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From a labour market policy perspective, it is of central importance to have an idea as to how the matching of the labour supply and labour demand works. Matching is also important to monetary policy since bottlenecks can lead to wage increases that fuel inflation. This article aims to describe the matching process in Sweden from a regional perspective. The results indicate that matching on the Swedish labour market varies between regions. On average, matching efficiency tends to be lower in more densely-populated regions compared with less densely-populated regions.

Ten years with the Financial Stability Report

MARTIN ANDERSSON[1]
Martin Andersson headed the Riksbank's financial stability work between 1996 and 2007. Today he runs a consultancy company and is a member of the Bank of England's Financial Stability Board.

This autumn it is 10 years since the Riksbank became the first central bank to publish a stability report in the form of an independent publication on the status of the financial system. Since then, 20 of these reports have been published. The Financial Stability Report became the starting point for a more structured and focused analysis of the financial sector by the Riksbank. During the 10 years that have passed since then these issues have become increasingly important in the Riksbank's activities. Today, financial stability is the other main task of the Bank, in addition to the task of maintaining low and stable inflation.

The work on financial stability has also become a matter of an important international profile for the Riksbank. As one of the pioneers of a more structured form of stability analysis the Riksbank has been involved and at the forefront of this field. For example, there are now more than 50 countries producing financial stability reports. The Riksbank was also active at an early stage on questions regarding cross-border banks and crisis management, by identifying problems and possible solutions. These questions have now come under greater focus in Europe.

In this article I describe the Riksbank's work in the field of financial stability over the past ten years. These are personal reflections on why the work was started up and what challenges we faced. In conclusion I shall look ahead over the coming 5–10 years.

The driving forces behind the stability work

THE CRISIS REMINDED US OF THE NECESSITY OF THE WORK

When Sweden suffered a bank crisis at the beginning of the 1990s the Swedish authorities were ill-equipped to handle the situation. As Norway

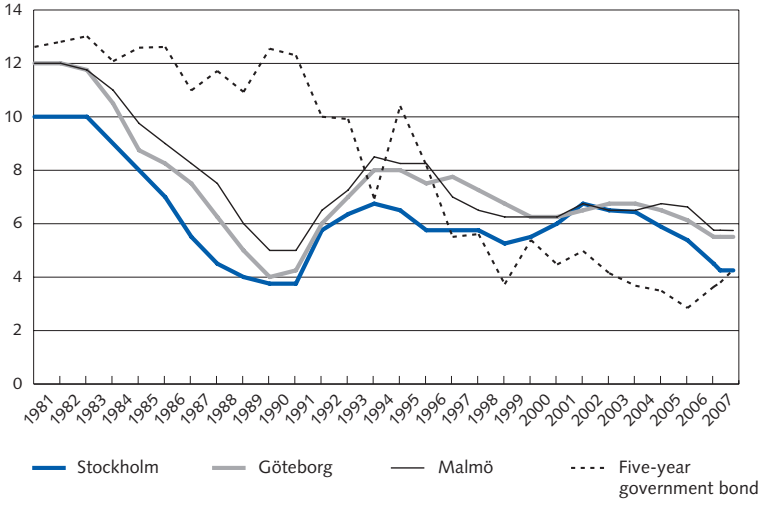
[1] I would like to thank Staffan Viotti, Kerstin Mitlid, Fredrika Lindsjö Hermelin and Johanna Fager Wettergren for their valuable viewpoints on the article and a particularly warm thank you to all the fantastic colleagues who have made it possible to build up the analysis I describe in the article.

had been afflicted before us, more effort was put into discussing why this could not happen in Sweden than into preparing ourselves to deal with a similar situation. The Riksbank, Finansinspektionen (the Swedish Financial Supervisory Authority) and the Ministry of Finance completely lacked both an analysis to understand the risks building up and a preparedness for dealing with a severe shock to the financial system.

The crisis was one important reason why we at the Riksbank began to systematise our work on financial stability a few years later. Prior to the crisis there was really no one in Sweden who systematically analysed developments in the Swedish financial system. The deregulation of the financial sector led to a sharp increase in credit in the economy at the same time as asset prices rose rapidly. Despite the fact that this development indicated that risks were building up, it received relatively little scope in the analysis and public debate. It was essentially obscured by the focus on the fixed exchange rate policy.

One example of a risk that may appear fairly evident with hindsight is the development in commercial property prices. For several years the direct yield on commercial property was much lower than the risk-free rate. This means that the investors demanded greater compensation to invest in risk-free government securities than in property, despite the latter carrying a higher risk. But no one highlighted the risks inherent in this speculation at the time.

Figure 1. Direct return on commercial property and the risk-free rate
Per cent



Sources: Newsec AB and Reuters EcoWin.

EXPERIENCE OF THE CRISIS AT THE RIKSBANK

When Urban Bäckström became Governor of the Riksbank and Stefan Ingves became Deputy Governor shortly afterwards, there were two people at the Bank who had earlier played a key role in managing the crisis. Urban Bäckström had worked as under-secretary of state to the minister for financial markets and had thus managed the crisis from the political point of view. Stefan Ingves had been General Director of the Swedish Bank Support Authority, which was formed to deal with the practical management of the bank crisis.

The new management thus had greater ambitions in the field and a more structured analysis of the financial sector. But initially this was a question of regularly gathering statistics from the institutions and publishing them in an aggregate form. The analytical ambitions did not extend beyond, with a few exceptions, analysing the statistics that had been gathered. At best, these were then published in the Riksbank's quarterly journal. There was no clear aim to build up an actual preventive analysis to capture potential imbalances.

ANALYTICAL FRAMEWORK ESTABLISHED

While this was happening, the monetary policy analysis was being developed. The new inflation targeting policy that replaced the earlier fixed exchange rate regime and the new management's ambitions for greater openness made much higher demands on the analysis. The Riksbank began to work with an "analytical framework", that is, tried to clearly establish basic principles as to how monetary policy should function. The analytical framework structured the issues and provided a focus for the continued work. The inflation targeting policy also required considerable openness to build up confidence in the ambition of maintaining low inflation. One means of increasing openness was to publish an Inflation Report. However, during the early years the report was more of a bureaucrat's product, and not signed by the management of the Riksbank.

The first analytical framework for analysing the financial sector was established in 1995. This concerned the analysis of the payment system.[2] The Riksbank at this time conducted fairly comprehensive work on issues regarding payment and settlement systems, both in Sweden and abroad. There was a greater need for the Riksbank to systematise a stance in order to pursue a consistent line and prioritise between different tasks. The analytical framework meant that the work should act to promote the various systems having functionality and risk management mechanisms

[2] Sveriges Riksbank 1995

that ensure a potential shock could be absorbed or at least would not aggravate the original shock. This can now be regarded as a fairly modest level of ambition, to put it mildly, but at that time it was far from self-evident. Neither VPC AB's system for settlement of securities trading nor Bankgirot's system for retail payments met these requirements at that point in time, in the Riksbank's opinion.

In 1996 we decided to raise the level of ambition by beginning to analyse the banks. I was given the task of producing an analytical framework and then carrying out the analysis. The analytical framework applied both to the task of promoting a safe and efficient payment system and to the role of provider of emergency liquidity assistance. This would help us to avoid blindly rushing into a new crisis – and if a crisis nevertheless arose, we would be prepared to deal with it. Below follows a review of the stances based on this analytical framework, which have become guiding principles for the Riksbank's work on financial stability.

A REPORT HELPED TO DEVELOP THE ANALYSIS

The Riksbank had good experiences of building up its analyses around a publication from the monetary policy field. With the wisdom gained from experience, the Riksbank Governor asked me the rather leading question in 1996, "why do central banks have two tasks, but only (at best) a report on one of them?" I could only agree with him. At that moment we decided to begin working on a stability report. The aim was to begin publishing a report on financial stability twice a year, with effect from 1997.

The first Financial Stability Report was published in autumn 1997. It contained the Riksbank's declaration of intent, or analytical framework, for the work on financial stability. In addition, there was an analysis of the competitive situation for the Swedish banks. To begin with the aim was to further develop the analytical framework regarding the payment system. But this was extended to also cover an analysis of what shocks could potentially affect the payment system. It was then a natural progression to make a more in-depth analysis of the institutions that are the most important participants in the payment system – the major banks.

The banks play a key role in the payment system. As important payment services are offered in the form of transfers between accounts, the banks' deposit accounts are central to the system. Thus, a crisis in the banking system could seriously impair the functioning of the payment system. But banking activities also have an inherent instability. This is because the banks' assets in the form of lending in particular are much less liquid than their financing in the form of deposits and volatile borrowing on the securities markets.

There are also considerable contagion risks if problems should arise in some part of the bank system. At times the banks' have very large exposures to one another. This means that problems in one bank can easily spread to other parts of the financial system. The contagion effects arise not only as a result of the banks having large claims on one another. It may sometimes be sufficient that there are *expectations or considerable uncertainty regarding the banks' exposures*. Initially unfounded rumours and expectations can in this way at worst become self-fulfilling.

Risks that can spread throughout the entire financial system are usually termed systemic risks. Individual participants in the financial markets usually have sufficiently strong motives for assessing and to an appropriate extent protecting themselves against risks that can affect their own activities. However, systemic risks do not only cover a company's own activities, they also encompass the costs to other institutions and society as a whole. The private incentives for avoiding risks related to such systemic risks are not sufficient from the point of view of society. The fact that systemic risks arise is thus an important motive for the government authorities to exercise supervision of and have special laws and regulations applying to the financial sector. Systemic risks are consequently also of central importance in the Riksbank's task of promoting a safe and efficient payment system.

The Riksbank's analysis of stability has therefore been largely focused on the major banks and the markets and participants that are important to the banks' earnings, financing and risk management. This was the starting principle when the Riksbank began its work on stability and it still stands.

FROM EXPLANATORY IDEAS TO ANALYSIS

The analysis was literally based around the Financial Stability Report. It would be untrue to claim that there was a well-thought out idea behind the first analysis dealing with the competitive situation. With the timetable that had been set – to publish the report during the first half of 1997 – it was quite simply the only field where we considered there was time to produce a sustainable analysis. However, the report was not actually published until autumn 1997.

There was also an idea that more energy needed to be put into explaining the reasoning. This was not just so that we at the Riksbank would learn, it was also to teach others how we thought, what we considered important and why. The three first reports were therefore more thematic than the following ones. The first report dealt, as already mentioned, with the competitive situation and its significance for the banks' earnings. The second report dealt with the connection between the macro

economy and the banks' credit risks. The third dealt with how the banks' exposures to one another could be mapped to gain a picture of the systemic risk, and that a problem would spread from one bank to others.

From the fourth report onwards there was a framework for regular analysis based on the three parts introduced in the earlier reports and the report then also changed its name to the "Financial Stability Report".

When the Riksbank published its first stability report in 1997, the Swedish banking system was essentially just that: Swedish. The fact that we had a financial system that was not only Swedish but also dominated by a few large banks made the task less complicated and was probably a necessary condition for being able to get started as soon as we did.

The fact that the system was national made it easier to link together the banks with the Riksbank's macroeconomic analysis. This is considerably more difficult today, when the banks' activities are conducted to a greater extent outside of Sweden. Analysing financial stability means analysing the entire operations of the most important participants of the system, regardless of where they conduct them. It is difficult to imagine that in modern banks, where an increasing part of their activities is centralised to one division of a group, a problem in one division would leave the rest of the bank untouched. Today, for instance, liquidity management is often centralised to the main office regardless of what legal form the bank uses to conduct its foreign operations.

A controversial report

As I mentioned earlier, the Riksbank was the first to present a separate financial stability report. The Bank of England had begun publishing its Financial Stability Report one year earlier (1996). But this was in all respects a rather different kind of report. It was a collection of articles on themes linked to the financial sector and gathered over the space of six months. It was not until 1999 that the Bank of England began to publish an analysis and assessment of financial stability in its Financial Stability Report.

Another central bank that developed its stability analysis in parallel to the Riksbank was Norges Bank. In 1997 they published an article containing an assessment of financial stability in their quarterly journal. However, as this analysis was not as visible as the Riksbank's report, it took some time before it received any broader international attention.

The Riksbank, on the other hand, received considerable attention when the Swedish report was published. This was not least because it was an official document right from the start, adopted by the Governing Council of the Riksbank and signed by the Governor.

The fact that we at the Riksbank were pioneers made things more difficult for ourselves. We were not able to borrow good ideas from others and we also had to deal with the controversy of doing something that others had not yet thought of doing. Publishing a Financial Stability Report was very controversial in the international central bank cooperation. There was considerable scepticism from our central bank colleagues. Many even considered it not just silly but downright irresponsible of a central bank to write a Financial Stability Report. The critics considered that, by making our analyses public, we might contribute to the risks actually materialising. They thought that the Riksbank might contribute to creating unrest and instability instead of, as we ourselves believed, promoting stability.

FACILITATES COMMUNICATION

But we stood firm in our assessment that the report would facilitate communication with the financial market participants on the vulnerabilities that might need adjusting. By regularly publishing reports we would also hone our own analysis work and give it a clearer focus. The report would also make it easier for the Riksbank to report back to the Riksdag (the Swedish parliament) on its task of promoting a safe and efficient payment system. In addition it was in line with the regeneration of the Riksbank's methods of working that was implemented during these years in general – and particularly with regard to monetary policy. The former image of the Riksbank as a closed and almost secretive institution was replaced by one where greater openness and transparency were important guiding principles and, not least, an important part of our way of working.

COUNTERACTS THE MARKETS OVERREACTING

The Riksbank considered it useful to be able to warn at an early stage of any tendencies that could lead to excessive risks building up in the financial system. Previous experiences also indicated that the market could easily overreact. It was therefore valuable to be able to provide a balanced and honest picture on the basis of a thorough analysis. Given their competence and presence in the financial sector, central banks can contribute to this. A common denominator for those countries that chose to publish stability reports at an early stage was that they had all relatively recently experienced financial crises of varying scope.

In recent years this subduing effect in troubled times has become more important, which is clearly illustrated by the experiences in Iceland in 2006. When the Icelandic financial sector and krona came under pres-

sure in 2006, this was partly because the participants in the financial markets had substantially overreacted to negative information. The central bank had been publishing a financial stability report for several years, which had a good reputation as fair and credible. This meant that they had an infrastructure for being able to publish an analysis and a more balanced and correct picture of the current situation, without having to sweep the actual problems under the carpet. It also calmed the acute market turmoil.

More than 50 countries now regularly publish financial stability reports and there is broad agreement that this is a good thing.[3] It has also become increasingly common for supervisory authorities to publish similar documents – here Sweden and Norway were also pioneers. Nowadays, international organisations such as the International Monetary Fund (IMF) and the European Central Bank (ECB) also publish financial stability reports.

Analytical framework for financial stability

The ultimate purpose of the Riksbank's analysis of financial stability has been to prevent crises and to be able to manage them if they nevertheless arise. In this way the work naturally follows on from the central banks' role as potential providers of emergency liquidity assistance. The purpose of overseeing financial stability is to reduce the risk of needing to provide emergency liquidity assistance and, if a crisis nevertheless arises, to be able to manage it at the lowest possible cost to society. This requires the Riksbank to be well-prepared to make correct assessments of a situation that has arisen at short notice.

A necessary condition for a stable financial system is that it is efficient. In the short term, increased competition may sometimes be perceived as negative, from the point of view of financial stability, as it reduces profitability and may mean that the financial institutions take greater risks. But all experiences indicate that only an efficient system can remain stable in the long term. Inefficient systems with low competitive pressure lead to a lower innovation rate and increased risk taking. The fact that the financial system functions well is also a necessary condition for being able to implement effective inflation targeting. Even with this view, the purpose of the oversight of the financial system should thus be to limit the risks of an overall crisis.

An area that is often debated is to what degree society's commitment to the regulation and oversight of the financial sector leads to

[3] Cihàk, 2006

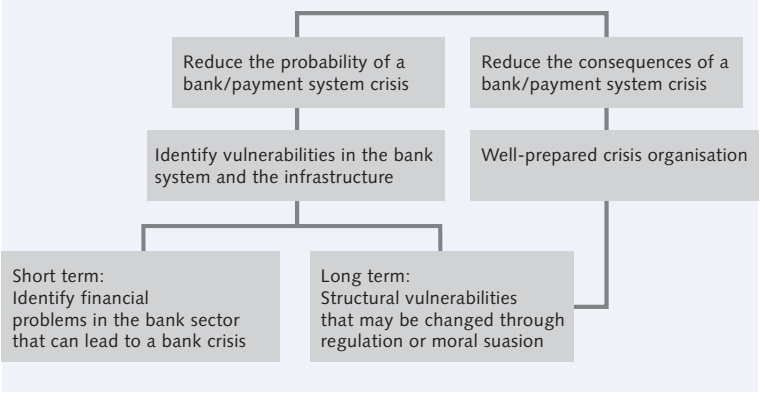
greater risk-taking, what is known as moral hazard. As the financial system is the hub of a modern market economy, it is often unavoidable that the government authorities have some commitment in this area. But it is nevertheless important that there are clear incentives for the participants to manage their risks themselves. One means of achieving this is that there is a clear and credible strategy for managing crises. If the banks' owners and management are aware that they will not be protected in the event of a crisis, they will have reason to manage their risks and the moral hazard declines. In this respect a good ability to manage crises is a necessary condition for economic efficiency.

ANALYTICAL FRAMEWORK FOR THE PREVENTIVE WORK

Compared with most central banks, the Riksbank's stability work is more aimed at the micro level, with an analysis of individual banks. This differs from the purely macro-prudential approach that is most common today, where the focus is on the bank sector on aggregate rather than on individual institutions. The more macro-prudential approach is motivated by the need for an overall analysis of potential imbalances that are built up in the economy and the financial system. The fact that the Riksbank has also chosen the more micro-based approach is a natural consequence of the task of crisis management. To be able to act quickly and decisively in a financial crisis it is important to have good knowledge of the systemically-important institutions.

The preventive stability analysis is based on three pillars. These are the banks, their surrounding world in the form of markets and macroeconomy, and the infrastructure. One of the advantages of writing a financial stability report is that it becomes necessary to link together these parts and to see what risks are related to this whole. Even if the Riksbank,

The Riksbank's view of Financial Stability



or another participant, analyses the various parts separately, a dimension will be missing if the links between them are not also analysed.

The banks are mainly analysed on the basis of credit risk, liquidity risk and strategic risk. Historically, the major bank crises have always concerned credit risks, and this was also the case in the 1990s crisis in Sweden. But on some occasions the banks' liquidity risks have been made visible without this being related to solvency problems. This took place in 1998 during the Russia crisis and when the LTCM hedge fund crashed, in 2001 in connection with the terrorist attacks and during the market turmoil that arose in autumn 2007.

The third risk the Riksbank has emphasised is strategic risk. Put simply, this concerns trying to analyse the banks' long-term earnings capacity and what strategies they may choose to improve their profitability. Characteristic for financial operations is the strong link between risk and return. If profitability is under pressure in the long term, there is always a risk that the company will instead choose to increase its risk, and it is important to monitor this when overseeing financial stability.

To understand the banks' credit risks it is necessary to understand how the payment capacity of the large borrower groups will develop. This means that the Riksbank analyses not only the overall macro-economic developments, but also makes in-depth studies of important borrower categories, such as households and companies. The micro perspective is clear here, too. As Swedish banks lend a substantial amount to the commercial property sector, this sector and its underlying market come under particular scrutiny in the analysis. In recent years the banks' international expansion has meant that the Riksbank has had to spend more time on analysing foreign borrowers in the countries that are the most important to the Swedish banks, that is, the Nordic countries, the Baltic countries and Germany.

The financial markets are interesting from both a liquidity and a credit risk perspective. A relatively large part of the banks' financing is currently directly via the financial markets. The markets can also be used to remove credit risk from the balance sheet through, for instance, securitisation, or to increase risk taking by buying various credit instruments.

The financial infrastructure consists of both the payment system and the legal framework for the financial system. Here the preventive analysis consists of overseeing that central components in the payment system function in a way that promotes financial stability and actively promotes problem-solving. The Riksbank also takes an active part in the commissions and consultation response work regarding the legal framework for the financial sector, not just in Sweden but also abroad under the umbrellas of the EU and Group of Ten.

For a central bank to be well-prepared to manage crises, the bank must first have taken a stance on issues of principle and must have practical routines. The issues of principle concern, for instance, the conditions for emergency liquidity assistance and what terms might be appropriate. They also cover questions regarding the type of collateral the central bank can accept in different situations.

When a crisis actually occurs, all of the statistics are out of date. It is then important to be able to quickly produce the most relevant information. This requires good relations with the banks, but also the ability to know in advance what is needed and to be able to analyse the facts that are presented. It is therefore important to have analysed the individual banks over a long period of time in order to be able to make a decision.

The Riksbank has published a couple of articles on how the Bank sees systemic importance and issues of principle regarding emergency liquidity assistance. The first of these concerns whether a failure in one bank could threat the Swedish payment system.[4] The conclusion of this analysis was that it is doubtful whether any individual bank is systemically-important in itself. But the risk of problems spreading between the banks as a result of their exposures to one another meant that a failure in one of the four major banks could threaten the stability of the Swedish payment system. One consequence of this reasoning was that it was reasonable to assume that none of the smaller banks could be regarded as systemically important. The other article discussed the Riksbank's role as lender of last resort.[5] The article took up issues of principle regarding pricing, collateral and durations.

Clear internal routines and external contacts

One aim in the work on crisis management has been that the Riksbank should be able to make a decision to grant or not to grant an institution emergency liquidity assistance within three hours. This makes considerable demands that both internal routines and external contacts have been clearly defined in advance. Similarly, there needs to be a clear idea of what information is given greatest priority when gathered at extremely short notice. This is of course made easier by the fact that the banks are also well aware of what this information is. One concrete example was that in connection with the market turmoil in 1998 the Riksbank asked all of the banks to report during the day their maturities in foreign currency

4 Sveriges Riksbank 2003a
5 Sveriges Riksbank 2003b

for the coming working week. It took one of the banks 8 days to produce this information! Although the system support is much better these days, this example nevertheless illustrates the importance of discussing in advance what information the Riksbank might need to gather in a crisis. Part of the problem in the example above was that we got into a discussion of statistical definitions, which is of course unfortunate in a crisis situation.

The banks' counterparty exposures are an example of information gathered primarily for the purpose of crisis prevention. The Riksbank collects information quarterly on the banks' major exposures within a number of different fields. This is to be able to gain an idea of how a potential problem could spread from one bank to others. There has been some criticism of the fact that the statistics are only quarterly and that quarter-ends are not representative. There is good reason for this criticism. But the statistics nevertheless provide an *indication* of how things look under normal circumstances, while the cost to the banks of producing the figures is reasonable. In addition, the work on the statistics means that there are routines and definitions for being able to produce these figures quickly if a crisis is imminent.

The practical routines for the Riksbank are gathered in a "crisis folder". This contains schedules, allocation of responsibility, draft contracts and press releases and contact lists of those who need to be reached in the event of a crisis, both in Sweden and abroad.

Regular crisis management exercises

The Riksbank began to hold crisis management exercises at an early stage. From the end of the 1990s the Riksbank has held regular crisis management exercises with the aim of testing its crisis management organisation. Some of the exercises have been purely analytical and others have had a more practical nature. These exercises have enabled the crisis folder to be further developed and adapted to the shortcomings that have been detected. Some of the exercises have been held in cooperation with other Swedish and foreign authorities.

MEASURING FINANCIAL STABILITY

Are there different degrees of financial stability? Several central banks and some academic researchers have tried to create some form of measure of financial stability, such as a stability index. But none of these initiatives has been particularly convincing. A driving force in these countries has been to try to create an analysis of financial stability that is similar to the one

on monetary stability that is expressed in the form of changes in the CPI. For many central banks the search for something similar to this is a top priority. But personally I do not regard this as a successful route to take.

Financial stability is a very complex concept, and includes many phenomena. Monetary policy largely concerns anchoring expectations among the general public of a low inflation rate to create behaviour that ensures this will be the case. However, financial stability does not work through the expectations of the general public. The situation is more binary in nature, either everything is fine or there is a crisis. Given this, it is difficult to see the usefulness of a stability index. However, it is unfortunately much easier to see the problems. In weighing together several different variables there is an obvious risk that one will miss seeing how the risks are actually building up

Financial stability analysis is made more difficult by the fact that many indicators are difficult to interpret. What does it mean that the risk premiums in the markets are falling – that the situation is very stable or that the market is underestimating the risk and that there is thus a tangible risk to financial stability? If households increase their indebtedness is this the beginning of a problem situation or a sign of very good future prospects? Do households and the banks have rational expectations of their future earning capacity and interest burden?

What the Riksbank has tried to do is to use established portfolio models to estimate the consequences of one of the identified risks materialising. This approach gives an understanding of the size of various risks, without giving the false security provided by a stability index.[6] The model makes it possible for the Riksbank to measure the approximate scope of the risks identified for individual banks, but also allows it to stress test various scenarios at both aggregate and individual bank level. The Riksbank has chosen to try to measure financial stability in terms of the banks' resilience to unexpected shocks. This model enables the Bank to test how much of the banks' resilience, in the form of earnings and capital, would remain if various risk scenarios were to materialise. Today the link between the macro economy and the input into the model is made through assumptions of how expected default frequencies and degree of recovery will develop. However, in the long term it is possible to estimate empirically how macro economic changes will have a direct impact on the banks' credit portfolios.

The Riksbank's work consists to a large part of making proxies for the banks' credit portfolios. The heavy model work has been avoided by using well-known and transparent models such as CrediRisk+ and KMV's

[6] This approach is described in detail in Sveriges Riksbank (2006)

Merton model. By only working with established models and public data it is also possible for others to make their own analyses. It is even more important that the Riksbank can then report the results at individual bank level in the Financial Stability Report and other public contexts.

The fact that the model is based on individual banks means that it can also be used in the crisis management work. Various stages of a crisis can be simulated, as can the effects of alternative possible solutions. In this way the model can provide valuable support for decision-making in a financial crisis, in a similar way to the bank models actively employed by the Swedish Bank Support Authority during the crisis in the 1990s.

Development tendencies that will shape future analysis

FROM NATIONAL TO INTERNATIONAL SYSTEMS

As the large financial institutions are now becoming increasingly international, the possibilities to conduct stability work with a purely national overtone is declining. The link between the macro economy and the banks is becoming more complex and the possibilities to base the analysis on national sources of statistics is diminishing. The Riksbank's choice of stress model with a focus on banks instead of working with a macro model makes the necessary adjustment of the analysis easier. It also becomes more difficult to isolate a crisis within national borders. This means that the risk increases that a crisis arising in one of the large cross-border institutions would have serious effects in several countries.

It therefore requires more cooperation with the authorities in other countries, both in terms of the preventive analysis work and in crisis situations. Local knowledge of one's own markets is important in the preventive analysis work, as is good knowledge of what statistical sources are available and also knowledge of their shortcomings. By making use of one another's knowledge, the analysis can be improved, although this may in many cases be rather time-consuming.

A necessary condition for the cooperation to work in a crisis situation is that there are well-established forms for cooperation in the preventive work. Even at a national level the crisis work may be hampered if cooperation is required between several different authorities – central banks, financial supervisory authorities, authorities responsible for deposit guarantees and ministries of finance. When a bank with extensive operations in several countries is afflicted by problems, the number of authorities involved increases exponentially. This, together with differences in regulatory frameworks, makes considerable demands with regard to coopera-

tion. It is then important to have channels for cooperation already in place. It is also necessary to have similar ideas on various policy issues – or at least to know in advance where the greatest stumbling-blocks lie.

Is it then reasonable to write national financial stability reports? Yes, I believe so. There are two good reasons for this. Firstly, it is relevant for national authorities to analyse the financial sector's links to developments in the national economy, regardless of which markets the banks operate in. Secondly, the experiences from our international work show that it is difficult to be explicit with regard to the risks envisaged if there are clearly national overtones. There is then a risk that one writes reports that do not say very much, apart from what is politically correct, and that the value of publishing financial stability reports will then be lost.

CHALLENGES FROM A MORE MARKET-DOMINATED SYSTEM[7]

One general international trend is towards greater market orientation. The banks are becoming increasingly dependent on financial markets for their earnings, funding and risk management. Their earnings consist to a rising degree of commission income in various forms. This income is in turn dependent on the developments in the markets where the assets are traded. At the same time, the percentage of funding through deposits from the general public has gradually declined, and an increasing share of the banks' funding consists of borrowing in the financial markets. The interest rate risk and exchange rate risk that arise in these markets are managed in the derivative markets. The banks' increased dependence on markets for their risk management and funding mean that they are also more sensitive to liquidity problems in these markets. This means that the analysis of the banks' financing and the liquidity risks linked to this becomes even more important.

However, other participants than the banks have gained in importance. For instance, institutional investors such as insurance companies and pension funds have become more significant in the financial system. Demand has driven innovation, which has led to a rapid expansion in a number of financial markets. This has created scope for new participants, such as hedge funds and risk capital companies, which have come to play important roles in the financial markets.

But at the same time the market dynamics have become more difficult to predict and market shocks have an increasing rapid sequence of events. Technological advances have created opportunities to link together a large number of financial markets. Many of the largest international

[7] This section is largely based on the report in Sveriges Riksbank (2007)

financial institutions are active in almost all of the financial markets and the linking of the markets in principle makes it possible to trade twenty-four hours a day. The financial markets have been linked not only electronically – they are also to a large degree financially linked in that assets sold on one market are used to actively manage risks arising in other markets.

Although it has been possible to spread many risks over a larger number of participants, it has become more difficult to gain an overall view of where the risks lie in the system. The markets have thus become less transparent. The reduced transparency is not least a result of the complexity in many of the new instruments and techniques for trading in credit risk that have arisen in recent years. When the risks are moreover repackaged and sold on through several channels, it becomes more difficult to see which balance sheets contain the final risks. The complexity also makes it difficult to assess the instruments and often demands advanced calculation models. It is therefore necessary to put greater focus on analysing financial markets and the most important participants in these markets to be able to assess financial stability.

Conclusions

The journey that started 10 years ago when the first Financial Stability Report was published has only just begun. A lot of work remains to be done. Old ideas and ambitions still need to be realised. At the same time, we are aiming for a moving target. New innovations and cooperation require constant changes in our methods of working.

The work on financial stability is ultimately a matter of being to influence through good arguments, what is known as moral suasion. A thorough and credible analysis enables central banks to influence financial stability without any actual tools. Not merely by issuing warnings at any early stage that certain phenomena may indicate that excessive risk is building up, but also by providing a modulated, but honest, picture when there is financial turmoil. This makes considerable demands that the analysis is focused on the right areas. It is also important to work actively on trying to spread the analysis to all of the decision-makers who can actually do something about the situation – something that is easier said than done.

In this way, published financial stability reports will promote financial stability and lay an important foundation for the work on creating good crisis preparedness.

References

Cihák, M. (2006). *Central Banks and Financial Stability: A Survey of Financial Stability Reports*. Washington DC: IMF.

Sveriges Riksbank, (1995). *The Riksbank's role in the payment system*.

Sveriges Riksbank. (2003a). *Financial Stability Report, June*.

Sveriges Riksbank. (2003b). *Financial Stability Report, November.*

Sveriges Riksbank. (2006). *Financial Stability Report, May.*

Sveriges Riksbank. (2007). *Financial Stability Report, December*.

In September 2007 the Riksbank organised the conference "The Evolution of Financial Markets and Financial Institutions: New Threats to Financial Stability"

The conference was arranged to draw attention to the fact that it was ten years since the Riksbank published its first Financial Stability Report. Researchers and representatives of authorities and financial markets described from their own different points of view how structural changes affect the risk of financial crises. Below we publish the contribution from Anthony M. Santomero and Kent Janér in the concluding panel discussion.

Loan Portfolio Management: Good News or Bad News for Financial Stability?

ANTHONY M. SANTOMERO
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Banks act as intermediaries between sources and uses of funds. Traditionally, these intermediaries have been seen as necessary for the financial markets to achieve an efficient allocation of resources. Yet in spite of their importance, the bank's role of middle man is fraught with risks. Traditionally, banks have had to hold the loans they made until maturity, thereby assuming both substantial credit and interest rate risks. They usually have had little control of the industry mix or concentrations in their loan portfolios. They evaluated loan applications as they came in and usually have had access only to the bond market as an alternative place to invest available funds.

There was some logic to this old system. When information on the borrower and his project was rather limited, buying and holding a direct long-term stake in specific investment projects allowed banks to illustrate their support for these projects and their willingness to monitor them after the initial investment. Evaluation, monitoring, financing and funding of risky loan contracts were all seen as part of the lending process.

However, several developments in the debt market had led to a shift away from the traditional "buy and hold" model of corporate lending. The advent of a deeper and more liquid market for bank loans have led institutions to view their loan portfolios as something under their control, something that they can and should manage over time. This has led substantial changes in the way loans are made and how they are managed by the financial sector.

In light of recent events, some are wondering whether the changes we have seen in bank lending are enhancing or damaging the stability of the financial system. This is the question at hand and one of the questions that are the focus of this conference.

The forces of change in the loan market…

To begin the discussion of the evolution of corporate lending, one must begin by recognizing that there have been several forces that have acted upon this market and changed the way in which the banking sector provides intermediary services to the corporate sector.

First among these forces is the fact that information has become cheaper and virtually ubiquitous in the financial market. Information about major borrowers is now easily available to virtually all interested investors, reducing the value of both the evaluation of credit applications for large institutional borrowers and the monitoring of on-going loan performance. That is not to say that losses have not occurred. Indeed they have! Over the past decade, the credit market has been subjected to several spectacular disturbances: The Asian crisis, the Russia crisis, and the collapses of Enron and Worldcom were all painful, and they were reminders that credit implies risk of loss. But these were public events, no longer swept into an opaque balance sheet of the banking industry.

A second source of change in the market for commercial loans was the substantial increase in market liquidity that has been occurring over the past decade. Since 2001 the markets have been flush with liquidity in part as a result of coordinated central bank policy throughout the world. This added liquidity meant a marked increase in the number of lenders and the amounts available in markets worldwide. In response, credit standards eased, and credit spreads tightened throughout the debt markets, reducing the price of risk.

At the same time, regulators added a third force of change. The regulatory environment and the new Basel II regulations have mandated more emphasis on risk management capability and risk sensitive capital. It is well known that these new regulations require more sophisticated measures of banks' exposure, but they may also have substantially altered incentives for many regulated institutions. Some have argued that holding standard corporate loans in a bank's balance sheet has become considerably less attractive as a result of recent regulation.

Technology has also been an important factor of change. Corporate finance departments everywhere have added to their arsenal of tools to evaluate and price risk. Better modeling techniques combined with the increased availability of data have improved the rigor and sophistication of the pricing process for all types of financial products. These methodological developments have made it easier to estimate the probability and cost of default and to measure and track correlations among borrowers within the credit portfolio. These new credit analytics are also changing the relationship between borrower and lender, making them two sides to

an arms length transaction and reducing the importance of the long term relationship.

Partly as a result of all these changes, non-bank investors are increasingly finding it attractive to hold bank loans in their portfolios. In essence, they have developed into a credible separate asset class. These credits are now more liquid and increasingly tradable. For instance, since the new millennium the proceeds from collateralized debt obligations (CDO) and the volume of loan trades grew at compound annual rates of 31% and 11% respectively. And, new classes of investments, such as investors in CDOs and hedge funds, now dominate the primary institutional market.

In this environment, the distinction between loans and bonds has faded, and more profoundly, the difference between credit risk and market risk is now blurred. Loans, like any other asset class, change in value constantly in response to changes in market risk factors, such as foreign exchange rates, interest rates, equity prices, and spreads, as do their volatilities and correlations.

Loan portfolio management is changing…

Within financial institutions, all of these factors present institutions with the infrastructure to better analyze and manage their loan portfolios of large corporate debt and at the same time have created a need for them to alter the way they think of their loan portfolio. Banks can now define and construct a loan portfolio with a chosen risk-return profile from the set of opportunities available to them in the market. They can buy or sell loans or portions of loans. They can join syndicated loan groups, gather up these loans into securitization vehicles such as CLOs and CDOs, or they can buy or sell credit derivatives to alter specific name or industry exposure. The increased power and flexibility of active loan portfolio management, ACPM as it is called, are precipitating a new perspective on bank lending and loan portfolio management.

The first feature of this new perspective is a separation of the value chain in corporate lending. Lending is now at least two separate businesses run by specialized units within the institution. Large firms have separated *origination and servicing* on the one hand, and portfolio management on the other. This approach promotes economic transparency because each function can be specialized and held accountable for its contribution to bank profitability.

By separating origination and servicing from the funding side of the business, the benefits associated with valuing each transaction at market prices include more disciplined credit selection, more rigorous pricing

strategies, improved distribution and greater focus on high value businesses. For those charged with portfolio management, this separation can result in improved diversification, improved capital allocation, and potentially reduced capital costs. A properly motivated portfolio management desk will innovate and develop products that respond to investors' needs in their effort to construct their optimal portfolio. And, portfolio management can be motivated to search for hedging opportunities in secondary markets that will free up capital that can be reallocated into further growth opportunities.

But, ACPM presents challenges to originating institutions…

For the institutions that originate these credits, this new approach comes with new challenges and new issues. First, for those that create these debt instruments the bank must be much more focused on its objective in the loan market. In the passive loan market of yesteryear, loan portfolios grew with time and were the result of geography, the economic cycle, and a good Rotary Club membership. Now, the bank can and must actively decide which of the credits will be held to maturity, which will be sold, and which will be altered directly or indirectly with the benefit of derivatives of various types. In essence, in this new world the bank must select its credit portfolio.

This raises a second problem, the issue of performance evaluation for this new function. Performance metrics are needed to access success and for the establishment of appropriate incentive systems. These will be dependent on the bank's specific goals for their loan portfolio activity.

Then there is a third issue of co-ordination within the firm. In an environment where loan creation is separated from loan portfolio management, the institution must decide exactly what is the relationship between the bankers who manage the loan portfolio, and those responsible for origination and servicing? Breaking an integrated process into separate activities raises important coordination issues. In particular, diversification objectives by the portfolio manager may sometimes conflict with the banks' ability to forge privileged relationships with borrowers and to exploit its information advantage.

Banks are responding to these challenges…

A recent survey of global financial institutions conducted by McKinsey sheds some light on how banks in North America and Europe are dealing with these issues. The thirty-three surveyed institutions, representing the

largest global players, identified loss limitation as their single most important objective for ACPM. Most saw enhanced liquidity as a significant goal as well. They saw profit generation from ACPM as relevant but relatively less important. Interestingly, though most recognized the need for such a system, few had a rigorous performance management system in place.

Many still seemed to be struggling with the separation of origination and portfolio management within the same organization. The European participants, as a group, seemed most comfortable with this division, while many of their U.S. counterparts resisted the decoupling. For the Europeans, credit treasury is the counterpart of the ALM function for interest rate risk; it is separate and disconnected from the line of business. For the majority of the U.S. bank participants, ACPM offered diversification and liquidity advantages, but they have been unwilling to distance origination from funding. The latter group sees ACPM's real value as the enhancement of portfolio characteristics made possible by adding market transactions to their home grown portfolio, not a separation of the two efforts. Many banks direct their portfolio management departments to accept all loans that are generated by the origination unit and to focus exclusively on carrying out the appropriate market transactions to alter the portfolio's risk-return profile. As a result, the survey suggests that two generic models of ACPM are emerging in the banking sector.

Yet, challenges remain for banking firms…

However, both groups recognize that there are two pieces of unfinished business. The first challenge is to align performance measurement and incentive systems of the two units with bank objectives. Obviously, it is important to avoid conflicts of interest between origination and portfolio management. The initial quality of the loans they underwrite determines portfolio management's ability to mitigate losses. Beyond that it is important to measure correctly each unit's contribution and to properly reflect this contribution in performance evaluation. The loan transfer mechanism between origination units and the portfolio unit can play a key role in this regard. A good incentive system should also promote the flow of information where permissible between the two units. In fact, portfolio management's ability to successfully manage the portfolio depends on the information it has on the individual loans. Yet, origination units are actually involved in managing borrower relationships and they are better informed about the borrowers present status. As a result, they must be provided with the incentives to share any relevant and appropriate information with the portfolio management unit. Unbundling the lending process

potentially allows bank to design more flexible and targeted incentive systems; however, this process may be more complex. Therefore, it is not surprising that the McKinsey survey finds that standardized performance metrics to differentiate performance and allocate profits to different business units are still a work in progress.

The second open issue is the extent to which institutions can extend portfolio management techniques across their entire credit portfolio. So far, ACPM is limited to the large corporate market, where special information advantages are less relevant and liquidity is more available. However, loans to large corporations are a relatively small fraction of the typical bank's loan portfolio. The challenge is to extend the reach of ACPM to mid-market and commercial lending. This is harder than it may seem at first, because this segment of the portfolio generally requires specialized monitoring services. In addition, it is clearly more difficult to develop liquid markets for these risks. That said banks with good structuring and distribution groups may be able to develop innovative ways to make these assets liquid. Should this be feasible, financial markets would be able to finance these firms as well.

And, ACPM presents challenges to ultimate investors…

For institutional investors in this market, the trading of whole loans, the purchasing of CLOs, CDOs, and participating in credit derivatives offers them both new challenges and new issues. First, investors are now faced with a myriad of structures, and dozens of different asset types among which to choose. Each has its unique pricing idiosyncrasies; each has unique terms; and each has unique volatility in the face of different economic shocks.

Recent events have made this clear and demonstrated how uncertain valuations can be in light of some stress scenarios. The news around the difficulty in pricing some funds has made this point quite clearly. They also seem to illustrate that the market is less comfortable with "mark to model" valuation of these complex instruments than some had thought. As a result of both of these issues recent evidence suggests that market liquidity and underlying financial stability may be adversely affected by these innovations in bank lending, at least for a time and surrounding some events.

This has raised a second concern surrounding the trend toward ACPM, namely the accuracy of reported asset values reported in the balance sheets of the largest financial institutions. If asset portfolios are now somewhat opaque as a result of this trend to trade and transform debt

instruments into increasingly complex assets, some have argued that the balance sheets of the institutions that are major players in this market may be suspect. In short, because assets are less easy to understand at a distance, the balance sheets of major institutions may be less transparent as a result of this trend toward credit portfolio management. The substantial revaluation of the market value of all financial sector participants in light of recent event seems to lend credence to this argument.

In short, it has become more difficult to know what credit risk resides in any portfolios and how its value changes with economic shocks than it was in an earlier era where loan portfolios were simpler.

The take-away from all of this…

The market for bank loans has come of age. They are now a separate asset class, and their attributes can be disaggregated and traded separately in increasingly liquid markets. The sorting and resorting of state contingent claims from various debt instruments have led to additional classes of assets, such as CDOs, CLOs and various structured debt instruments, not to mention the substantial growth in credit derivatives of various types.

This has led to the emergence of active portfolio management, ACPM, at all major financial institutions. The exact nature of the activities conducted under this rubric varies from firm to firm, and current practice continues to evolve. Nonetheless, some things are clear. The value chain associated with corporate lending is splitting apart, with origination and servicing separating from portfolio management. The best way to conduct ACPM is still debatable, and may well depend upon the bank's franchise and special information advantage it possesses about its clients. In any case, evaluating the performance of the two separable parts of lending is becoming increasingly important, as is the strategy any one bank employs to service its customers and protect its solvency in this risky environment.

This has also led to considerably more trading in various debt instruments and their derivatives. Recent events suggest that financial markets are still a bit uncertain as to the value of these assets and their implied price variation in the face of economic disturbances, such as the one we have just experienced. Contrary to expectations, some markets became less stable, rather than more, as a result of value uncertainty and the sudden decline in liquidity that occurred.

Where do we go from here? This is a difficult question. Perhaps recent events suggest a direction. They suggest that, while we have made assets more tradable, we have not necessarily made their value more

transparent. Indeed, the added complexity associated with current asset portfolios drawn from various types of credit and credit derivatives cries out for better transparency and better reporting. This ought to be the agenda for the next decade.

Financial Evolution and Stability – The Case of Hedge Funds

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Hedge funds are a prime example of financial evolution. Not many years ago they were still marginal players. Today they are among the most important institutions on the financial markets.Hedge funds represent no more than perhaps two per cent of all financial assets. But they leverage their capital base and trade frequently. It is estimated that they generate 30–50 per cent of the turnover on many markets and possibly account for the same proportion of all active risk taking. Hedge funds are also very active in seeking out new markets and new financial instruments.

Below is my view on the evolution of hedge funds over time and also some comments on the recent market turmoil in August 2007.

Evolution of Hedge Funds

ALPHA HUNTERS

Hedge funds started as alpha hunters and still like to think of themselves as such. This is understandable, since alpha can be described as the ultimate return stream.

Alpha, defined as excess return over a benchmark, is skill based. Strictly defined, alpha is a zero sum game. All positive alphas have negative mirror images somewhere else. By nature alpha tends to have a low correlation with various benchmarks of risky assets, making them ideal for improving the performance of traditional investment portfolios. Higher return combined with lower risk does wonders for risk-adjusted returns.

However, alpha is short in supply. It is unclear what happens to the total pool of alpha in financial markets over time. As new markets and new instruments evolve, new alpha opportunities arise which expand the alpha pool. However, it is doubtful that the pool of alpha increases much

over time in large and mature markets such as those for equities and bonds.

If hedge funds tear more alpha out of those markets, it implies, by definition, that other players increase their stock of negative alpha. The bulk of that money is institutional, and most institutions have seen stronger governance and better performance measurements over time. In combination with the growing use of indexing and "closet indexing", this indicates there is unlikely to be a trend of worsening performance amongst other players than hedge funds.

It is highly unlikely that negative alpha among non hedge funds has increased at the same rapid pace as assets under management among hedge funds. The conclusion is that alpha as a percentage of hedge fund assets has decreased as those assets have increased; in other words the average excess return from hedge funds has decreased over time.

It should be stressed that whereas the average hedge fund has produced less alpha over time, some individual hedge funds continue to deliver solid alpha returns year after year.

SUPPLIERS OF DIVERSIFIED BETA

Although the alpha part of hedge fund returns has decreased other parts have increased.

Hedge funds are now large suppliers of diversified risk premiums, or beta.

Many hedge funds are on average long equities, credit products, illiquid instruments, carry, term premium etc. while being short volatility. These strategies involve risk, for which investors should be compensated, i.e. earn more than the risk free return without having to display skill. It could be added that profitable timing of beta is a quite different matter and should be defined as alpha.

While the average hedge fund is exposed only to a few of the risks mentioned above, hedge funds as a group on average have systematic exposure to these and other similar risks. Thus, a fairly large proportion of the return on hedge fund indices is not skill based but compensation for various types of risks.

Does this part of a hedge fund's return lack value? Not necessarily. Many of these risk premiums (betas) are "exotic" and not present in a typical financial portfolio. They help diversify these portfolios, thereby increasing their risk-adjusted return. Furthermore, the process of extracting exotic betas often helps improve market pricing and liquidity, just like the hunt for alpha.

However, the growing use among hedge funds of diversified betas could also have some drawbacks. These include higher correlation between different betas and by extension hedge funds, compressed risk premiums encouraging higher leverage and more crowded trades leading to the occasional violent shakeout of weak positions.

From the hedge fund industry's perspective another point should be mentioned. The right price for something that is replicable by a laptop is not 2 and 20. Replication strategies will over time exert downward pressure on fees for hedge funds that rely on betas for performance, and probably even more so in the case of funds-of-hedge funds. Alpha, in contrast, is not replicable and under no downward price pressure. In fact, the price of alpha may well rise over time.

SHADOW BANKS?

In recent years the distinction between hedge funds and other organisational forms for financial activities has become increasingly blurred. There has, for example, been widespread discussion as to whether the distinction between private equity and activist hedge funds is disappearing; same business model, different clothing.

Perhaps this should not surprise us. Hedge funds are conceptually extremely flexible organisations. Indeed, hedge funds can be described as all possible investments and vehicles minus the subset of traditional, constrained, investment funds and vehicles.

Or, as industry observer Hunt Taylor put it more colourfully: *The 2 and 20 will continue to attract the best, the brightest and every other financial starlet with a headshot and a dream. Given that the constraints on what they can do are almost nonexistent, I expect hedge funds to seek out any and all return streams, no holds barred. We will see hedge funds in businesses we didn't know were businesses*.

In the recent credit crisis we have seen some hedge funds in effect acting as banks. They have been lending long and borrowing short, expecting the market to go on funding their leveraged risk positions. Banks can do this – they have a lender of last resort should confidence and liquidity dry up. Hedge funds, conduits, SIVs (Structured Investment Vehicles) and the like cannot do this, unless they have secured funding elsewhere. This has become particularly evident lately.

When non-bank vehicles act as banks, they can do so without regulation, capital adequacy ratios and backstop liquidity. In the process they take the liquidity of the markets as given, a free public good. Also, many banks have been running SIVs off their balance sheets in what looks like a

regulatory arbitrage; the capital charge for contingent liabilities is much lower than it would be if the risk were carried on the balance sheet.

What is known as the shadow banking system, regardless of organizational form, is likely to come under the scrutiny of regulators looking for ways to improve the current working of the financial system.

Hedge Funds and the Recent Turmoil

The first thing that should be noted about the recent turmoil is that hedge funds have not been at the centre of it. Some hedge funds have certainly lost money and even failed, but others have done well and the assets of distressed hedge funds have in many cases been picked up by stronger rivals.

Rather, the problems have centred on asset classes like subprime mortgages and commercial paper, mostly outside hedge funds. Tight bank funding has also been part of the story.

Just the same, hedge funds have not been immune to spillover effects. August was a very bad month for hedge funds. In an unusual pattern most, if not all, sub indices of hedge fund returns were negative.

The main reason was strong contagion effects between different hedge fund strategies, in turn driven by risk reduction and de-leveraging across the board. The risk reduction was partly a normal response to higher volatility and uncertainty, partly a way of cutting losses on positions turning sour but also partly because of funding becoming more expensive and less readily available.

When the hedge fund community cuts risk, it does so by buying back short positions (which hedge funds have sold because they think these financial instruments are expensive on a relative or absolute basis) and by selling out their long positions (which they think are cheap).

Overpriced instruments become even more expensive in this process and vice versa. To the extent that other hedge funds have similar models or qualitative judgments of value, this creates further losses for other hedge funds that often respond by cutting back their positions, thus reinforcing the effect. Especially in market segments where hedge funds account for a large part of the turnover and are major suppliers of liquidity ("crowded trades"), the situation can become explosive and somewhat irrational.

During the recent turmoil this could be seen most clearly in statistical equity arbitrage, with one major player being quoted as complaining bitterly that the market showed relative moves of more than twenty standard deviations per day for three days in a row.

The situation was aggravated by lower liquidity and higher transaction costs, a state of affairs that should be seen as the norm in stressed situations. September and October were much better months for hedge funds, which were making money again despite volatile markets. Positions and leverage have been reduced, which reflects greater uncertainty.

Hedge funds may not be immune to intensifying turmoil and more extreme fluctuations, but they are better prepared and will probably not be at the eye of the storm. They could even prove to be a stabilizing force in an environment in which banks and lenders are increasingly constrained by shrinking capital bases as an effect of credit losses. A risk scenario for hedge funds would be one in which investors withdraw their capital on a large scale, an eventuality that would certainly have some strange effects on market pricing as a result of forced de-leveraging.

The financial market turmoil – causes and consequences

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During the autumn of 2007 the international financial system has been subjected to its hardest test in a long time. The price of risk has risen which, coupled with earlier major investment in financial instruments that are difficult to assess, has meant that liquidity in important markets has declined, and occasionally disappeared. This has in turn put considerable strain on the international bank system. The article describes the background to the market turmoil and what we can learn from what has happened – as far as is possible at this early stage. The article concludes with a discussion of the risks we see ahead of us.

Rapid changes in the credit market

In recent years there have been major changes in the international credit markets. New agents have entered the market at the same time as new instruments have been introduced at a rapid pace.

At the core of the changes in the credit market is a phenomenon called securitisation. In brief, securitisation entails a number of loans, such as mortgages or credit card accounts, being acquired by a specially-created company. The company finances the acquisition by issuing bonds on the market. These bonds are usually called Asset Backed Securities (ABS).

Managed properly, there are considerable advantages to securitisation. Illiquid loans are converted into liquid bonds, which can easily be

[1] This article is based on a speech Lars Nyberg held before the Riksdag Committee on Finance at a hearing on the financial market turmoil on the 22nd of November 2007.

sold. Many investors are happy to have credit risk in their portfolios for better diversification. But they do not want to manage individual credits, and they also want liquidity in their investments. They therefore demand the securitised products. Even if the volume of loans that have been securitised has increased rapidly in recent years, it may be worth pointing out that securitisation in itself is not a new phenomenon, but has been practised by US mortgage institutions and banks since the 1970s.

In recent years, however, it has become increasingly common for securitised loans (which have been converted into bonds) to be repackaged into various so-called structured credit instruments. An impressive variety of this type of structured products has arisen in a short period of time. Perhaps the most common form are those known as CDOs, Collateralised Debt Obligations.[2] With a CDO it is possible to put together bonds from many different securitised loan portfolios and even to add other assets if desired. The idea is that the portfolio that has been put together is structured in different parts (tranches) with different credit risks (this is in practice often done by the large international investment banks). When interest income from the underlying assets starts coming in, it is distributed according to the order of priority, or seniority of the tranches. The most senior tranches, that is those that are highest up on the prioritisation list, receive their allocation first. The income is then distributed to the second most senior tranches, and so on. Investing in a junior tranche thus entails greater risk than investing in a senior tranche, but on the other hand the returns are higher. At the bottom is an equity-like part, which is only paid when all the others have received their share. But then they receive everything that is left. Should the default on the underlying loans be greater than expected, this will thus first affect those who invested in the less senior tranches.

The advantage with prioritising the payments in this way is that one can sell the tranches to investors with different risk appetites. Those with a high risk appetite can buy the higher risk tranches, while more cautious investors, such as insurance companies and pension funds, can buy the parts that are assessed to have the lowest credit risk.

But although there are advantages to packaging together securitised loans in a CDO, there are also disadvantages. One disadvantage is that it is expensive, time-consuming and difficult to assess the credit risk in the different tranches. The underlying assets may be of a heterogeneous nature. Moreover, there are products where a CDO is repackaged and in turn included as a component in another CDO, which will of course make it more difficult to gain an overview of the risk content. The credit risk in

[2] For a more detailed presentation of CDO instruments, see Lucas (2001).

the structured products is often assessed by the credit rating institutions, which also rate the different tranches, at least the more senior ones. The credit rating institutions thus play an important role with regard to the structured products.

Pricing is another problem. Tailor-made products are not in general subject to regular trading and price listings are rare. One is often reduced to employing mathematical models, which are based on estimated default frequencies for various credits, given the development previously observed. Quite simply, one calculates a price of what the instrument should be worth and hopefully the theoretical price will not differ too much from the price you get if you actually sell it. The rating is often decisive to the pricing. The structured products are thus more adapted to investors' needs than the purely securitised products. But this has been at the cost of poorer liquidity.

Special investment companies soon emerged

It is essentially a good thing that new instruments make it possible to trade credit risk. Insurance companies, pension funds and other institutional investors benefit from being able to invest in such products. And if the banks' balance sheets are relieved of the credit risk and investors with equity capital take on the risk, it is a positive development for financial stability. It increases the system's capacity to manage shocks.

However, not all of the credit risk has moved from the banks to financially strong investors. In recent years, many banks have started special investment companies that are separate legal entities outside of the banks' balance sheets. What these have in common is that they invest in assets with a high return and long duration, for instance, structured credit products, and finance themselves by issuing corporate certificates in the short-term money market. The certificates are called Asset Backed Commercial Paper (ABCP). Depending on how they are constructed, the investment companies are often called "conduits" or Structured Investment Vehicles (SIV). "Conduits" are the most common of the two and account for almost 80 per cent of the outstanding stock of asset-backed commercial paper. An SIV has a more advanced construction than a "conduit". It is usually highly leveraged, 15-20 times the equity capital. It is not necessarily tied to a bank and the financing is largely for longer durations. But the need for financing in the short-term money market is nevertheless crucial.

Although the investment companies in themselves are not banks, they conduct bank-like operations and have their own balance sheets and names. But if an investment company for some reason is unable to issue

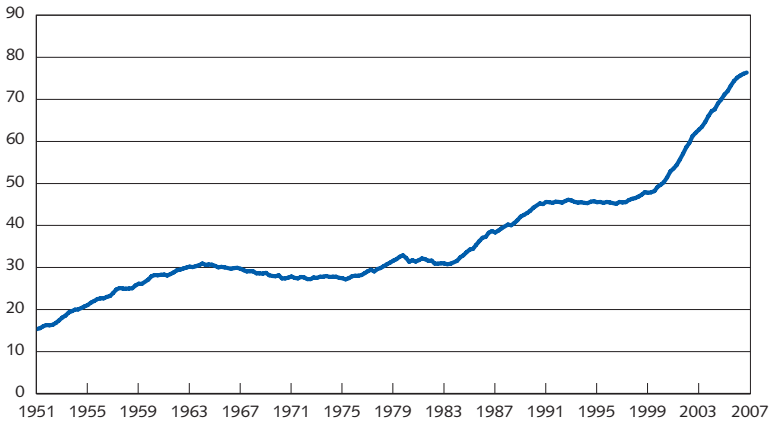
new corporate certificates when the old ones fall due for payment, the bank guarantees the ability to pay, wholly or partly. The guarantees may be of a formal nature, where the bank commits itself to redeeming the certificate if the investment company is unable to do so. But a guarantee can also be of a more informal nature and based on the bank being unwilling to abandon its investment company in order to protect its name and reputation. Whichever is the case, it means that if an investment company faces financing difficulties, the problem is referred back to the bank, which must provide the company with sufficient liquidity for a short period of time. This is to some extent reminiscent of the situation prevailing at the beginning of the Swedish banking crisis when finance companies that had exposures to the property sector became dependent on the banks for their financing (Englund, 1999).

This construction with companies that have invested in assets that are difficult to assess and have a long duration and which have financed themselves in the short-term money market with a guarantee from the banks is a powder keg – and one where the powder has been piled up more quickly than both the market and the financial supervisory authorities have been aware. The igniting spark came from the US mortgage market, but it could have come from other areas.

Bad credits in the US mortgage market is the igniting spark

In the United States the financial innovations have gone hand in hand with a rapid increase in loan volumes. As is the case in most of the world, it is mainly households' mortgages that have increased.

Figure 1. US households' mortgages (per cent of GDP)



Source: Federal Reserve Board and Bureau of Economic Analysis (BEA).

What distinguishes the United States in this respect is that a not insignificant portion of the mortgages have been taken by households with poor credit ratings (Committee on the Global Financial System, 2006). These loans are called subprime loans. Although the subprime loans constitute a minority of the total mortgages, there are nevertheless significant sums involved.[3] It is worth pointing out here that of course it is not always wrong to grant loans to houses merely because the lenders cannot manage the banks' normal, fairly tough criteria. But it is always necessary to carry out a proper credit assessment. And the lender should be paid for the higher risk through a correspondingly higher interest rate. None of this happened in the United States. During spring 2005 and 2006 the credit assessments appear to have deteriorated, at the same time as loans were granted on terms that far from corresponded to the risks. The price of risk was quite simply too low.

However, during this period risk premiums on all assets fell. So it was not merely on subprime loans where the price was set too low. The same also applied, for example, to the market for leveraged buyouts.

Hedge funds were the first to experience problems

The first signs that the spark had reached the powder keg came during the summer, when it was evident that there would be more defaults on subprime loans than had been feared earlier. Two hedge funds tied to the US investment bank Bear Stearns were among the first to be affected. The funds had borrowed money which was then invested in structured credit instruments linked to securitised subprime loans. When the financiers wanted to pull out, the funds were forced to sell their assets. However, they were not successful as suspicions against subprime loans had increased and the funds collapsed with substantial losses. At around the same time the credit rating institutes began downgrading credit instruments containing subprime loans. As the ratings have set the tone for how the instruments are assessed, the downgradings have meant that the financial markets more or less lost confidence in anything that might contain subprime loans.

Finally the banks were also affected

But it was not only hedge funds that had invested in subprime loans. The banks' investment companies had also done so to a great extent. The

[3] Subprime loans comprised an estimated 13 per cent of the total mortgage stock in the United States in 2006.

buyers of the investment companies' certificates are usually risk averse investors who are choosing between buying short government securities and corporate certificates. When it became clear, or even when there was reason to suspect, that subprime loans were among the investment companies' assets, the demand for certificates fell drastically (see Figure 2). Investors instead chose to buy short government securities, which meant that interest rates on these fell. One could say that the investment companies suffered a classic bank run.

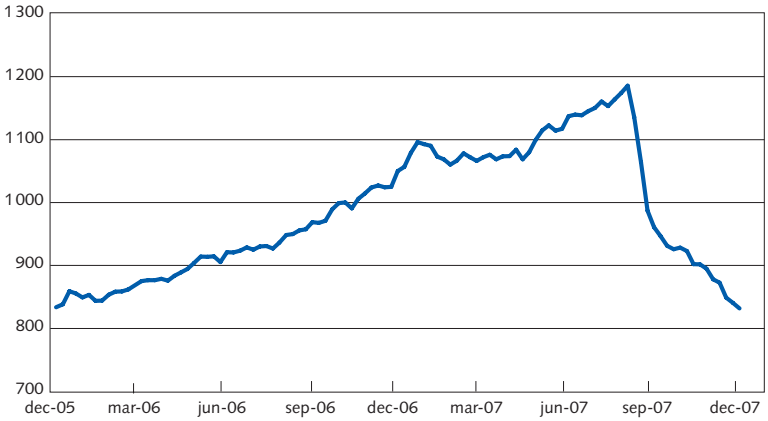
The parent banks were now forced to fulfil the liquidity guarantees they had made earlier. At the end of July the German bank IKB announced that it had suffered major losses through an investment company that had invested in subprime loans. Some weeks later another German bank, Sachsen Landesbank, experienced similar problems.

The banks then began to hoard liquidity and suspiciousness spread throughout the bank system. Banks that had investment companies did not want to lend money as they might need it themselves to meet their own guarantee obligations. Even banks without investment companies were unwilling to lend money as it was uncertain where in the bank system the credit risk was actually located. It was impossible to gain a clear insight into the complicated CDO structures. Consequently the interest rates on the interbank markets soared (see Figure 3).

Parallel to this, scepticism towards the credit rating institutes' ability to grade structured products increased, and this concerned not only products containing subprime loans.

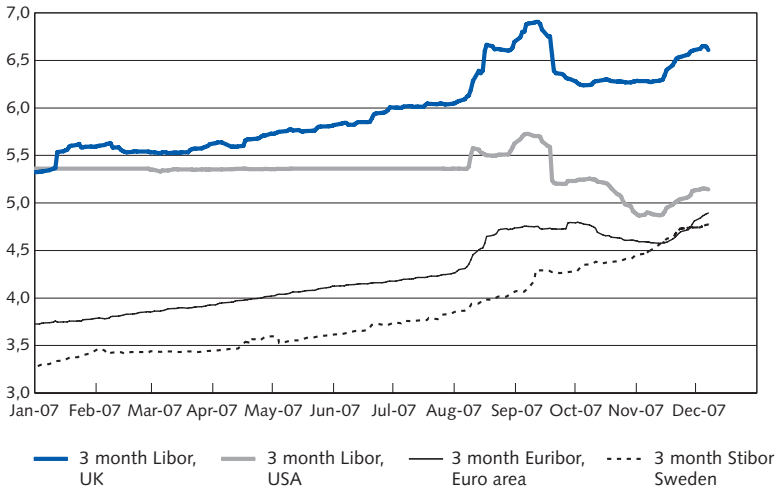
Several central banks decided at this point to intervene in different ways in the interbank market. In general, the interventions contributed to reducing interbank rates towards desirable levels for shorter durations. For

Figure 2. Outstanding stock of US ABCP (USD billion, seasonally adjusted)



Source: Federal Reserve Board.

Figure 3. Interbank rates (per cent)



Source: Reuters EcoWin.

the slightly longer durations the difference between the interbank rate and the risk-free rate remained substantial. The unwillingness to lend money was a hard blow to institutions dependent on financing from the market. For example, the British mortgage lender Northern Rock was forced to seek help from the Bank of England to manage its acute liquidity problems when it could no longer obtain financing.

The market turbulence during the autumn had relatively limited effects on the Swedish banks. The main effects were higher financing costs, some changes in the value of bond portfolios and less activity on some markets. Here an important factor was the fact that the Swedish banks did not have any significant exposure to securitised subprime loans, neither directly nor indirectly through investment companies.

Deficiencies in the functioning of the credit markets have been exposed

The rapid developments in the financial system over the past decade have essentially been beneficial. There is no reason to wish we were back in the financial iron age of the 1980s. It is also interesting to note that the two phenomena that many claimed would cause the next crisis, namely hedge funds and credit derivatives, have not reinforced the problems in the market, rather the opposite.

Nevertheless, the market turbulence has shown that the deficiencies in the design and functioning of the credit markets need closer investiga-

tion. Some innovations appear to have been a little too fast for the market.

When loans pass through several channels and are repackaged along the way, there is often a long distance between the final investor and the party that originally issued the loan. This means that the incentive to make a thorough credit assessment declines. It appears as though the original credit grantor took too little responsibility with regard to the repackaging process. The way that information on credit quality is passed on to investors is also open to debate. One of the credit rating institutes' tasks is to fill in the information gap between the issuer and the end investor (Committee on the Global Financial System, 2005). With hindsight, one can note that this has not always been successful.

But even if there are deficiencies in the way that the credit rating institutes have worked with regard to structured credit products, there are also signs that many investors misunderstood how a credit rating should be used. They also need to take into account liquidity and market risks, which are not captured in the credit rating.

However, it is worth remembering that the market for structured credit products is entirely dominated by professional investors. There is thus no evident need for consumer protection that would justify the intervention of the authorities to protect investors in this market.

The difficulty in grading and pricing the various structured products remains. Some of them will probably disappear without being missed, and for exactly this reason. But it may be possible to develop simpler products that can even be traded on stock markets and thereby form a base for pricing more complicated instruments. The way the market manages this challenge is an important issue for the future.

Something that requires more thorough investigation is the directly problematic role played by the banks' investment companies. They appear to have often existed because of so-called regulatory arbitrage. The banks have been able to circumvent the capital adequacy rules and liquidity rules by investing assets in apparently independent companies. Moreover, it has also been a mystery which banks have been exposed to which investment companies, how large the exposures are and what they have consisted of. This has made it difficult for market participants and authorities to assess a bank on a consolidated basis. Some of these problems are dealt with by the new capital adequacy rules in Basel II. Nevertheless, it is essential that the authorities play an active role to ensure better insight. And this is also very much in the market's own interests.

The uncertainty remains

The outcome of the current situation will depend on how subprime loans are valued in the long term. If interest rate payments from the underlying loans are received as calculated, there is no need to write down the value for this reason. However, it looks as though there will be more defaults on payments than originally feared (Fitch Ratings, 2007). In addition, it takes several months from the time that a household defaults on payment of a loan until it reaches the minus side of the end-investor's balance sheet. Although a number of banks have already made major losses when forced to write down the value of their assets, it will be a long time before all the cards are on the table.

Moreover, there are considerable problems with valuations. Banks and other investors are to write down the value of their assets to market value, but there are seldom any such for the structured products where many mortgages are packaged. Problems with valuations can force the banks to larger write downs than is motivated by the quality of the underlying credits.

An important factor in all of this is US economic activity. If there is a more rapid downswing than expected, the problems in the mortgage market may be more profound and spread to other sectors of the credit market. And of course the unrest in the financial markets can in turn contribute to a broader slowdown in the US economy. The situation remains uncertain and there is considerable sensitivity to new negative information and to other shocks. And there will probably be more bad news from the United States and Europe.

We were all taken by surprise

This autumn has seen a number of unpleasant surprises and there is reason to believe that the unrest will continue. The Riksbank, like most other central banks, had previously warned that there were difficulties in the credit market, particularly the low risk premiums. The situation we have seen was therefore not entirely unexpected. However, something that was underestimated was how quickly and by how much the price of risk rose, as well as how quickly problems in a distant part of the US credit market could spread throughout the world and have such a strong impact on the interbank market, which is the actual core of the international financial system.

The unrest in the financial markets has also shown that central banks constantly need to adapt their analysis and find new approaches to meet the challenges of operating in a constantly changing financial landscape.

A more detailed discussion about this can be found in the Riksbank's latest Financial Stability Report (Riksbank, 2007).

References

Committee on the Global Financial System (2005): "The role of ratings in structured finance: issues and implications," CGFS Publications No 23.

Committee on the Global Financial System (2006): "Housing finance in the global financial market," CGFS Publications No 26.

Englund, Peter, (1999): "The Swedish Banking Crisis: Roots and Consequences," Oxford Review of Economic Policy, Oxford University Press, vol. 15(3), pages 80-97, Autumn.

Fitch Ratings (2007): "The Impact of Poor Underwriting Practices and Fraud in Subprime RMBS Performance," US Residential Mortgage Special Report.

Lucas, D. (2001): "CDO Handbook," J.P. Morgan.

Sveriges Riksbank (2007): "Financial stability – new challenges," Financial Stability Report 2007:2.

The matching process on the Swedish labour market:

A regional analysis

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From a labour market policy perspective, it is of central importance to have an idea as to how the matching of the labour supply and labour demand works. Matching is also important to monetary policy since bottlenecks can lead to wage increases that fuel inflation. This article aims to describe the matching process in Sweden from a regional perspective. The results indicate that matching on the Swedish labour market varies between regions. On average, matching efficiency tends to be lower in more densely-populated regions compared with less densely-populated regions.

1. Introduction

During the whole of the 1970s and 1980s unemployment in Sweden was very low, in international terms. The 1990s began with an overheated labour market (with record-low levels of unemployment and very high labour force participation). During the crisis years 1992–1993 the number of unemployed increased rapidly and higher unemployment has to some extent been persistent, in spite of several years of improving economic growth. This suggests there may be structural problems in the labour market with, among other things, poorer matching between the unemployed and vacancies.

The labour market in Sweden currently displays a somewhat mixed picture, where demand for labour has risen rapidly at the same time as many are still outside the labour force. Unemployment has fallen but is still at a relatively high level. It is of central interest for labour market policy to have an idea of the matching between the labour supply and labour demand in order to create better conditions for labour market performance in the future. It is also important from a monetary policy perspective

to analyse how efficiently the matching between jobseekers and vacancies operates since recruitment difficulties can lead to bottlenecks and to wage increases that fuel inflation.

A common way of describing efficiency on the labour market is to use the so-called matching function, which describes how the number of matches (people who gain employment) is affected by the number of jobseekers and the number of vacancies. Internationally, there are a very large number of studies that analyse matching functions (see Petrongolo & Pissarides, 2001 for an overview). However, only a few studies have assessed matching functions based on Swedish data (see e.g., Edin & Holmlund (1991), Hallgren (1996) and Forslund & Johansson (2007)). Most studies of the matching function use aggregated time series data. It is then implicitly assumed that the search efficiency is the same in all regions in a country. Coles & Smith (1996) is one of the first studies that showed the importance of controlling for the existence of regional differences when estimating the matching function.

Given that regional differences exist on the Swedish labour market (e.g., in the composition of the labour supply and demand), it is important to control for these differences, since bottlenecks in the form of matching problems in certain regions can affect wage formation and curb employment growth in the country.

In this study the matching on the Swedish labour market is analysed. The analysis aims to estimate the matching function using Swedish data and to investigate whether there are regional differences in the matching efficiency. A regional panel data set is used in the analysis that allows for county variations in the matching efficiency.[1] The time period studied extends from January 1992 to September 2007.

The following section contains a description of the matching process and the matching function that will be applied. Section 3 describes the data set together with a general descriptive analysis. The econometric analysis is to be found in section 4 and a conclusion is provided in the final section.

2. The matching process

The most common method of illustrating the matching process is with the so-called Beveridge curve, which shows the relationship between the unemployment rate and the job vacancy rate. If the unemployment rate rises at the same time as there is a fall in the job vacancy rate, this may be

[1] Boeri & Burda (1996); Ilmakunnas & Pesola (2003); and Kano & Ohta (2005) are other studies that estimate matching functions using panel data.

interpreted as a fall in demand for labour in a cyclical downturn (a movement along the curve). If both vacancy rates and unemployment rates rise at the same time (the curve shifts outwards), this may, however, indicate structural changes in the labour market which impairs the efficiency of the matching process.

One problem with the Beveridge curve is that a shift may occur which is not linked to changes in the matching efficiency. Factors that may affect the matching process, and which can thus lead to a shift in the Beveridge curve, include changes in long-term unemployment, changes in geographical or professional mobility, the demographic composition of the jobseekers or the regulations covering unemployment benefit, for example. Matching functions, which also describe the matching process, are a more direct way of analysing efficiency on the labour market.

There are different theories about the way in which the matching of vacancies and jobseekers is done. These underlying matching theories affect how the matching function is specified. A common theory is that the matching process is assumed to be random (random matching). According to this theory, unemployed randomly choose from the stock of vacancies, regardless of how long they have been unemployed or how long the job has been vacant. Matching would thus only depend on the number of jobseekers and the number of vacancies over time.

According to a second theory, the jobseeker is well-informed as to which vacancies are suitable based on his or her education and experience. If no matching occurs between new jobseekers and the stock of vacancies, jobseekers will henceforth take an interest in the inflow of new vacancies. The stock of jobseekers is then, above all, matched with the inflow of new vacancies, (stock-flow matching).

Random matching and stock-flow matching provide two different explanations for the frictions that can be observed on the labour market. If labour market matching is best described as random, inefficient matching is mainly explained by a lack of information. Jobseekers lack information about what vacant jobs are available and employers lack information about people with suitable qualifications. In the case of stock-flow matching, where the stock of jobseekers is mainly matched with new vacancies, an inefficient process is primarily explained by there being no suitable match at a given time (mismatch).

In a study of Swedish weekly data from August 1991 to October 2002, Forslund & Johansson (2007) have found that the matching on the Swedish labour market is better described by stock-flow matching than by random matching. The results of the study thus indicate that the newly unemployed search for jobs both in the stock and the inflow of job open-

ings, while people who have been unemployed for a long period of time mainly search among the inflow of vacant jobs.

Given that the matching on the Swedish labour market is best described by stock-flow matching, the regional matching function is specified as below:

$$(1) \qquad M_{it} = f_{it}(U_{it}, V_{it}, \dot{U}_{it}, \dot{V}_{it}) = A_{it} U_{it}^{\alpha_1} V_{it}^{\beta_1} \dot{U}_{it}^{\alpha_2} \dot{V}_{it}^{\beta_2},$$

where $i = 1, \ldots, N$ regions and $t = 1, \ldots, T$ periods of time. The number of matches (M_{it}) is a function of the stock of jobseekers (U_{it}), vacancies (V_{it}) and the inflow of jobseekers $(\dot{U}_{it})$ and new vacancies $(\dot{V}_{it})$.[2] The parameters α_2, β_1 and β_2 are matching elasticities with regard to stocks and flows of jobseekers and vacancies respectively. The scale parameter A_{it} (also called the mismatch parameter) measures the region-specific and the time-varied matching efficiency and is specified as below:

$$(2) \qquad A_{it} = A e^{\mu_i + \lambda_t + \varepsilon_{it}},$$

where μ_i are regional effects and λ_t are time effects.[3] The terms "number of jobseekers" and "the number of vacancies" during a given period are not clear-cut. One cannot employ the stocks at the end of each period of time (the end of the month), since these quantities depend on how many matchings have occurred during the period. In the data used in the analysis below, the number of jobseekers and vacancies at the end of each month is measured. It is therefore natural to estimate the size of the stocks at the start of a certain period using the size of the stocks at the end of the previous period.

After inserting equation (2) into equation (1) and logarithmation, we obtain:

$$(3) \qquad m_{it} = \alpha + \alpha_1 u_{it-1} + \beta_1 v_{it-1} + \alpha_2 \dot{u}_{it} + \beta_2 \dot{v}_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Equation (3) can be estimated as a so-called fixed effects model.[4]

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2 The function is assumed to be concave and increasing in U and V. The matching function is often assumed to be homogeneous of degree one (constant returns to scale).

3 The error term ε_{it} is assumed to have mean zero and constant variance.

4 The fixed effects model is recommended on the assumption that the region-specific factors are constant and correlated with the explanatory variables. On the assumption that the region-specific factor is not correlated with the explanatory variables, but is a random variable included in the error term component, the random effects model should be used. The difference between fixed and random effects is that in the first case the regional effects are treated as constant over time, while in the second case they are treated as purely random and the regions are thus assumed not to have any individual characteristic features that distinguish them from the average over time.

3. Data and descriptive analysis

Statistics from the Swedish Public Employment Service are used in this study.[5] The panel data set extends from January 1992 to September 2007 and contains information about inflows and outflows of unemployed and job openings as well as the stock of unemployed and job openings.[6] The stock of unemployed is defined as all jobseekers, that is, all unemployed including those on labour market programmes. The inflow of unemployed is termed all newly-registered/registered persons who report themselves/are reported unemployed with the offices of the Swedish Public Employment Service. The outflow of unemployed refers to those persons who have gone from unemployment to a job.[7]

Figure 1 below shows vacancies and outflows to jobs as well as the stock of jobseekers. The number of vacancies is positively correlated with economic activity over time, while the reverse applies for both the outflow and the stock of jobseekers. The number of jobseekers was clearly above the mean value (500 000) during the period 1993 to 1998 and was at its highest in 1994. From 2002 the number of jobseekers gradually rose up to the beginning of 2006 when levels fell once again. The outflow to jobs is highly correlated with the stock of jobseekers, but also co-varies with the inflow. This might indicate that the number of matches, measured as the outflow to jobs, can also be explained by the inflow of jobseekers (see the correlation matrix in the lower part of Table 1).
Figure 2 shows the average outflow of jobseekers, the stock of jobseekers and the stock of vacancies during three different periods of time (1992–1996, 1997–2001, and 2002–2007), as well as the average size of the population during the entire period of time (1992–2007), broken down into Swedish counties. At regional level jobseeker development has shown virtually the same trend for all Sweden's 21 counties. Both the outflow and stock of jobseekers has gradually declined between the three periods of time in all regions, at the same time as the stock of vacancies increased. Stockholm alone shows a peak in the number of vacancies between 1997 and 2001, in contrast to other regions where the stock of vacancies is at its highest in the more recent period (2002–2007).

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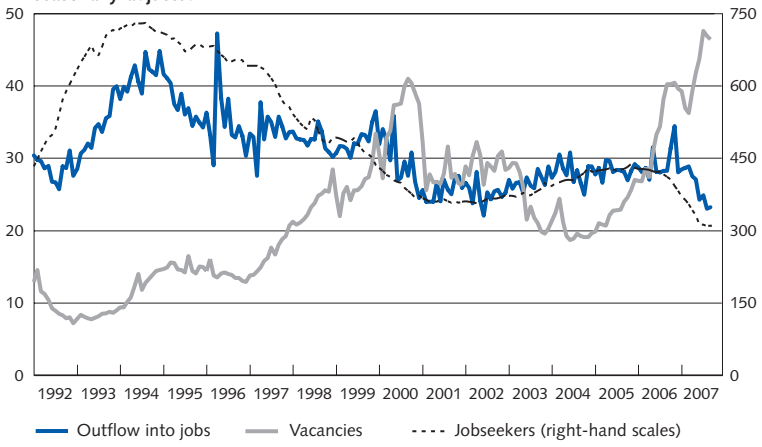
[5] Using the number of job vacancies, according to the Swedish Public Employment Service, as a measure of vacancies is not without problems. For example, the number of vacancies has been overestimated recently due to duplicated registration of job openings. Moreover, the statistics do not cover the entire labour market since far from all vacancies are reported to the Swedish Public Employment Service. The Employment Service's market share of job openings has varied between a maximum of almost 45 per cent at the beginning of 1990 and a minimum of 27 per cent in 1997. Recently, the share has increased and is now around 41 per cent (see the Swedish Public Employment Service's Arbetsmarknadsrapport 2007:1). This market share also varies across regions.

[6] 3969 observations are used in the panel data set where the number of months is 189 and the number of regions is 21.

[7] The outflow to a job is only one part of the total outflow of jobseekers over time.

Figure 1. Outflow into jobs, jobseekers (stock) and vacancies (stock) (thousands), seasonally-adjusted



Source: The Swedish Public Employment Service.

Table 1: Descriptive statistics of the aggregated variables (thousands). A total of 189 observations

	Outflow into jobs	Jobseekers	Vacancies	Inflow of jobseekers	Inflow of vacancies
Mean value	31	500	22	80	34
Standard deviation	5	131	10	18	12
Variation coefficient[8]	0.16	0.26	0.43	0.23	0.34
Max value	47	730	47	118	81
Min value	22	309	7	35	18

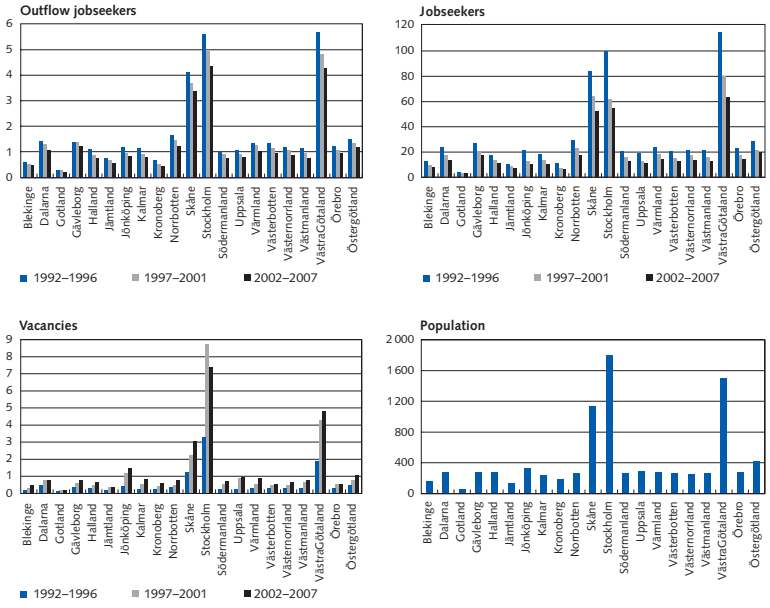
Correlation matrix

	Outflow into jobs	Jobseekers	Vacancies	Inflow of jobseekers	Inflow of vacancies
Outflow into jobs	1.00				
Jobseekers	0.82	1.00			
Vacancies	–0.51	–0.79	1.00		
Inflow of jobseekers	0.76	0.87	–0.71	1.00	
Inflow of vacancies	–0.38	–0.64	0.89	–0.72	1.00

What does mainly differ between the regions is the level for jobseekers and vacancies. One interesting note is that the regional differences in the levels (both for jobseekers and vacancies) have endured over time. The number of jobseekers, vacancies and the outflow of jobseekers is greatest in the most densely-populated counties, such as Stockholm, Skåne and Västra Götaland. In order to detect the regional differences in matching efficiency it is therefore important to normalise the variables when estimating the regional matching function. In the empirical analysis, all variables have been normalised with the respective regions' population size.

[8] Variation coefficient = standard deviation/mean value.

Figure 2. Jobseekers (outflow and stock), vacancies (stock) and population broken down into regions (thousands)



Note. The population is calculated on the average for the entire period of time (1992–2007).
Sources: The Swedish Public Employment Service and Statistics Sweden.

4. Econometric analysis

In this section the results of the estimated model (equation 3) are presented. The equation is estimated with and without regional dummies (columns 1 and 2 respectively) in order to control for regional differences in matching efficiency. Annual and seasonal effects are included in both specifications. The results indicate that the effect from the stock of jobseekers is greater than the effect of the stock of vacancies. The number of jobseekers thus tends to influence matching to a greater extent than the number of vacancies. Flow variables also influence the number of matchings positively and the results indicate that the inflow of vacancies has a greater effect than the stock of vacancies.

This is a relatively common result in academic research. Gregg & Petrongolo (2005) show that the flows may have a more significant impact than the stocks when estimating the matching function and, in a study based on British data, Coles & Smith (1998) have found that the inflow of new vacancies alone, not the stock, has a positive effect on the probability for the long-term unemployed to get a job. Forslund & Johansson (2007) also find that matching on the Swedish labour market is best described by stock-flow matching, where the inflow of new jobseekers is matched relatively quickly and persons who have been unemployed a longer period of time mainly search among the inflow of vacancies.

In both models the hypothesis of constant returns to scale is rejected. Constant returns to scale entails that a two-fold increase in the number of jobseekers and vacancies leads to a two-fold increase in the number of matches.[9] Aggregated time series studies often find support for constant returns to scale. The empirical support for constant returns to scale is, however, less clear when disaggregated data is used (see e.g., Kangasharju, Pehkonen & Pekkala (2005)).

The matching functions that are shown in column 2 have been estimated with fixed regional effects.[10] The results indicate that there are significant regional differences in the matching efficiency. This means that the matching efficiency is not the same within the Swedish labour market, which is implicitly assumed when estimating the matching function without controlling for the existence of the regional differences.

TABLE 2: REGRESSION RESULTS

	1	2
Stock of jobseekers, *t-1*	0.69(0.02)*	0.66(0,03)*
Stock of vacancies, *t-1*	0.05(0.01)*	0.02(0.01)*
Inflow of jobseekers, *t*	0.24(0.02)*	0.05(0.02)*
Inflow of vacancies, *t*	0.13(0.01)*	0.12(0.01)*
Dummy region		Yes*
Dummy year	Yes*	Yes*
Dummy season	Yes*	Yes*
Scale elasticity	1.10	0.86
(*P-value, H_0: constant scale elasticity*	(0.00)	(0.00)
Breusch-Pagan LM		15873
(*P-value, H_0: Var(°) = 0*)		(0.00)
Hausman χ^2		19
(*P-value, H_0: $E(°_i X_{it})=0$*)		(0.00)
R-squared	0.80	0.85
Observations	3948	3948

Note. White's robust standard error in brackets. An * indicates a significance level of 5% All variables in the models are normalised with the respective regions' population size

4.1 REGIONAL MATCHING EFFICIENCY

Figure 3 illustrates the estimated matching efficiency in Swedish counties, based on the specification in column 2 (Table 2). The estimated regional matching efficiency, μ_i, in Figure 3 is normalised in the following way (see also Kano & Ohta (2005)):[11]

[9] Scale elasticity is obtained by summing the matching elasticity with respect to jobseekers and vacancies.
[10] Breush-Pagan's LM test and Hausman's test indicate that the fixed effect model is the most suitable one.
[11] In this case $\min(\hat{\mu}_i)$ corresponds to Blekinge county's matching efficiency.

$$(4) \qquad \mu_i^* = \hat{\mu}_i - \min(\hat{\mu}_j),\ i, j = 1 \ldots N$$

The figure shows that matching on the Swedish labour market varies quite significantly between the regions. Blekinge county demonstrates the lowest matching efficiency, closely followed by Skåne. Matching efficiency is highest in Jämtland county (on average 0.3 times higher than in Blekinge). One interesting observation is that the most densely-populated counties, such as Stockholm, Skåne and Västra Götaland tend, on average, to have a lower matching efficiency compared with the less densely-populated areas.[12]

Earlier studies (see e.g., Coles & Smith (1996)) often argue in favour of a higher matching efficiency in more densely-populated regions, since not as much effort is required in a tight labour market to find the right match (i.e. low search cost) as jobseekers are close to the vacancies. However, this view is not supported in this study.

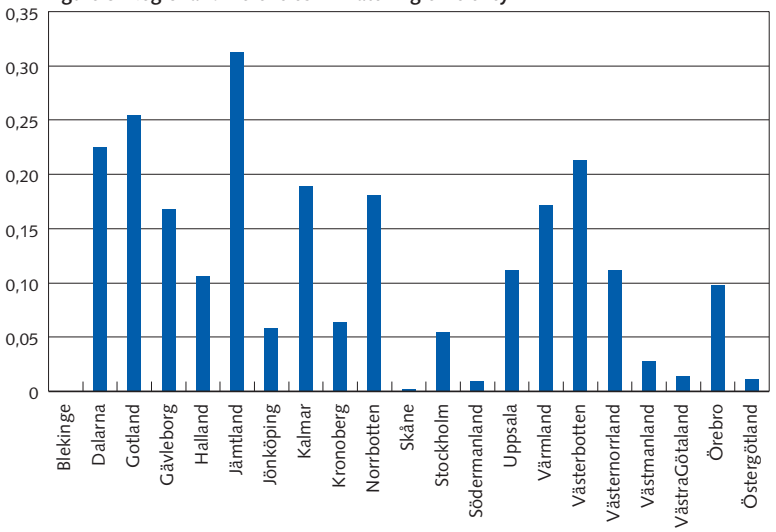
The result may be due to regional differences in the distribution of heterogeneous employers and employees. For example, less densely-populated regions may be more homogeneous in the composition of the labour supply and the demand for labour. Matching works well therefore, as the qualifications on offer on the market are also those that are in demand. In more densely-populated regions, the labour supply and the demand for labour can differ more with regard to qualifications, for example. This could make the matching process more difficult since there will not always be a suitable matching, given the same level of jobseekers and vacancies as in the less densely-populated regions. Kano & Ohta (2005) also find support for this hypothesis; the estimated matching efficiency in Japanese regions is negatively correlated with population density and per capita income.

5. Conclusions

In this study we have analysed the matching on the Swedish labour market with the help of the so-called matching function. A regional panel data set has been used to control for observable and non-observable differences between Sweden's counties. The matching function was estimated in accordance with a stock-flow specification where both stocks and inflows of jobseekers and vacancies, are assumed to influence the matching process. Both the stocks and the inflow of jobseekers and vacancies had a significant positive effect on the number of matches. It was primarily the inflow of vacancies that affected the number of matches positively

[12] Specifications that allow region-specific coefficients (α_i och β_i) produce similar conclusions.

Figure 3. Regional differencies in matching efficiency



and not the stock, which is a relatively common result in academic research.

This study also finds support for matching efficiency varying over regions (significant regional effects). The results indicate that matching efficiency is highest in Jämtland county, while Blekinge county displays the lowest matching efficiency. Coles & Smith's (1996) view that matching between jobseekers and vacancies should function more efficiently in more densely-populated regions does not appear to apply to the Swedish labour market. The most densely-populated counties, such as Stockholm, Skåne and Västra Götaland tend, on average, to have a lower matching efficiency than the less densely-populated areas. One explanation for this result might be that the new jobs that emerge (in demand) in more densely-populated (expanding) regions differ from the skills on offer in these regions. The bottlenecks that then arise (in these regions), in the form of matching problems, can thus affect wage formation and curb employment growth in the whole country.

References

Boeri, T., and Burda, M., (1996). "Active labor market policies, job matching and the Czech miracle". *European Economic Review*, 40, 805–17.

Coles, M., and Smith, E., (1996). "Cross-section estimates of the matching function: evidence from England and Wales". *Economica*, 63, 589–597.

Coles, M.G. and Smith, E., (1998). "Marketplaces and matching". *International Economic Review* 40(4), 851–868.

Edin, P.-A., and Holmlund, B., (1991). Unemployment, vacancies and labour market programmes: Swedish evidence, in F. Padoa-Schioppa, ed., *'Mismatch and Labour Mobility'*, Cambridge University Press, Cambridge.

Forslund, A., and Johansson, K., (2007). "Random and stock-flow models of labour market matching – Swedish evidence". Working paper 2007:11, IFAU

Gregg, P., and Petrongolo, B., (2005). "Stock Flow Matching and the Performance of the Labor Market". *European Economic Review* 49(8), 1987–2011.

Hallgren, A., (1996). Job matching and labour market programmes in Sweden. Licentiate dissertation, Department of Economics, Uppsala University.

Ilmakunnas, P., and Pesola, H., (2003), "Regional Labour Market Matching Functions and Efficiency Analysis". *Labour*, 17, 413–437.

Kangasharju, A., Pehkonen, J., and Pekkala, S., (2005). "Returns to scale in a matching model: evidence from disaggregated panel data". *Applied Economics*, 37(1): 115–118.

Kano, S., and Ohta, M., (2005). "Estimating a Matching Function and Regional Matching Efficiencies: Japanese Panel Data for 1973–1999". *Japan and the World Economy*, 17(1): 25–41.

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