds for certain when the loss function is quadratic, the model is linear, and the implied instrument settings are feasible.

** In general, as long as there are as many policymakers each with one instrument as there are target variables, the bliss outcome can be achieved with non-cooperative behavior.

Both policymakers must take into account the effects of their instruments on all three of the target-variable deviations. In other words, the decentralized policymakers must act together in precisely the same way that a single policymaker would.

It might be argued that, in theory, advantages exist to having each policymaker be concerned with only one or a subset of the target variables. One advantage of this arrangement might be that it makes it is easier to hold policymakers accountable. Another advantage might be that policymakers could specialize. As stated above, in the absence of instrument scarcity, non-cooperative behavior among decentralized policymakers would not reduce efficiency. If it is thought that a decentralized assignment of target variables improves accountability or promotes specialization, therefore, there might be a case for favoring that arrangement. In the more relevant and realistic circumstances of instrument scarcity, however, the arrangement would be inefficient. Of course, the assignment of one target variable to each policymaker would leave one or more target variables unassigned.

To illustrate the inefficiency of decentralization we return to the three-target variable, two-instrument example. If every target variable is assigned to some policymaker, one or the other of the policymakers would then be responsible for two target variables. As an example, suppose that the monetary authority is assigned inflation and output and the macroprudential authority is assigned financial stability. Further, suppose that policymakers are instructed to limit attention to their own assigned target variable or variables when choosing their instrument values. The loss function of the monetary authority ($L_{m,t}$) is then

$$L_{m,0} = E_0 \sum_{t=0}^{\infty} \beta^t \left[\left(\pi_t - \pi_t^* \right)^2 + \lambda_y \left(y_t - y_t^* \right)^2 \right]$$

and the loss function of the macroprudential authority ($L_{pr,t}$) is

$$L_{pr,0} = E_0 \sum_{t=0}^{\infty} \beta^t \lambda_f \left(f_t - f_t^* \right)^2$$

The social loss function is the sum of the loss function of the two policymakers

$$L_{s,0} = L_{m,0} + L_{pr,0}$$

However, under decentralization, the loss functions of the two policymakers are separated. When choosing the interest rate to minimize $L_{m,t}$, the monetary authority takes into account only the effects on the deviations of inflation and output. Likewise, when choosing the capital requirement to minimize $L_{pr,t}$, the macroprudential authority takes into account only the effects on the financial-stability deviations. Therefore, the choices will be inefficient.

The result in the three-target variable, two-instrument case is an example of a more general result. With instrument scarcity, no matter how the target variables are divided up, an inescapable loss in efficiency can occur if decentralized policymakers engage in non-cooperative decisionmaking. In order for the dividing up of the target variables and the narrowing of focus of the separate policymakers to be worthwhile, any gains from increased accountability or specialization would have to exceed this loss in efficiency.

The drift of the well-known theoretical reasoning summarized here is that decentralized non-cooperative decisionmaking is capable of producing economy-wide outcomes for a society that are inferior to the best attainable outcomes that could result from centralized decisions or the equivalent situation of full cooperation and information sharing among the decentralized decisionmakers. The general principle, then, is that coordination of decisions has a potential payoff. Decentralized policymakers should, other things being equal, take account of the effects of the instruments they control on all relevant target variables (relevant to all policymakers). If, despite the general principle, decentralized decisions without cooperation and information sharing are to be pursued, then it is incumbent on the advocates of this approach to identify benefits from decentralization—such as increased accountability, or improved specialization of function, or the avoidance of an undue concentration of power in a single authority—that offset the potential efficiency losses stemming from the lack of coordination.

Decentralized decisionmaking with non-cooperative behavior that can result in welfare reductions may arise within individual nations, and of course is characteristic of most policy choices in the multi-nation global environment. The separate policymakers can have altogether different target variables. In more subtle examples, the policymakers

may have the same target variables but different desired target values or different weights on deviations from target values, or both. Perhaps the most frequently cited illustration within a national jurisdiction is the interaction between the central bank and the government, that is, between monetary policy and fiscal policy. One possibility is that the monetary authority and the fiscal authority have a similar loss function, with the same weights on output deviations and inflation deviations, but the government has a higher desired value for output than the central bank. Another possibility is that desired values for output and inflation deviations are the same but the central bank puts a higher weight on inflation.

When considering the possible decentralization of monetary-policy and macroprudential decisions within a national government, it may be more difficult to perceive plausible differences in loss functions among the relevant financial authorities. For example, all authorities presumably value in some degree the objectives of price stability, resource-utilization stability, and financial stability. But even if the separate authorities share the same or similar target variables, there might be second-order differences among them in the desired target paths for the target variables or in the weights associated with the deviations of the variables from target paths. And perhaps the greatest source of difference among the authorities could arise from their different mandates. If each decentralized policymaking authority has been charged with focusing on only a subset of the target variables when choosing the paths for their instrument settings, then their operational loss functions would de facto result in uncoordinated instrument choices that could cause inefficient, less than the attainable ideal outcomes.

But why, it should be asked, would an arrangement for decentralized decisionmaking be set up in the first place? Presumably the proponents of decentralized responsibilities among government authorities *do* believe that significant benefits accrue from that allocation. The perceived benefits, again, might be increased accountability, or improved specialization of function, or the avoidance of an undue concentration of power in a single authority, or yet something else. Those favoring decentralization might also believe that clear agreement does not exist in the society about priorities and that outcomes resulting

from negotiation among authorities with different views might well be better than outcomes when only a single authority makes decisions alone.*

The view that decisions for monetary policy and for macroprudential policies should be managed in a more integrated, coordinated fashion is gaining ground among those who must make these decisions. The shift in views is captured in the following quotation:

> The evolving consensus, which is by no means settled, is that monetary policy is too blunt a tool to be routinely used to address possible financial imbalances; instead, monetary policy should remain focused on macroeconomic objectives, while more-targeted microprudential and macroprudential tools should be used to address developing risks to financial stability, such as excessive credit growth.... The diverse tools of financial regulation and supervision, together with appropriate monitoring of the financial system, should be, I believe, the first line of defense against the threat of financial instability. However, the effectiveness of such targeted policies in practice is not yet proven, so the possibility that monetary policy could be used directly to support financial stability goals, at least on the margin, should not be ruled out.**

Interaction of Monetary Policy and Macroprudential Policies: Sweden

Striking an appropriate balance between centralized and decentralized decisions is, we have learned, a longstanding subject of general interest in Sweden. For financial policies, the subject is again in the air. Several government-appointed commissions are due to report on the issues in coming months. And a recent evaluation of Riksbank policies

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* Those most strongly advocating decentralization argue that it should not be expected that the loss functions, analytical models, and information sources of the separate decisionmakers would be the same and that the airing of differences should be part of the decisionmaking process.

** Bernanke (2011).

submitted to the Riksdag focused on them.*

Four agencies share responsibility for financial stability and crisis management in Sweden: the Riksbank, Finansinspektionen, the Swedish National Debt Office, and the Ministry of Finance. Current arrangements for coordination among these agencies are set out in a 2009 Memorandum of Understanding. The four agencies comprise a "consultation group."** The general purpose of the group appears at the beginning of the Memorandum:

> The consultation group has the task of assessing financial stability and systemic risks. The group should also develop routines for the coordination of risk management, including which party should coordinate the work of the group in various situations.

Much more explicit statements of what is expected of members of the group are supplied later in the Memorandum.

For several months prior to the 2009 Memorandum, the representatives of the agencies had worked together to deal with the crisis that hit Sweden with hurricane force in September 2008. By all accounts coordination among the agencies during the time of the crisis was excellent. This performance is especially remarkable because there had to be much improvisation given the lack of an explicit framework for dealing with crises. To a considerable extent, things worked out as well as they did because the top decision makers knew one another well and, probably more important, many of them had had key roles in dealing with Sweden's banking crisis in the early 1990s.

In 2009 the time was ripe for a new Memorandum for three reasons. First, the SNDO had been given important new powers for crisis management in the Government Support to Credit Institutions Act of 2008. Second, there was a desire to take account of lessons learned during the crisis. Third, there was a generation of officials with invaluable experience gained from working together not only in the 2008–

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* Goodhart and Rochet (2011).

** Sveriges Riksbank and others (2009). The May 2009 Memorandum replaced an earlier version from June 2005. IMF Staff (2011b) refers to the consultation group as the "Domestic Standing Group (DSG)."

2009 crisis but also in the crisis of the early 1990s. The new memorandum formalized participation of the SNDO in the consultation group and made some modifications in the statements of what is expected of members of the group. However, several individuals we interviewed argued that the new Memorandum does not go far enough in delineating the responsibilities of the four agencies and, especially, in specifying how the members of the group are to go about "the coordination of risk management."

The management of financial stability policy is being actively discussed in many countries and in several international forums. As a prominent example, a BIS Study Group on Central Bank Governance and Financial Stability (chaired by Stefan Ingves, the Governor of the Riksbank) published an extensive report in May 2011.* That report identifies four broad approaches to governance of macroprudential policies. One approach labeled "macroprudential policy as a shared responsibility" envisages a dispersion of powers, essentially a decentralization, across several different agencies, but with creation of a coordinating council that catalyzes decision-making among the agencies. A second approach, "a separate macroprudential agency, with decentralized implementation" entails even more of an explicit decentralization. A third approach concentrates macroprudential policy instruments at the central bank but keeps a separate agency as the microprudential supervisor and regulator. A final alternative, the closest option to full centralization, gives the greatest decisionmaking powers to the central bank because it assembles all three of the main functions—macroprudential policy, microprudential supervision, and monetary policy—under the same roof.**

The first of these approaches seems the one under most active consideration in Sweden. A new "Financial Stability Council" (FSC) would be created with overall responsibilities for financial stability and crisis management. Detailed decisionmaking authority would remain

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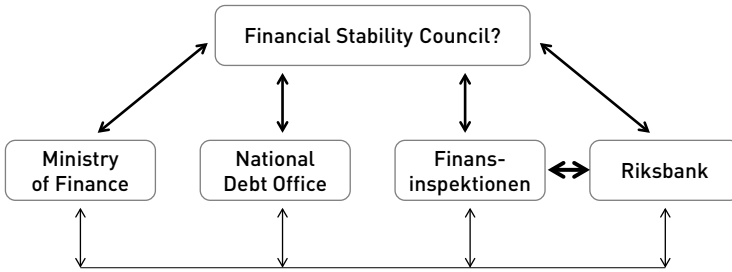
* Cited above: BIS (2011) [Ingves Report].

** The fourth approach would provide for a separate agency having the function of financial product safety regulator.

decentralized among the same four agencies who now share the various responsibilities. The Financial Stability Council would be charged with engendering the desired amount of information sharing, analysis, and coordination of decisions.*

Figure 27 is a schematic representation of the interactions among the four agencies as we imagine them. People from one agency would communicate with members from one, or a group, of the other agencies on an informal basis whenever and at whatever level they thought it advisable to do so. These lines of communication are indicated by the thin arrows at the bottom of Figure 27. The Riksbank and Finansinspektionen would interact almost continuously at all levels, as indicated by the very wide arrow between them in Figure 27. There would be formal meetings of the designated representatives of the four agencies on a regular basis. Communication through these meetings is represented by the medium-width arrows in Figure 27. The meetings might be monthly or quarterly in normal times. They would be as frequent as necessary, perhaps daily, in crisis times (as for example with the meetings of the consultation group during the 2008 crisis). Possible rules of engagement for these meetings, suggested to us in our conversations, are discussed briefly below.

Figure 27. Agency Interactions within a Financial Stability Council



* No name for a possible new coordinating group has been chosen. In discussions of such a group, the Swedish Fiscal Policy Council (2011) has used the name "Financial Stability Council"; the IMF Staff (2011a) has used the name "Systemic Financial Stability Council."

The other approach most discussed in Sweden, a variant of the fourth alternative in the options above, would entail a merging of the Riksbank and FI (but would leave the roles of the SNDO and the Ministry of Finance little changed). Under this approach the Riksbank would greatly increase its responsibilities for financial stability and would acquire control of most of the macroprudential tools. Merging the Riksbank and FI would eliminate a majority of the coordination problems that could arise among the financial stability authorities.* In the 2009 Memorandum, the discussion of coordination is divided evenly between provisions regarding coordination among all four agencies and provisions regarding coordination between just the Riksbank and FI. A merger of the two agencies would eliminate the need for the wide arrow between the two agencies shown in Figure 27. The responsibilities of the Riksbank and FI have considerable overlap and both agencies are concerned with the day to day functioning of the Swedish financial system.

National jurisdictions differ significantly about the agency location of the function of microprudential supervision and regulation. And policymakers and analysts have debated for years whether it is better to separate the functions of monetary policy and microprudential supervision or, alternatively, to integrate them within the central bank. Countries have even tried both allocations. The United Kingdom is an interesting example. Supervision and regulation of financial institutions was long ago lodged within the Bank of England; it was moved into a Financial Services Authority outside of the Bank in 1985–1986; then in 2010 it was moved back again into the Bank. Central banks themselves have welcomed a somewhat more extensive involvement in microprudential supervision since the 2007–2009 period of financial turmoil.**

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* Öberg (2011) is a strong advocate of a merger of the two agencies along with some significant changes in management responsibilities at the Riksbank.

** Bernanke (2011): "... the crisis illustrated some important benefits of involving central banks in financial supervision. Among these benefits are the facilitation of close and effective information sharing between supervisors and the providers of backstop liquidity, especially during crises; the ability to exploit the substantial overlap of expertise in the making of monetary policy and financial stability policy; and the useful-

The United Kingdom has adopted an interesting variant of the approach that gives the central bank overall decisionmaking authority for the entire range of financial policies. In particular, the Bank of England is responsible for both monetary policy and macroprudential policies. Decisions about the former are to be made by the Monetary Policy Committee and about the latter by a Financial Policy Committee. The U.K. model is seen in England as having the best of both worlds. Deliberations have some of the advantages of decentralization. The sizes of the committees are manageable. There are two committees making it possible to have more members with special expertise in each type of policy. Yet coordination of monetary policy and prudential policies is easier than with complete decentralization. The memberships of the committees are overlapping and the primary analytical resources are all mobilized within the Bank of England. So far as we know, such an institutional arrangement is not under consideration in Sweden but perhaps it should be.

Whatever the potential information-sharing and coordination benefits might be of a merger of the Riksbank and FI in Sweden, most of those with whom we talked in our interviews were either in favor of, or resigned to, a continuation of something like the current division of responsibilities between the two agencies.* Most also did not envisage a major change in the responsibilities of SNDO and the Ministry of Finance. Several interviewees expressed a reluctance to have the Riksbank gain more power relative to the other three agencies.

The perennial problem for Sweden, not solved in the 2009 Memorandum and not yet decisively dealt with in recent discussions, is how to catalyze integration and coordination among the different authorities' decisions while still preserving the perceived advantages of decentralization.

Although we were often told that the four Swedish authorities work

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ness of the information supervisors gather about economic and financial conditions for monetary policy. Appreciation of these benefits is leading to larger roles for central banks in financial supervision."

* Those in favor of a continuation included several high-level civil servants with long experience in financial stability matters.

quite well together, and did so especially well in the crisis months of 2008–2009, a widespread belief also exists that there is room for improvement. In a few instances, things did not go so smoothly. Under current arrangements there is some scope for one agency with macroprudential responsibilities to make recommendations to another. For example, a member of the Riksbank's Executive Board sits on the Board of Directors of FI. One interviewee told us of a pre-crisis recommendation made by the Riksbank member of the FI Board of Directors about trouble brewing in the Baltics. In his view the recommendation did not receive the attention it deserved. In another interview at the Riksbank, we were told of a recommendation that had been sent from the Riksbank to FI in the form of a memorandum. When we asked at FI about this memorandum, we were informed that the memorandum could not be found in the files.

According to the 2009 Memorandum of Understanding, "One aim is to coordinate the information provided to external recipients, even though this will not always be possible." An example of a coordination failure occurred in the late summer of 2011. Swedbank announced a decision to buy back some of its shares. This decision led to some concern in the markets.* One vocal critic was the Minister of Finance. One Saturday on Radio Sweden he recommended canceling the purchase saying that "It is very important that the banks are well capitalized." On the following Monday, officials from the Riksbank and Finansinspektionen stated that Swedish banks were well capitalized and that Swedbank's planned purchase would not reduce its capital below the level prescribed by the Riksbank. Also, the Financial Markets Minister stated that Swedbank's capital adequacy was not threatened.

If a Financial Stability Council were to be established, it would be subject to practical constraints. Given the effective decentralization of decisionmaking powers at the Riksbank, FI, and SNDO, how would the Council carry out its coordinating responsibilities? The presumption seems to be that the Council would primarily be a vehicle for joint consultation and peer pressure. Council members could make recommendations to one another. Council members could ask for the prepa-

* This paragraph is based on a story in Scandinavian Companies and Market Magazine (2011).

ration of analyses that would cut across agency boundaries. Council members could request better information sharing. And so on. But the agencies represented on the Council would probably remain independent decision makers in their areas of responsibility. At any rate, it appears unlikely that the Council, at least initially, would have decisionmaking powers per se.

Two procedural guidelines for the new Financial Stability Council, as proposed by some advocates, would make it more likely that Council joint recommendations to an individual agency would receive serious consideration. The first feature would be, following a Council recommendation to an agency, a "comply-or-explain" obligation. The agency's response might be subsequently published. The second feature would be a commitment to publish the minutes of meetings, perhaps with some lag. We believe both procedural guidelines would be supportive steps encouraging constructive cooperation.

The task of the FSC might be made more difficult by two features of the Swedish financial-policy agencies that appear unlikely to change. One feature is that the Riksbank, although continuing to have a substantial responsibility for financial stability, will have little effective control of many of the tools of macroprudential policy. Pressure on the Riksbank to promote financial stability could increase without its having the means to satisfy the increasing demands. The other feature is that more economic analysis goes on at the Riksbank than at the other agencies. The number of economists involved in financial-stability analysis at the Riksbank is much larger. The skills of these economists run the gamut from policy analysis with a tight deadline, to in-depth contributions to the Riksbank publications, to longer-term research, to various forms of quantitative modeling including the large scale Ramses econometric model. Of course, there are well-trained economists with varied skills at FI and the SNDO, just not nearly as many. If the FSC arrangement is to work well, the Riksbank will have to take into account the analytical needs of the other agencies when allocating its resources.

One recent change will make it easier for FI to carry out its analysis and regulatory tasks. In two recent reports it was argued that the FI was

significantly understaffed.* We were informed that the government has included forty new positions for FI in the forthcoming budget. Many of these positions may apparently be filled by accountants and lawyers and only a few by economists. This allocation of the new positions reflects FI's perception of its needs. We were told that FI does not feel that it should substantially increase the number of economists on its staff. So far, FI appears to be willing to leave much of the basic research and analysis on the financial system to the Riksbank staff. If this were the choice actually made, leaving the responsibilities for macroprudential policies divided between the two agencies might not lead to much duplication of effort in economic analysis. As time goes on, however, FI may feel increased pressure to enhance its own in-house analysis.

Central bank independence is believed by many to have led to significant gains in economic performance. A key question arises when the central bank participates in the shared-responsibility approach to macroprudential policymaking: Can the gains from independence of monetary-policy decisions be retained?** As argued in our discussion of the principles that justify cooperative decisionmaking, coordination among decentralized policymakers requires that the policymakers take into account the effect of their own instruments on a joint loss function. Thus, to illustrate, the Riksbank will have to take account of the effect of its repo-rate choice on the credit to GDP ratio and the FI will have to take account of the effect of its LTV cap on output and inflation.

Difficulties might arise when macroprudential-policy and monetary-policy considerations call for different actions. Consider, for example, a case in which the economy is in a period of weak or negative growth but housing credit is growing faster than seems justified. The best coordinated policy response would involve reducing the repo rate and lowering the LTV cap. This response could be readily made by decentralized decision makers if they had the same loss function and

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* Jackson (2010) and IMF Staff (2011a).

** BIS (2011).

the same model of the economy. In the more likely case when either the loss functions or the models or both are different, making the best coordinated response would require agreement in the Financial Stability Council. If the Riksbank and FI made their decisions without discussion, the repo rate and the LTV cap might not be lowered enough. For example, the Riksbank might underestimate the effects of its action on credit and the FI might underestimate the effects of its action on output and inflation. The more important question is not whether the gains from independence can be retained but whether the gains from discussion outweigh any costs of having to discuss.

Sweden and Europe

We have focused here on coordination issues within Sweden. But we close with a reminder of the broader European and world context in which Swedish decisions are made. A set of issues that looms increasingly important with time arises because national governments are decentralized decisionmakers in a world that so far has been characterized by only nascent efforts at collective governance. Many of the most obvious examples of adverse consequences stemming from decentralized non-cooperative decisionmaking occur because national governments often ignore cross-border spillover effects.

The grounds for supporting cross-border cooperation in general, and in particular in the areas of financial policies and macroeconomic policies, have never been stronger. Of course, the challenges and difficulties have never seemed stronger either.*

Intra-European and international considerations are powerful constraints on Swedish policymakers. The complications arise for all prudential policies, microprudential and macroprudential. And they arise powerfully for traditional monetary policy. Swedish policy must take into account, and try to contribute to, the evolution of European Union financial policies. European Union treaties and Directives, and European Union prudential institutions such as the European Banking Authority and the European Systemic Risk Board, all limit to some degree the effective choices open to Sweden. In an even broader inter-

* Bryant (2003).

national context, the Basel Committee on Banking Supervision—now chaired by the Governor of the Riksbank—and the Financial Stability Board are still further influences.

The greatest uncertainty facing Swedish policymakers, about financial policies but also about every aspect of Sweden's economic policies, stems from doubts about the future of the Eurozone within the European Union. As this report was written, no one could clearly foresee whether a 17-member Eurozone struggling with sovereign debt issues would stay intact. Key aspects of the mandate of the European Central Bank were being debated.

Although the issues were less explicitly discussed, it was also quite unclear how the European Union in the future would handle within its single-market framework the tensions between Eurozone countries and non-Eurozone countries. Those tensions are likely to become increasingly important for Sweden, as all the non-Eurozone countries —especially the United Kingdom and Denmark as well as Sweden— try to work out arrangements for themselves that are satisfactory and politically feasible. What will prove satisfactory and politically feasible in Sweden and the United Kingdom and Denmark may not seem so satisfactory and politically feasible from the perspective of, say, Germany and France.

The Eurozone member nations will be under continuing pressure to move faster toward measures of "fiscal union" (unless the Eurozone itself fractures). The European Central Bank will probably be pushed to play a stronger role as a lender of last resort for the Eurozone. Amid such pressures, will the issues of financial policies, including especially macroprudential policies, evolve as a Eurozone responsibility rather than as a European Union responsibility? Perhaps even more in the next than in the last decade, the future of Europe—and Sweden within Europe—will continue to dominate financial, economic, and political discourse.

Analytical Support for Decisions about Financial Policies

Several times in our report we have raised questions about the analytical foundations underlying policy decisions. We add here concluding observations that emphasize that theme in its own right.

When choosing policies, decisionmakers necessarily use some sort of analytical framework to relate their own actions to expected outcomes. Such analytical frameworks—"models" for short—can be more or less explicit. But even if largely implicit, an analytical framework is a fundamental input to policy choices. If a policymaker were to insist that decisions can be made without relying on any type of model, such a claim would constitute either quibbling over semantics or self-deception. If policymaking were to ignore all explicit models, in essence it would be choosing to use an implicit model—which can be still more flawed and unreliable than the explicit models. Explicit models can at least be analyzed, criticized, and improved. Implicit models can be badly wrong, and stay wrong because they are not subjected to criticism.

The overriding dilemma is that analysts at best have only limited knowledge about the functioning of national economies. Reliable knowledge about the functioning of financial systems is especially scarce. Understanding of how national economies interact to generate global economic outcomes is still more imperfect. This analytical ignorance—"model uncertainty"—is surely the most important obstacle to sound policymaking.

Even well before the global financial crisis, thoughtful analysts were aware of the deficiencies of existing models in capturing the behavior of financial intermediaries and the financial system. Most aspects of financial behavior were scarcely incorporated in macroeconomic models at all. The modeling of the transmission of monetary-policy actions through the financial system to influence real economic activity, moreover, was rudimentary. Earlier in the report, for example, we identified the assumption in some existing models (often just implicit) that spreads are constant or little changed between an official policy rate and market interest rates.

The global financial crisis has forced analysts and policymakers alike into a much sharper awareness of the deficiencies of existing models. The characterization in the models of the transmission of

monetary policy through the financial system to the real economy has been shown to be still more inadequate than was realized before the crisis. Research efforts had already been under way before the crisis to improve the modeling of financial behavior. But, thankfully, one can now discern an intensification of these efforts in many central banks, research universities, and international institutions. We understand that such an amplified program of research is underway within the Riksbank, in particular to modify the financial-behavior components of the RAMSES model.

In addition to the already recognized priority of adapting existing models to better incorporate the behavior of financial intermediaries and financial markets in general, the agenda for research also includes a more specific new task. If financial authorities wish to place greater reliance on the use of macroprudential instruments to foster financial stability, they will need to be able better to model the effects of time variation in those instruments. Eventually, modeling of the macroprudential instruments and their effects will need to be integrated into the larger, general-equilibrium analytical frameworks underpinning all types of macroeconomic and prudential policy actions.

Recommendations to support research aimed at reducing the obstacle of model uncertainty inevitably invite doubts and controversy. Research on model improvement and on model evaluation is a long-run task. The payoffs usually come only several years into the future. Even so, a far-sighted approach to policy today can readily justify such research, because it is very important for improved policy in future periods.

An earlier section of the report addressed the institutional allocation of responsibilities among the Swedish authorities for different aspects of financial policies. Longer-term research and quantitative analysis are important, which leads us to reiterate the earlier points. Because the Riksbank contains many more staff economists than FI or the SNDO, it seems natural to presume that much of Sweden's longer-term research on and quantitative modeling of the financial system will be lodged within the Riksbank. That allocation, however, makes it critical for the Riksbank to take into account the needs of FI and SNDO when budgeting its resources. There may come a time, moreover, when FI and SNDO feel pressure to upgrade their own research capacities.

The tradeoff between centralization and decentralization *for research activities* is less delicate than for many other aspects of financial policies. But the tradeoff for those activities is not absent altogether.

The Riksbank has been an early adopter of advances in research in the areas of its responsibility, including innovations in econometric modeling. There is every reason to expect that Swedish economists both within and outside the Riksbank will be leaders in the area of financial modeling at both the microeconomic and macroeconomic level. There is good cause for official support of this research because of the size of the Swedish financial sector and its involvement in world markets. The research will be a good investment for Sweden.

Annex: From Early Warning Systems to Macroprudential Indicators

Early Warning Systems

CURRENT CALLS FOR macroprudential indicators to help predict and avoid financial crises are not hard to understand.* The cost of this and past crises have been significant, so preventing future crisis is high on policymakers' agenda all over the world. However, trying to predict crises in order to prevent them is not a new idea; the work at the International Monetary Fund (IMF) on developing an early warning system started after the Mexican crisis in 1994 and was furthered in the aftermath of the Asian crisis in 1997.

In the first versions of early warning models at the IMF, the focus was on predicting currency crises since such crises often generated a need for IMF balance of payments support. As Berg, Borensztein, and Pattillo (2005) point out in their assessment of early warning models, these models were used as a complement to the regular bi- and multilateral surveillance work the IMF carries out. The first early warning model was developed by Kaminsky, Lizondo, and Reinhart (1998, often referred to as the KLR model) and was extended by Berg and Pattillo (1999). In addition to these efforts, academics and banks developed alternative models that all aimed at predicting currency crises. The papers developed in this area addressed four important issues; how a currency crisis is defined,

* For example, the G20 communiqué dated November 15, 2008 states that the IMF and FSB should "... work to better identify vulnerabilities, anticipate potential stresses, and act swiftly to play a key role in crisis response." and in April 2009 the G20 asks the IMF "to provide early warning of macroeconomic and financial risks."

what variables are used to predict crises, what horizon is chosen for the forecast, and what statistical method is employed to estimate the model and to produce forecasts. Abiad (2003) provides an extensive survey of papers which deal with these issues in a variety of ways. The evaluation in Berg et al. (2005) shows that early warning models have some value in predicting currency crises, but that signals are not very precise in that they both miss crises and give false warnings. The inability of these models to provide consistent and reliable early warnings meant that they never really became the focus of policy discussions either with country authorities or in multilateral forums.

The original early warning literature discussed above adopted several definitions of currency crisis. However, recent calls for (renewed) efforts to develop early warning systems do not focus on currency crises, but rather on (often vaguely defined) financial crises. In the past, researchers have also looked at different types of crises, including banking and debt crises as well as significant drops in output [e.g., Kaminsky and Reinhart (1999), Manasse and Roubini (2005), and Becker and Mauro (2006)]. The IMF Staff (2010c) paper on an early warning exercise asks the question "Which of the myriad of things that could go wrong in the world economy require the most attention by policymakers?" This question can be interpreted as asking either what indicators to use to predict all sorts of crises or what type of crisis to focus on. Ghosh, Ostry, and Tamirisa (2009) in their discussion of what policy makers can expect from early warning systems also note that the relevant crisis definition may be different in different types of countries and state: "In advanced economies, though crises may have an external dimension, they are more likely to be centered on the financial sector. In addition, sharp declines in output—beyond mere cyclical fluctuations—are likely to be of independent interest to policymakers, regardless of whether they are accompanied by a financial crisis."

Recent Work on Early Warning Systems and Macroprudential Indicators at the IMF

At the IMF, the crisis brought a new focus on two needs: further evaluation of alternative early warning indicators and development of an integrated model of the real and financial sectors. There are (at least)

three important publications recently that address these needs: first, the IMF Staff (2010c) paper on the early warning exercise that the IMF and the FSB conducted jointly; second, the IMF Staff (2011c) paper for the Executive Board on macroprudential policies; and third (and most recently), Chapter 3 in IMF Staff (2011d) the *Global Financial Stability Report* (GFSR) for the fall of 2011.

While the aim of all these papers is to contribute to the development of relevant early warning systems, they are also full of caveats and discuss the shortcomings of the current early warning system "state-of-the-art." The following are three examples: "the success of analytical tools has usually been limited to gauging the potential for a crisis to manifest itself" [p. 5 in IMF Staff (2010c)]; "Macroprudential policy requires a capacity to identify systemic risks early ... Several gaps remain in developing the analytical framework, especially to improve its reliability and forward looking capacity in assessing systemic risk." [p. 13, IMF Staff (2011c)]; and "... there is still no robust set of indicators for detecting systemic risk." [p. 2, IMF Staff (2011d)].

The first two IMF papers do not end up with one unified, formalized, quantitative model that produces one specific early warning index or measure. Instead, they give a long list of potential early warning indicators that are more or less consistent with the list of variables included in the earlier papers discussed above. Some variables are combined into crisis probabilities, risk indices, and "heat-maps." The definitions of crises or events that these two papers focus on are a bit more vague than those in the papers discussed above. The IMF/FSB early warning exercise is presented as a complement to the World Economic Outlook (WEO) that is focused on "low-probability, tail risks" and associated vulnerabilities. One interpretation is that it is relevant for predicting when output will fall outside the range discussed in the WEO. The paper on macroprudential policy focuses on financial stability and systemic risk, but does not provide a specific definition of financial stability.

The GFSR chapter stresses that it is important to understand the source of a shock to assess the implications for financial stability.* It

* Aydin and Volkan (2011) present a DSGE model with a financial sector and show that the advisability of responding to changes in credit variables or spreads with *monetary*

is based on a structural model that incorporates a financial sector in a more standard DSGE model of the kind that is used for monetary policy analysis in central banks. The model includes three shocks: an asset price bubble; lowered lending standards; and a productivity shock. In response to any of the three shocks, credit to GDP will increase. While it is desirable to limit credit growth if it is a result of one of the first two shocks, it should not be limited in response to a productivity shock. The more general conclusion from the structural model is that measures like the credit to GDP ratio have to be looked at in combination with other indicators to understand what the underlying shock could be to make sure that only "unwarranted" credit growth is stopped.

The analysis then moves to an empirical assessment of how different credit measures fare in terms of issuing signals of banking crises. It concludes that the yearly change in credit to GDP performs better than the credit to GDP gap in a large sample of countries, although the gap measure as well as a broader measure that takes into account cross border flows seem to work relatively well for advanced countries. Asset prices for house and equity also have some ability to signal crisis and tend to do this at an earlier stage than credit variables. However, both credit and asset prices tend to either miss many crisis or send many false signals depending on how thresholds for sending warnings are set.

Caveats and the Importance of Structural Models

In order to make an assessment of risks macroprudential supervisors need relevant early warning indicators of financial crises. Attempts to identify such indicators are closely related to earlier attempts to identify early warning indicators for currency, banking, debt, and output crises. These earlier attempts identified a few potentially useful indicators. However, there are many empirical issues to be addressed when it comes to identifying robust indicators. First of all, any single country has in most cases experienced only a small number of crises. Also, even when a group of countries is analyzed, there are relatively few

policy also depends on what kind of shock generated the changes.

crisis observations compared to the large set of indicators or explanatory variables that researchers often want to explore. In addition, if the set of countries is enlarged to increase the number of crisis episodes, heterogeneity of countries becomes an issue since countries at different levels of development seem to be subject to different types of vulnerabilities.

Given the lack of a unified, quantitative, and reliable early warning model, many indicators are used to identify vulnerabilities in a rather unstructured way, and judgment plays a significant role. This process opens the door to different interpretations of a given situation. It risks making macroprudential policy less predictable and potentially subject to pressure from both politicians and business interests. Improving on this process is inherently difficult and may not be possible with reliance only on empirical studies. It will likely involve continued efforts to build better structural models of how the financial sector interacts with the real sector.

Having structural models makes it possible to analyze how alternative macroprudential tools affect the response of the economy to different shocks. The GFSR chapter does just that. The authors analyze how time-varying capital buffers affect the behavior of credit, GDP, and other variables. They show that although time-varying capital buffers limit fluctuations and output losses resulting from asset prices bubbles, such macroprudential measures can significantly reduce the amount of output growth resulting from a positive productivity shock.* Barrell et al. (2010) use their empirical model to back-out how capital requirements would have to be increased to reduce crisis probabilities to, in their view, more acceptable levels. They also address the question of how capital requirements should vary over time in response to increases in house prices. Although there is still work to be done in refining these and other models, they can provide much needed analytical support for the policymakers faced with the difficult task of determining which tool to use and how.

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REFERENCE GROUP FOR THE PROJECT

Danske Bank: Michael Boström
Nektar: Peter Kaplan
Swedbank: Cecilia Hermansson
Swedish National Debt Office: Lars Hörngren

LIST OF PROJECT MEETINGS

Ralph Bryant and Dale Henderson visited Sweden twice during their work with the report. Together with Torbjörn Becker they had meetings with a large number of people.

May 24–June 1, 2011

Daniel Barr, Head, Bank Support Department, Swedish National Debt Office
Michael Boström, Head of Analysis, Danske Bank Sverige
Peter Englund, Professor, Department of Finance, Stockholm School of Economics
Jonas Eriksson, Head of Treasury, Swedbank
Harry Flam, Professor, Institute for International Economic Studies, Stockholm University
Martin Flodén, Professor, Department of Economics, Stockholm University
Lars Frisell, Chief Economist, Swedish Financial Supervisory Authority
Lars Heikensten, Member of the European Court of Auditors, former Governor, the Riksbank
Cecilia Hermansson, Chief Economist, Swedbank
Lars Hörngren, Chief Economist, Swedish National Debt Office
Stefan Ingves, Governor, the Riksbank
Per Jansson, Head, Monetary Policy Department, the Riksbank
Martin W. Johansson, Deputy Head, Financial Stability Department, the Riksbank
Peter Kaplan (with colleagues), Strategist and Economist, Nektar Asset Management
Per Lindqvist, Deputy Head of Danske Markets Sverige, Danske Bank Sverige
Marianne Nessén, Deputy Head, Monetary Policy Department, the Riksbank

Jonas Niemeyer, Head, Policy and Analysis Unit, Financial Stability Department, the Riksbank
Lars Nyberg, Deputy Governor, the Riksbank
Mattias Persson, Head, Financial Stability Department, the Riksbank
Peter Sellin, Senior Economist, Monetary Policy Department, the Riksbank
Lars E.O. Svensson, Deputy Governor, the Riksbank
David Vestin, Deputy Head, Monetary Stability Department, the Riksbank
Staffan Viotti, Adviser to the Executive Board, the Riksbank

August 13–20, 2011
Martin Andersson, Director General, Swedish Financial Supervisory Authority
Gunnar Blomberg, Senior Adviser, Monetary Policy Department, the Riksbank
Fanny Borgström, Acting Head of Treasury and Head of Group Funding, Nordea
Karolina Ekholm, Deputy Governor, the Riksbank
Lars Frisell, Chief Economist, Swedish Financial Supervisory Authority
Johan Gernandt, Chairman, General Council, the Riksbank
Lars Heikensten, Executive Director, The Nobel Foundation, former Governor, the Riksbank
Jyry Hokkanen, Head, Statistics Unit, Monetary Policy Department, the Riksbank
Lars Hörngren, Chief Economist, Swedish National Debt Office
Anders Kvist, Head of Treasury, SEB
Anders Lindström, Senior Adviser, Statistics Sweden
Bo Lundgren, Director General, Swedish National Debt Office
Martin Noreus, Deputy Banking and Securities Department Director, Swedish Financial Supervisory Authority
Lars Nyberg, Deputy Governor, the Riksbank
Svante Öberg, First Deputy Governor, the Riksbank
Thomas Olofsson, Head, Debt Management Department, Swedish National Debt Office
Leif Pagrotsky, Member of the Riksdag, former Deputy Chairman, General Council, the Riksbank

Göran Robertsson, Deputy Head, Asset Management Department, the Riksbank
Irma Rosenberg, former First Deputy Governor, the Riksbank
Lars E.O. Svensson, Deputy Governor, the Riksbank
Staffan Viotti, Adviser to the Executive Board, the Riksbank
Barbro Wickman-Parak, Deputy Governor, the Riksbank