

SPEECH

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■ Challenges for the design and conduct of macroprudential policy

The last three years have been a challenging time for central bankers and policy-makers. And yet significant challenges lie ahead. The crisis exposed gaps in the existing regulatory frameworks and raised questions about previously accepted beliefs and practices. We are still trying to understand the key lessons from the crisis so we can determine the reforms to the financial systems, regulatory structures and policy instruments that are needed to enhance financial stability in the future. But it is clear that a major element of these reforms will be the development and implementation of effective macroprudential frameworks empowering some form of agency to identify system-wide risks to financial stability, and providing the instruments to prevent and mitigate those risks.

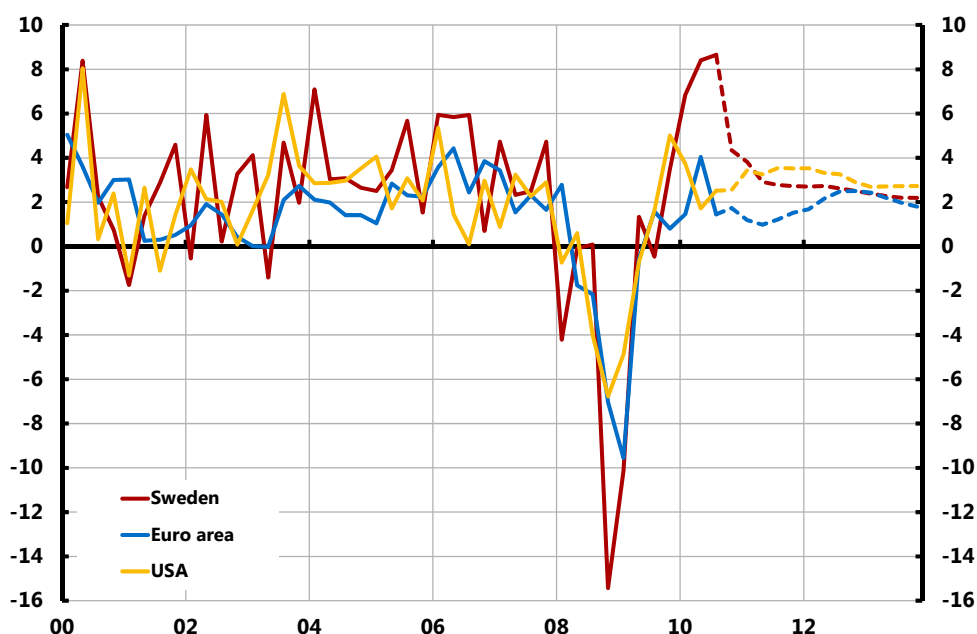
Of course, while the reforms are being developed and implemented, we must rely on the existing framework and instruments to support the fragile recovery of the real economy and financial system.

Sweden's economy is recovering but vulnerabilities remain

Strong Swedish recovery from the crisis

As in many countries, GDP fell sharply in Sweden as a consequence of the financial crisis. But Sweden is now experiencing a relatively strong economic recovery (see Figure 1) and the Swedish banking sector appears resilient.

Figure 1: Development of GDP in selected countries and regions



Quarterly changes in per cent, annual rate, seasonally adjusted data.

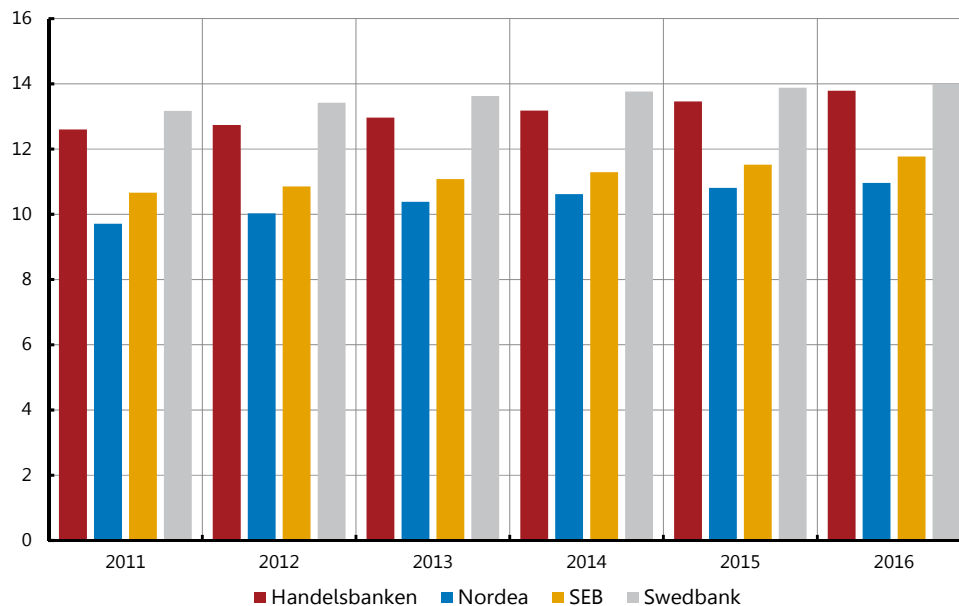
Sources: Bureau of Economic Analysis, Eurostat, Statistics Sweden and the Riksbank (Monetary Policy update, 15 December 2010)

Swedish banks' access to market funding, which was disrupted after the failure of Lehman Brothers, has recovered sufficiently to enable the Riksbank to withdraw the extraordinary lending it provided during the crisis.¹ In addition, the four largest Swedish banks, which have a combined market share of about 75%, are well capitalised. Indeed, the Riksbank estimates that, by the end of 2011, they will already have sufficient resources to meet the forthcoming Basel III capital requirements, including the capital conservation buffer and a full-scale counter-cyclical capital buffer, without undertaking any exceptional capital raising exercises (see Figure 2).²

¹ During the crisis, the Riksbank provided extra liquidity to the Swedish banking sector through a number of long-term loans in SEK and USD.

² However, we expect that some banks will need to raise their liquidity buffers to meet the new Basel III liquidity rules.

Figure 2: Estimated common equity tier 1 capital ratios for the four largest Swedish banks



Sources: Bank reports and Riksbank calculations. (The Riksbank's Financial stability report 2010:2)

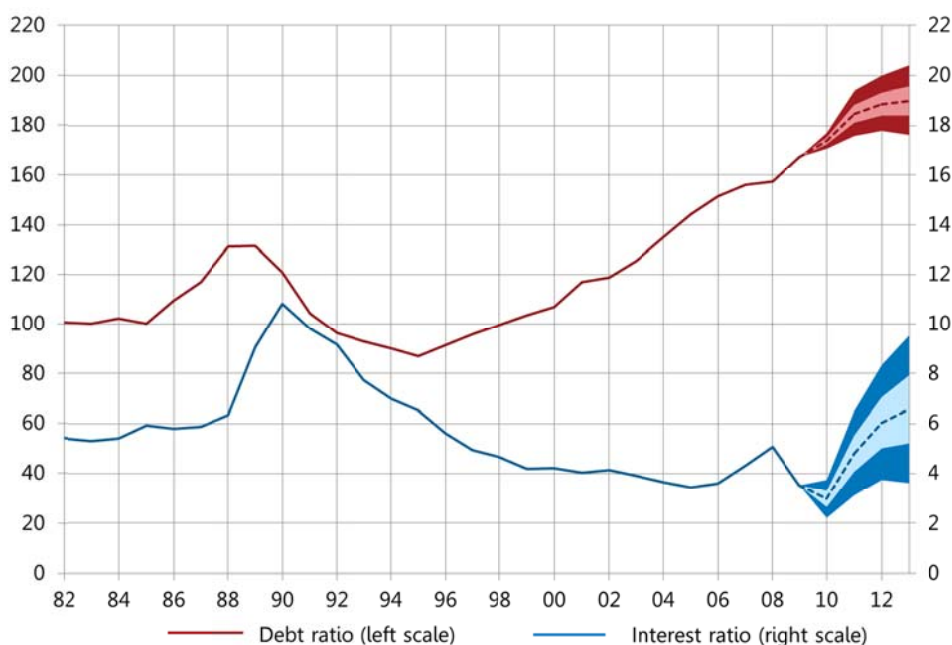
But potential vulnerabilities are building up in Sweden

Despite these positive developments, there are still vulnerabilities in the Swedish financial system. Recent surveys suggest that Swedish households remain capable of servicing their debts.³ At the same time, household credit losses in Sweden are traditionally low: even in 1992, at the peak of the Swedish banking crisis, credit losses from households only made up 6 per cent of total credit losses.⁴ But household indebtedness has continued to grow faster than income (see figure 3), loan-to-value ratios have increased, and a large proportion of mortgages are variable-rate loans. These vulnerabilities could impair the financial system by increasing loan losses if the current economic recovery were to stall, or by impairing Swedish banks' ability to finance mortgages if investors' confidence in Swedish covered bonds were to fall.

³ See Finansinspektionen, "The Swedish mortgage market and bank lending", February 2010, and Sveriges Riksbank, "Financial Stability Report 2009:2".

⁴ Finansinspektionen (2009), "Utvecklingen på bolånemarknaden 2008", 2009:7. (Only available in Swedish.)

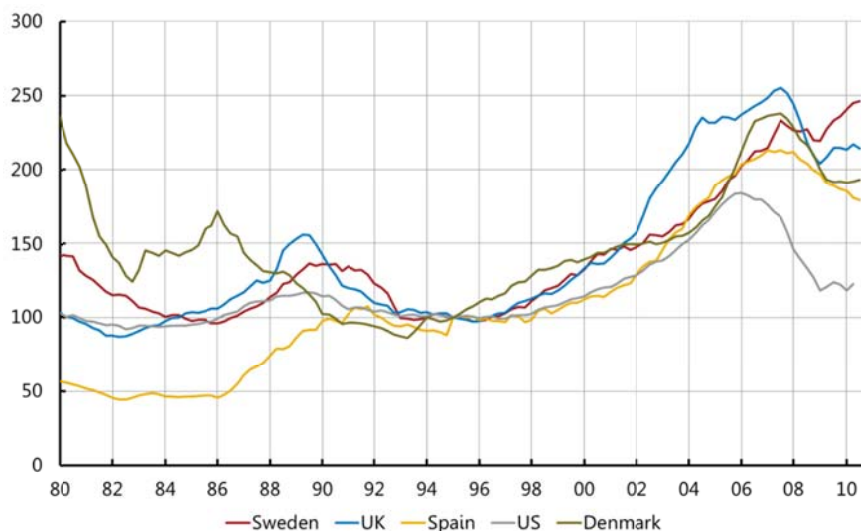
Figure 3: Swedish household debt and post-tax interest expenditure



Per cent of disposable income. Sources: Statistics Sweden and the Riksbank. (The Riksbank's Financial stability report 2010:2)

It is too early to establish whether recent repo rate increases and the introduction of a maximum permitted loan-to-value ratio of 85% for residential mortgages by Finansinspektionen (the Swedish Financial Supervisory Authority) have had a discernable effect on credit growth. In any case, house prices are continuing to grow (see figure 4). The Riksbank does not consider the present level of house prices and household debt to be an immediate threat to financial stability, but their current growth rates are unsustainable, so future problems cannot be ruled out.

Figure 4: Real residential property prices in Sweden and other countries



Index 1995 q1 = 100. Source: Reuters Ecowin and Statistics Sweden. (The Riksbank's Financial stability report 2010:2)

■ If the current growth rates of house prices and household debt are considered to be a potential threat to future financial stability, it may be necessary to act soon, because it will take time for any measures to take effect. So the Riksbank is investigating instruments (existing or potential) to prevent or mitigate this threat by smoothing the house price cycle, controlling household indebtedness or improving the resilience of banks. There are a range of prohibitive instruments that could be used to restrict the choices of households and financial institutions. These could include, for example, the introduction of a binding maximum loan-to-value ratio on household borrowing⁵ or a maximum debt-to-income ratio, or requiring mortgage interest payments to be fixed for a certain time period. There is also a range of taxation instruments that could act on the price of the activities of households and financial institutions. This includes changes to financial institutions' capital requirements or changes to the reserve requirements (SEK or foreign currency that financial institutions are required to hold at the central bank). The choice between prohibition and taxation is not new to public choice economics.

And vulnerabilities are building up internationally

The build-up of problems is even more apparent when looking internationally; in particular at the recent difficulty eurozone countries with weak public finances have had in issuing government bonds.⁶ Investors are increasingly making similar assessments with regard to sovereign risk as the Riksbank is making for Swedish household debt. For example, debt-to-GDP ratios give a similar picture for countries' ability to repay debt as the debt-to-income ratio shows for households. There are fairly well developed and commonly used techniques to estimate probabilities of default (PD) and loss given default (LGD) on banks' loan portfolios, which are useful for the conduct of microprudential policy. These techniques are also useful for macroprudential policy, and should be used more extensively, as they can be used to estimate PDs and LGDs at an aggregated level for entire sectors (eg banks, households, corporates). I would expect that these same techniques could be used to assess sovereign debt but, to my knowledge, I believe it is not done.

An analogy can also be drawn between the macroprudential tools the Riksbank is considering for household debt and the Stability and Growth Pact for countries in the eurozone. The Stability and Growth Pact is designed to facilitate the stability of the Economic and Monetary Union (EMU) by placing upper limits on member countries' national debt (60% of GDP) and annual deficit (3% of GDP). These are somewhat similar to maximum loan-to-value ratios and debt-to-income ratios for households. The Stability and Growth Pact was reformed in 2005, making it more enforceable by relaxing the rules to reflect the difficulty

⁵ The current maximum loan-to-value ratio constrains the amount a household can borrow in a mortgage contract but places no limit on other forms of lending to that household. A binding maximum loan-to-value ratio on household borrowing could place a firmer limit on households' total borrowing.

⁶ One of the reasons that the Swedish economy is currently experiencing relatively strong economic growth is that Sweden's public finances were comparatively strong going into the crisis. Therefore, Sweden has managed to avoid the fiscal consolidation currently seen in many other EU countries. One reason for Sweden's robust public finances is that it had to implement a programme of fiscal consolidation in the mid-1990s, following the Swedish banking crisis. Therefore, Sweden had already learnt the importance of maintaining sustainable deficits and debt levels, and had already imposed many of the public reforms required to deal with structural problems that can inhibit economic recovery.

of adhering to limits throughout the economic cycle as the burden on public debt increases during a recession due to automatic stabilisers (such as increased social security payments). A number of measures were introduced in the eurozone during the crisis to protect the EMU, such as the creation of the European Financial Stability Facility. The debate about longer-term reforms is currently ongoing.

Calibrating these rules and national macroprudential instruments, such as a maximum household debt-to-income ratio, is difficult because we lack complete understanding of how risks to the financial system develop and how macroprudential instruments act on those risks. As a result, decisions cannot be fully guided by theory; instead, policy makers are required to make genuine policy judgments. This may be more difficult to achieve for international tools that require agreement between multiple national policy makers.

Macroprudential policy needs to be operational soon

It is therefore clear that vulnerabilities are emerging as countries recover from the crisis and it is important that national authorities are soon able to implement macroprudential policies to address those risks. Leading the development of formalised macroprudential policy arrangements are the European Systemic Risk Board, which will hold its inaugural meeting in just two days, and the Financial Stability Oversight Council in the US, which held its first meeting in October 2010. But many other countries are thinking seriously about how to implement and conduct macroprudential policy in their jurisdictions.

Governance arrangements for macroprudential policy

A vital aspect of the macroprudential policy framework will be the design of the governance arrangements. They will determine how the different elements of the framework are brought together and will influence how macroprudential policy interacts with other policy areas.

Governance arrangements should be effective in three broad areas; they must ensure that the macroprudential decision-maker (the "macroprudential agency") has: (i) a clear mandate; (ii) access to the necessary information and the analytical capability to set policy; and (iii) control over a sufficient set of tools to achieve its mandate.

The need for a clear mandate

Effective governance arrangements must ensure that the macroprudential agency has a clear mandate. That is, the objectives of macroprudential policy, the tools available to the macroprudential agency and the interaction of macroprudential policy and other public policies must be clearly set out. This is necessary to ensure that: (a) there is no ambiguity about the macroprudential agency's role; (b) expectations on the agency are in line with what it can achieve; (c) the macroprudential agency can be held accountable for its actions (or lack of action); and (d) any overlaps between policy areas or agencies can be better handled.

It may be desirable to set out the macroprudential mandate (and objectives) explicitly because this could make it easier for the macroprudential agency to defend unpopular but necessary interventions. It would also allow policy objectives to be ranked, which would help manage policy trade-offs. However, when setting explicit mandates or objectives in law, care must be taken to avoid inadvertently constraining policy actions. This is a potential problem because we do not fully understand the variables that influence financial stability. Indeed, we currently lack a precise but comprehensive definition of financial stability.

In addition to giving the macroprudential agency a clear mandate, there should be a transparent decision-making process that avoids political and interest group pressure. This is necessary to ensure that the macroprudential agency is free to make interventions that impose short-term costs on financial institutions or the public in order to achieve long-term benefits through financial stability.⁷ While the macroprudential agency must be independent, it must also be accountable for its actions (or lack of action). A clear mandate will help achieve accountability and make assessment of the macroprudential agency against its objectives easier.

Information and analytical capability

Effective governance arrangements must also ensure that the macroprudential agency has access to the information and analytical capability needed to quickly identify system-wide risks and to determine when and how instruments should be used in response to these risks.

Information on exposures between institutions and on exposures commonly held by institutions is likely to be crucial for macroprudential supervision. Much of this information will need to be obtained from individual institutions and may overlap with the type of information collected for microprudential purposes. The collection and sharing of this information may be easier if the microprudential and macroprudential agencies are located together. An alternative approach would be to give a separate microprudential agency responsibility for collecting the information necessary for the conduct of microprudential and macroprudential policy. Memorandums of Understandings or information-sharing protocols would then be used to ensure the free sharing of information between agencies.

The analytical skills and tools required for macroprudential policy are likely to draw on those used for macroeconomic analysis and, to a lesser degree, microprudential analysis. But the macroprudential agency will need to build new analytical techniques. Before the crisis, many central banks had already begun to develop the type of system analysis that will be required for macroprudential supervision (for example, in the assessment of interdependencies and systemic risks included in financial stability reports) – but the analytical techniques remain in their infancy.

⁷ This argument is developed by Martin Cihák in a speech “Price stability, financial stability and central bank independence”, 38th Economics Conference of the Oesterreichische Nationalbank, 2010. A number of case studies illustrating how inadequate independence arrangements for financial sector regulators and supervisors have contributed to the emergence and scale of financial crises are presented by Marc Quinton and Michael W. Taylor in “Regulatory and supervisory independence and financial stability” IMF Working Paper, WP/0246, 2002.

Control over a sufficient set of tools

As well as the information and knowledge necessary for effective analysis, the macroprudential agency must have access to suitable instruments in order to achieve its mandate. Otherwise there will be unreasonable expectations of what the macroprudential agency can achieve, as it may be unable to address the system-wide risks that it identifies.

The macroprudential mandate is likely to be broad in scope, as system-wide risks can arise in a wide range of ways and from a wide range of sources. Consequently, the range of macroprudential instruments must be equally broad in scope. Discussions of macroprudential instruments usually emphasise the need for instruments that operate in two dimensions: the time or cyclical dimension, in which instruments are designed to counteract financial multipliers/accelerators that amplify cycles; and the cross-sectional dimension, in which instruments are required to isolate or dampen the transmission of problems across the financial system.

While it is important that the macroprudential agency has control over instruments to prevent and mitigate system-wide risks, it is not essential for the agency to implement these instruments itself. The macroprudential toolkit is likely to include instruments used for other policy objectives and not implemented by the macroprudential agency (for example, capital requirements and insurance premiums).

Overlap between policy areas

The overlap between different policy areas is one of the major challenges to the design of effective governance arrangements. Responsibility for using instruments that can be used for multiple policy objectives is more complicated and policy-setting is more difficult as policy-makers must consider the unintended impact of their instruments on other policy objectives and the unintended impact of other policy-makers' instruments on their own policy objective. The use of an instrument for one objective may conflict with or amplify the effect of instruments used to achieve a different policy objective. This is best illustrated by considering the relationship between macroprudential policy and monetary policy.

Monetary policy instruments can affect financial stability

Monetary policy instruments can have an effect on financial stability. Recently, it has been proposed that monetary policy can affect the build-up of risk in the financial system through the "risk-taking channel", an independent and previously unrecognised part of the transmission mechanism.⁸ There are a number of ways in which (loose) monetary policy is said to encourage risk-taking. Low interest rates can encourage investors to substitute low-yielding, safe assets for higher yielding, riskier assets - the "search for yield". Investors (such as pension

⁸ The concept of a risk-taking channel was introduced by Claudio Borio and Haibin Zhu in "Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism?" BIS Working Paper No.268, 2008.

■ funds) may make this substitution in the hope of attaining returns that match their commitments.

Alternatively, investors may be encouraged to take greater risks if they perceive that monetary policy is being used asymmetrically – that is, that the policy rate is reduced aggressively in the event of a sharp fall in asset prices but the policy rate is not used to address sharp increases in asset prices.

Another, more indirect channel, is formed by a feedback loop that amplifies asset price increases and causes banks to increase their holdings of risky assets. It is argued that financial institutions target leverage ratios that are constant (commercial banks) or pro-cyclical (investment banks). Therefore, an increase in the value of financial assets causes financial institutions to increase their balance sheets to maintain their target leverage ratios, which puts further upward pressure on asset prices. This also causes an increase in the level of risk in the financial system because the availability of safe investments is limited, so banks must move up the risk spectrum towards risky borrowers when they increase their balance sheets.

Macprudential policy instruments can affect price stability

Macprudential policy instruments can also have an effect on price stability. This can be illustrated using a highly stylised view of the monetary policy transmission mechanism:

$$i_t^{lending} = i_t + \delta_t.$$

This equation describes how banks' lending rates are a function of the central bank's policy rate plus an interest rate margin or spread. The interest rate margin (δ_t) is a function of the compensation taken by banks for factors such as administrative costs, capital costs, risk premiums and the banks' profit margins. The failure of macroprudential policy can affect the transmission mechanism of monetary policy by affecting the interest rate margin. For example, during a crisis, the relationship between the policy rate and market rates may diverge as market rates are increasingly governed by uncertainty over credit risk.

But macroprudential policy can also affect the transmission mechanism outside of a crisis. This is because the bank lending rate is also a function of financial regulations (placed on banks to enhance financial stability and consumer protection), as these tend to increase banks' costs which, to a certain extent, are passed on to customers in the form of an increased interest rate margin. This concept can be illustrated in the stylised equation for the lending rate by adding a variable (z_t) which designates regulations affecting the interest rate margin:

$$i_t^{lending} = i_t + \delta_t(z_t).$$

This equation is, of course, a simplification, but it is useful for illustrative purposes. It shows how some static macroprudential instruments, such as increased capital or reserve requirements, will affect the interest rate margin in a 'one-off shift' when they are introduced, which will affect the transmission mechanism during the period of adjustment. However, there are also likely to be dynamic macroprudential instruments, such as time-varying countercyclical capital buffers, aimed at ensuring that macroprudential policy can influence the

■ availability and pricing of credit throughout the cycle. These time-varying instruments will affect the transmission mechanism on an ongoing basis as they change over time.

But the instruments are not perfect substitutes

While the effects of monetary and macroprudential instruments may overlap, they are not perfect substitutes.⁹ As stated earlier, the macroprudential policy toolkit is likely to include a diverse range of instruments that operate in different ways on different elements of the financial system. And the effect of these instruments on policy objectives other than macroprudential policy will also vary. For example, cross-sectional instruments are less likely to conflict with monetary policy than with the cyclical dimension of macroprudential policy. And instruments aimed at a narrow range of financial institutions or agents will be easier to focus on financial behaviour rather than macroeconomic factors.

In general, it is desirable to use instruments with a narrower focus to address specific problems, as they can be better tailored to the problem and will have fewer unintended consequences on the real economy and on other policy objectives. However, there will be times when instruments with a broader scope will be desirable – for example, when there is a danger that developments in the financial system will enable agents to circumvent more narrowly focused instruments.

The ability to circumvent instruments forms one of the challenges for macroprudential policy. The effectiveness of macroprudential policy could be strained when the build-up of risks (for example, an asset price bubble) in the financial system justifies significant policy intervention to contain the risks but the prevailing macroeconomic conditions do not justify a similarly aggressive monetary policy. While the macroprudential agency may tighten policy substantially to increase market interest rates (to dampen the asset price bubble), doing so will increase the incentive to circumvent the intervention (for example by borrowing from institutions outside the scope of macroprudential policy, such as foreign lenders). This implies that the effectiveness of time-varying macroprudential instruments will vary depending on the arbitrage opportunities available to borrowers and lenders in the economy.

Macroprudential and monetary policy instruments must be coordinated

The interaction between macroprudential policy and monetary policy instruments means that it will be necessary to coordinate their use. This is for three reasons. Firstly, there is a danger of the instruments conflicting if they are implemented in an uncoordinated manner by authorities with different objectives. This has been shown to lead to a “push-me, pull-you” problem in which monetary policy and macroprudential policy instruments are used more aggressively,

⁹ A recent paper, by Charlie Bean, Matthias Paustian, Adrian Penalver and Tim Taylor, “Monetary policy after the fall”, Federal Reserve Bank of Kansas City Annual Conference, August 2010, shows that the monetary policy instrument and macroprudential instrument (a lump-sum levy/subsidy on the banking sector) are not perfect substitutes in a sticky-price New Keynesian macroeconomic model with a banking sector.

in opposing directions, leading to a worse outcome than if the instruments had been coordinated.¹⁰

Secondly, in most cases, monetary policy and macroprudential policy instruments should reinforce, not conflict with, each other. But it will still be necessary to monitor and understand the overlap between the instruments to ensure optimal policy.

Thirdly, in some extreme situations, the use of instruments usually prescribed for monetary or macroprudential policy will be insufficient to meet their respective policy objectives. In such situations, monetary and macroprudential policy instruments will be required to work in tandem to meet the policy objectives. Close coordination will be needed to guide use of the tools in these circumstances, as the distinction between the objectives of the instruments will be blurred.

The overlap between macroprudential and monetary policy is one rationale for giving the central bank a prominent role in the setting of macroprudential policy. In addition, many central banks already have some of the analytical skills that will be needed for conducting the policy. However, greater analytical capacity will need to be built up.

Analytical tools must be developed to guide policy

While we know that there is an overlap between macroprudential policy and monetary policy, we lack models that describe the relationship in much detail. It is a difficult task for a number of reasons: (a) in the models currently used by central banks, financial sectors are poorly modelled, so it is difficult to introduce financial instabilities; (b) developments in financial markets are sometimes driven by psychology, which is difficult to replicate in models with rational agents; (c) the risk of a crisis cannot be modelled in the usual way, as it is more like an extra channel in the transmission mechanism; and (d) policy-makers want models that can give them guidance on when to act, which is extremely challenging.

One approach that I find promising was recently outlined in a presentation by Michael Woodford.¹¹ He described a version of a new Keynesian model with two possible states for credit spreads: normal and elevated (that is during a crisis). He argued that it is the degree of leverage in the financial system, rather than the level of asset prices, that poses a risk to financial stability. In a standard New Keynesian model, the optimal policy commitment will be to hold the output-gap-adjusted price level (the 'optimal target criterion') constant. However, Woodford showed that when the likelihood of a crisis increases when leverage increases, the optimal target criterion is altered to include a factor relating to the marginal increase in the expected loss from a crisis per unit increase in the level of leverage. Therefore, the central bank should balance its inflation and output stabilisation objectives against its concern about financial instability. An attractive feature of this model is that it shows that, in most cases, the central bank will set the optimal policy rate in the usual manner (that is, it can

¹⁰ Charlie Bean *et al*, *ibid*.

¹¹ Michael Woodford, "Inflation targeting and financial stability", Czech National Bank seminar, September 2010.

disregard the factor relating to the marginal risk of a crisis in the optimal target criterion) but, if required, the central bank can affect the probability of a crisis by keeping the policy rate higher.

An alternative approach is to describe the connection between the Taylor rule for monetary policy and a form of Taylor rule that describes how regulations vary based on an assessment of, for example, credit growth.¹² The different rules are connected through the stylised view of the monetary policy transmission mechanism presented earlier:

$$i_t^{lending} = i_t + \delta_t(z_t).$$

The policy rate (i_t) is determined by the well-known Taylor rule for monetary policy. The interest rate margin (δ_t) is influenced by regulation (z_t), which is itself determined by non-time varying regulations (\bar{z}), the credit gap (measured as actual credit volume in relation to a level deemed sustainable over the long-term ($l_t - \bar{l}_t$)), and the output gap (measured as the actual level of output in relation to a level deemed sustainable over the long-run, ($y_t - \bar{y}_t$)):

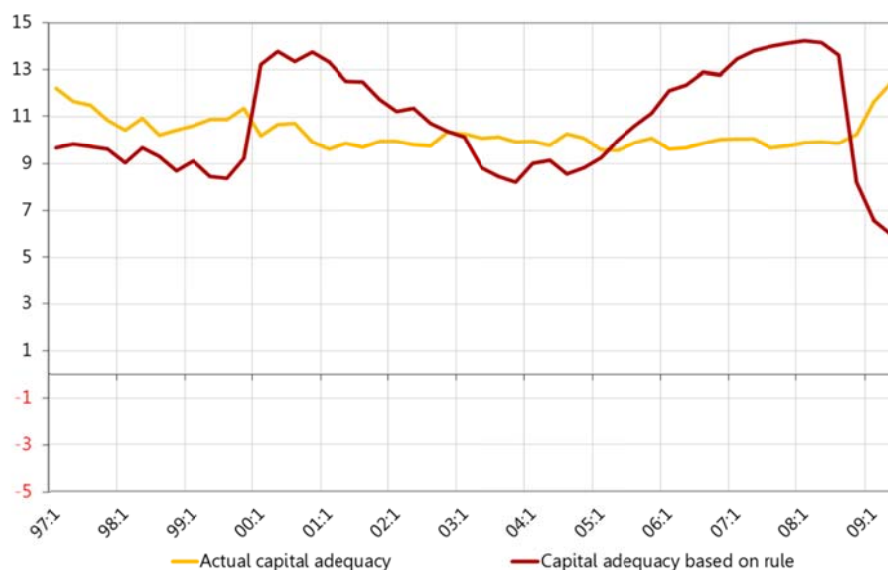
$$z_t = z(\bar{z}, l_t - \bar{l}_t, y_t - \bar{y}_t, \dots).$$

Together, the Taylor rule for monetary policy and the rule for regulation form, through the bank lending interest rate equation, a system that describes the relationship between monetary policy and macroprudential policy. I should emphasise that this is merely an illustration of a quite loose concept, rather than a description of a concrete proposal or model. But it helpfully illustrates the type of work that must be carried out before any theory or model can be applied in practice.

The Riksbank has used a simple version of this rule to illustrate the effect that countercyclical capital buffers could have had in Sweden between Q1 1997 and Q2 2009 (see Figure 5). Under this rule, capital adequacy for the four main banks in Sweden is a function of the banks' long-run capital adequacy ratio, the credit gap and the output gap.

¹² Stefan Ingves, "Monetary policy and financial stability – some future challenges", Swedish Economics Association, May 2010.

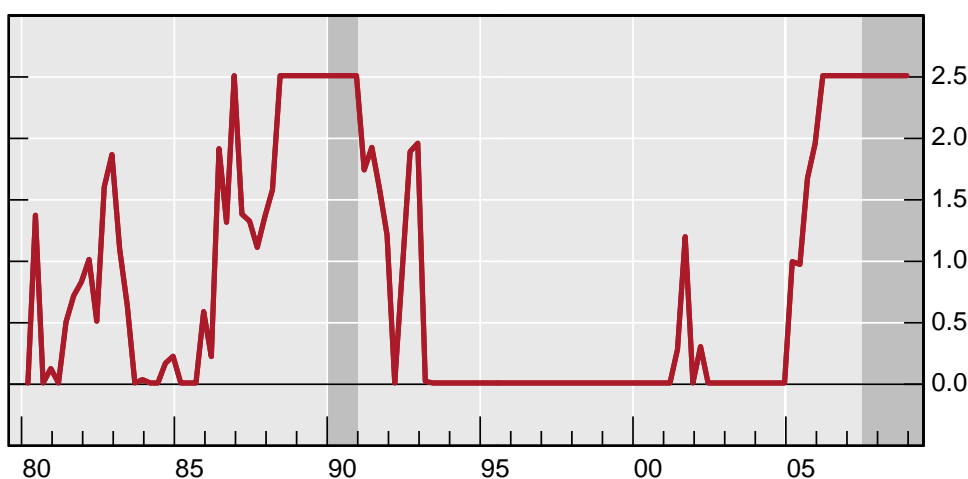
Figure 5: Countercyclical capital buffer using capital adequacy rule



Source: Riksbank

Again, this exercise is purely illustrative, but the results are encouraging, as the rule would have raised the banks' capital in the run-up to the recent crisis and lowered it after the crisis hit. And the results broadly match those from a similar exercise conducted by Claudio Borio, in which a measure of the credit-to-GDP was used to guide the size of countercyclical capital buffers in Sweden since 1980 (Figure 6).¹³

Figure 6: Countercyclical buffers in Sweden using credit-to-GDP gap rule



Vertical shaded areas indicate the starting years of system-wide banking crises. The countercyclical buffer is 0 when the value of the credit/GDP gap is below 2, and 2.5 when it is above 10%; for gaps between 2 and 10% the buffer is calculated as 2.5/8 times the value of the credit/GDP gap exceeding 2%. Source: BIS calculations

¹³ Claudio Borio, "Credit in monetary and (macro-)prudential policy", Sveriges Riksbank workshop on housing markets, monetary policy and financial stability, November 2010.

■ However, much more work is required, for example to allow the approach to include other regulations, to determine how best to calculate the sustainable level of credit in the long-run, and to overcome the econometric problems when estimating the rule.¹⁴ And it is a long way short of being something that can guide the practical use of macroprudential policies.

Summary

In this speech, I have broadly illustrated some of the thoughts and reflections that macroprudential (and other) policy-makers will need to consider going forward. There are many challenging issues: some of them are new (and particular to macroprudential policy) but many of them are not, such as the need to manage the overlap between policy areas. However, we can already see system-wide risks again building in financial systems, in Sweden and internationally – so it is important that we now face these challenges head on.

The first challenge will be designing effective macroprudential frameworks to ensure that the appropriate agencies are given the appropriate mandates, sufficient capability, and policy instruments to deal with threats to financial stability. Governance arrangements will play an important role. They will help to clearly define the role of macroprudential policy, to ensure that it can be used effectively, and to manage the interaction with other policy areas. While there are likely to be numerous solutions for the design of effective governance arrangements, the issues and key concerns are fairly well defined and understood.

Unfortunately, as I have discussed, it is clear that we do not have the same understanding of the more technical aspects of how macroprudential instruments should be used and of how they interact with other policy areas. I have highlighted a couple of high-level approaches to modelling the interaction of macroprudential policy and monetary policy, but these are not yet sufficiently developed to produce anything that is practically applicable. So there are likely to be a number of open questions / uncertainties when macroprudential policy becomes active. Fortunately that is nothing new for policy-makers.

That said, this is an exciting and, I believe, potentially very fruitful area for research in the future. And it is encouraging to see prominent researchers becoming increasingly interested in issues related to financial stability. I am therefore hopeful that there will be mutually beneficial cooperation between academics and policy-makers in the future.

¹⁴ The Riksbank faced several econometric problems when attempting to estimate the capital adequacy rule shown in Figure 4. For example, we used a short time series and faced an endogeneity problem (because bank lending is included on the left and right hand side of the rule). Therefore, in this exercise, we have simply selected coefficients that achieve what we believe to be an appropriate level of sensitivity between capital adequacy regulation and the output gap and the bank lending gap.