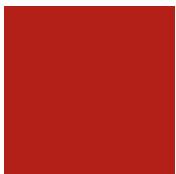




Sveriges Riksbank Economic Review



2012:1





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SVERIGES RIKSBANK ECONOMIC REVIEW
is issued by Sveriges Riksbank three to four times a year.

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The Review is published on the Riksbank's website
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Dear readers,

This year's first edition of the Riksbank's journal contains three articles and a commentary that in various ways concern the objectives, regulations and forms for economic policy, giving consideration to developments in the financial system and to the financial crisis. The focus is on the lessons learnt from the crisis with regard to monetary policy and the policy for financial stability.

- Central banks' monetary policy is normally balanced to stable inflation and resource utilisation around sustainable levels. Does this entail a risk that it will contribute to the build-up of financial imbalances, for instance, if globalisation helps hold back inflationary pressures? In this case, should monetary policy be formulated to reduce the risk of future crises?

Michael Woodford assumes in his article that a high level of resource utilisation leads to higher leverage in the financial sector and that this in turn entails a greater risk of a financial crisis. There is then reason for a central bank to give consideration, in addition to stabilising inflation and resource utilisation, to the effect of leverage on the risk of a financial crisis.

Lars E.O. Svensson says in his comment on Michael Woodford's article that it is more efficient to use other means than the policy rate to influence leverage in the financial sector. Then monetary policy and financial stability policy can be conducted independently of one another, with separate objectives and separate instruments.

- The financial crisis was to a great extent caused by a lack of insight into the risks in the financial system as a whole, by a lack of tools to counteract these risks and by confusion over the allocation of responsibility between the authorities. There is currently extensive international work under way to remedy these deficiencies. For instance, an entirely new policy area, known as *macroprudential policy*, is now emerging. This centres on detecting, analysing and mitigating risks to the financial system as a whole, unlike the traditional financial supervision, which focuses on the state of health of the individual institutions.

Christina Nordh Berntsson and Johan Molin have written an article presenting their views on what macroprudential policy involves and which tools could be used to mitigate threats to the stability of the financial system. They also discuss the advantages and disadvantages of a number of potential institutional models for conducting macroprudential policy in Sweden.

- The idea of a so-called Tobin tax, that is, a tax on financial transactions recurs now and then in the general debate. It is put forward by, for instance, Attac and the global

fairness movement. The European Commission has recently presented a proposal to introduce a financial transaction tax in the EU.

Johan Almenberg and Magnus Wiberg show in their article that there is no clear evidence that the functioning of the financial markets would improve with the introduction of a transaction tax. There is also a risk that if similar taxes are introduced in individual countries without applying at a global level, the consequence will be that financial trading moves to other countries that do not tax this type of transaction.

Read and enjoy!

Claes Berg, Joanna Gerwin and Kerstin Mitlid

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Michael Woodford

Michael Woodford believes that it is appropriate for a "flexible inflation targeting" central bank to endeavor to balance financial stability objectives against its price stability objective and its concern for output-gap stabilization, when choosing among alternative short-run paths for the economy at a given conjuncture. In his model a high level of resource utilization leads to higher leverage in the financial sector and this entails a greater risk of financial crisis. There is then reason for a central bank to give consideration to the effect of leverage on the risk of a financial crisis. This should not require any compromise of the primacy of price stability as the central bank's long-run objective.

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Lars E.O. Svensson

Michael Woodford's paper "Inflation Targeting and Financial Stability" presents a case for tighter monetary policy, "leaning against the wind," in order to reduce the probability of a financial crisis. However, the introduction of financial-stability instruments (macro-prudential instruments) that have a more direct effect on leverage than the policy rate allows monetary-policy and financial-stability policy to be conducted separately, with monetary policy focusing on the traditional objective of stabilizing inflation and resource allocation and financial-stability policy focusing on the objective of financial stability.

■ A Swedish framework for macroprudential policy 40

Christina Nordh Berntsson and Johan Molin

Lack of overview of the risks in the financial system as a whole, insufficient tools to counteract those risks and unclear allocation of responsibilities between authorities were circumstances that contributed substantially to the emergence of the global financial crisis. Extensive international work is now in progress to rectify these deficiencies. For example, a completely new policy area,

macroprudential policy, is developing. The focus of this is to discover, analyse and counteract risks to the financial system as a whole, unlike traditional microprudential supervision that focuses on the health of individual institutions.

In this article we discuss in detail what macroprudential policy, or the mitigating of systemic risk, is really about. We also discuss a number of criteria that may provide guidance in the choice of a suitable toolkit for macroprudential policy. In conclusion we take an in-depth look at the demands that should be made on an institutional framework for macroprudential supervision in Sweden and analyse the pros and cons of different conceivable models.

■ Taxing financial transactions 84

Johan Almenberg and Magnus Wiberg

The idea of taxing financial transactions is an old one. However, it came up again recently when the European Commission presented a proposal on a financial transaction tax within the EU in September 2011. The aim of the tax is twofold. First, the transaction tax is intended to improve the workings of the financial markets, which could reduce the risk of financial crises in the future. Second, the tax is intended to generate revenues and thus to get the financial sector to contribute to covering the costs that arise as a result of financial crises.

The hypothesis is that the tax would reduce any elements of speculation in financial markets as it would increase the costs of transactions with financial instruments. This in turn would result in a more realistic valuation of the returns that the financial assets can provide in the future. Although a reduction in speculation would reduce the base on which the tax is levied, that is the tax base would shrink, it would also reduce the risk of financial crises.

Inflation Targeting and Financial Stability*

MICHAEL WOODFORD

Columbia University

A number of commentators have suggested that central banks should reconsider the desirability of inflation targeting in the light of the global financial crisis. Early on, Paul De Grauwe (2007) asserted that the crisis had “unveiled the fallacy” of the consensus view in favor of inflation targeting as an approach; a little later, Axel Leijonhufvud (2008) argued that inflation targeting “has failed” as a strategy, and that “the problems we now face are in large part due to this policy failure”; and more recently, Francesco Giavazzi and Alberto Giovannini (2010) have proposed that inflation targeting, as conventionally practiced, “can ... increase the likelihood of a financial crisis.”

How seriously should inflation-targeting central banks take these charges? I think it is important to distinguish between inflation targeting as such and the more specific doctrine – enunciated by some prominent proponents of inflation targeting, but not, in my view, a defining feature of this approach to the conduct of monetary policy – according to which central banks need not pay attention to asset prices, or more generally to concerns relating to financial stability, when making monetary policy decisions.

I do not believe that the central claims that were made by proponents of inflation targeting on behalf of this approach are challenged in any direct way by the events of the crisis. It is worth recalling what inflation targeting was intended to achieve. It was expected, above all, to serve to stabilize medium-term inflation expectations. This, it was asserted, would allow monetary policy to be used more aggressively for purposes of stabilization of the real economy, without so much sacrifice of price stability as would be required in the absence of such well-anchored inflation expectations. It was expected to eliminate a particular source of macroeconomic instability, namely, the possibility of wage-price spirals triggered by commodity-price shocks, of the kind that had been problematic in the 1970s. And it was expected to allow countries to avoid the possibility of a deflationary trap of the kind experienced by many countries in the 1930s, in which expectations of deflation, once entrenched, become self-fulfilling.

The failure of any of these central claims to be borne out in practice would give one serious reason to reconsider the basic theory of inflation targeting. But thus far they have

* Revised text of a talk given as a keynote address at a conference, “The Future of Central Banking,” at the Einaudi Institute for Economics and Finance, Rome, September 30, 2010. I would like to thank Jean Boivin, Steve Cecchetti, Vasco Cúrdia, Stefan Ingves, Jean-Pierre Landau, Florencio Lopez-de-Silanes, Rick Mishkin, Benoit Mojon, and Lars Svensson for helpful discussions, Claes Berg for editorial comments on an earlier draft, and the (U.S.) National Science Foundation for research support.

held up quite well. Rather than discrediting inflation targeting, one could argue that the events of the last several years have provided further vindication for it. Despite a serious disruption of the world financial system, that some have compared in magnitude to that suffered in the 1930s, this time none of the major economies fell into deflationary spirals. And despite large swings in oil prices, the effects on the dynamics of wages and prices this time have been modest. These comparatively benign outcomes are surely due in large part to the fact that inflation expectations in most of the major economies have remained quite well anchored in the face of these substantial disturbances. And it is arguable that the credibility with regard to control of the rate of inflation that the leading central banks have achieved over the past twenty years deserves a great deal of the credit for this stability.

Of course, the global financial crisis has done great damage, and this has understandably led to questions as to whether the disaster might have been avoided, or its severity reduced, had policies been different. The aspects of policy that have most obviously been called into question have to do with the regulation of the financial system. But it is also worth asking whether alternative monetary policies might have made a difference.

In particular, the crisis does justify reconsideration of at least one aspect of the inflation targeting doctrine that had developed over the previous two decades. This is the thesis that a central bank with an inflation target need not pay attention to financial developments – such as a credit-financed real estate boom – except to the extent that such developments affect the outlook for inflation (or perhaps, either for inflation or for real activity). While this thesis is not, in my view, a central, definitional aspect of an inflation targeting regime, it was undoubtedly a common view among proponents of inflation targeting prior to the crisis. It is therefore important to reconsider both the extent to which such a view is defensible, and the extent to which it is a necessary element of a coherent approach to inflation targeting. Can this previously conventional view still be maintained, after recent experience? And if not, would this require abandonment of inflation targeting as well?

I shall begin by reviewing some common arguments that have been offered for setting aside the question of financial stability in the conduct of monetary policy. I conclude that there is a persuasive case for taking this issue into account, as at least one factor, when making decisions about interest rates. But I shall also argue that it is possible to do this in a way that represents a natural extension of “flexible inflation targeting,” as that concept has been developed in the literature prior to the crisis. It should thus be possible to adapt the framework used to structure monetary policy deliberations in a way that takes account of legitimate concerns raised by the recent crisis, but without having to discard what was learned from the previous quarter century of experience with and analysis of methods of inflation stabilization.

1 Is financial stability relevant to monetary policy deliberations?

Prior to the global financial crisis, many (though certainly not all) central bankers took the view that considerations of financial stability should play no role at all when making decisions about monetary policy. A variety of arguments were offered in defense of this view, and it is worth discussing them briefly before proposing my own view of the matter.

One of the simplest arguments was that, however desirable it might be to act to head off financial crises were one able to do so, such crises are simply *not predictable enough* for there to be any point in trying to “lean against” developing financial-sector risks. This view gained particular credence when the issue was cast as one of using monetary policy to lean against (or even to “prick”) asset “bubbles,” which were in turn defined as situations in which the market price of some asset was significantly higher than its fundamental value. How, it was asked, should central banks expect to know the correct valuation of assets if the correct value was not sufficiently obvious for market participants to have gotten it right? Because “bubbles” are, by their nature, situations that are difficult to identify until after they have burst, it was argued to be more practical for a central bank to simply plan to “mop up” after the crash of the bubble than to try to prevent it from occurring.

But complacency about the ease of “mopping up” after a financial crisis is much more difficult after the recent global crisis; despite unprecedented and heroic efforts on the part of a number of central banks, it was not possible to prevent a very sharp contraction of world trade and economic activity, and even years later many economies are still struggling with the after-effects of the crisis. And the excuse that crises are unpredictable is not as compelling as it might at first seem. After all, in order for it to be useful to adjust policy in order to reduce the risk of financial crisis, one needn’t be able to predict exactly when crises will occur; it suffices that one is able to identify circumstances under which the *risk* of a crisis increases (and that there are policies that can affect these risks). It is true enough that our understanding of how to measure such risks is much more incomplete than we should want. But there are indicators that have been found to have predictive value (e.g. Borio and Drehmann, 2009) and it is hard to justify not trying to improve our ability to measure financial crisis risks.

It is important, I believe, to realize that the real issue is not identifying whether one type of asset or another is currently overvalued. Instead, what central banks (and potentially other “macro-prudential” regulators) need to be able to monitor is the degree to which the positions taken by leveraged institutions pose a *risk to financial stability*. Of course, a belief that multiple institutions have each borrowed in order to invest in an asset the value of which is likely to collapse, because its current price is far above its true value, is one possible reason to believe that there is a substantial risk of a systemic crisis; but a central bank need not be able to identify asset over-valuations in order to recognize situations in which the probability of simultaneous financial distress at several institutions is non-trivial. The typical case against which the central bank should be on guard is not one in which the *mean* of the distribution of possible future net worths for the institutions is too low, but rather one

in which the *lower tail* of the distribution is too large. Moreover, the question of greatest concern is not even the size of the lower tail of outcomes for individual institutions, but the probability of a bad *joint* outcome. This question of systemic risk is not one with which individual institutions may have much concern in their financial decisions, and so the belief that it is useful for the central bank or other regulators to assess systemic risk does not depend on a belief that the regulators are able to forecast better than private institutions can.

A second ground for skepticism about the relevance of financial stability concerns in monetary policymaking is based on doubts about how much monetary policy can do to influence the build-up of risks to financial stability, even granting that it might be possible to identify such risks in real time. Adjustment of the short-term interest rates controlled by central banks will have little effect on stock-market or real-estate “bubbles,” it is often argued – if short rates are relevant to such valuations at all, the change in monetary policy required to make a difference would be very severe, and, given the unpredictability of the evolution of such bubbles, the effects of the sudden, sharp change in monetary policy would be difficult to predict. Again it is often concluded that it should be easier to “mop up” afterwards than to try to contain a bubble as it develops, on the ground that it is clearer what monetary policy can do to help once the problem becomes a shortage of liquidity.

But once again, I think that many discussions of this point dismiss the potential relevance of monetary policy too easily, by posing the question as one of using interest-rate policy to control “bubbles” in asset prices. The real issue, I would argue, should not be one of controlling the possible mispricing of assets in the marketplace – where the central bank has good reason to doubt whether its judgments should be more reliable than those of market participants – but rather one of seeking to deter extreme levels of leverage and of maturity transformation in the financial sector. Once the problem is recast in this way, the relevance of interest-rate policy decisions – whether to exacerbate the problem or to mitigate it – is more obvious. Even modest changes in short-term rates can have a significant effect on firms’ incentives to seek high degrees of leverage or excessively short-term sources of funding.¹ Again, this is something that we need to understand better than we currently do; acceptance that monetary policy deliberations should take account of the consequences of the policy decision for financial stability will require a sustained research effort, to develop the quantitative models that will be needed as a basis for such a discussion. But there is certainly no ground, on the basis of current economic knowledge, to assert that interest-rate policy is likely to be irrelevant.

A third ground for skepticism would assert that, even if one grants that monetary policy might be able to influence the risk of occurrence of a financial crisis, there are surely better tools available for this purpose. It is best to assign only one goal to each available policy

¹ Woodford (2011b) provides an example of an explicit model in which monetary policy decisions affect the endogenous capital structure decisions of intermediaries, and as a consequence, the severity of the “fire sale” externalities associated with a crisis state.

instrument, in accordance with what is sometimes called the "Tinbergen principle," and in that case monetary policy is not the right tool to use to ensure financial stability. That should instead be the task of supervisory policy, of regulatory policy, or perhaps of new instruments of "macro-prudential policy" such as countercyclical capital requirements.

It is indeed true that these other aspects of policy should have an important role in maintaining financial stability. While I have just argued that it is plausible to believe that monetary policy has an effect on the risk of financial crisis, it hardly follows from this that the interest-rate policy of the central bank can or should provide a *complete solution* to the problem. That would be true only if one believed not only that interest-rate policy can be a very effective tool to deal with the problem, but that there are no costs to subordinating interest-rate policy to that end. The latter is surely not the case, as the model sketched in the next section is intended to illustrate. Hence acceptance of the proposition that monetary policy is relevant to financial stability is no excuse for failing to improve bank regulation, tighten capital requirements, or develop additional tools of macro-prudential policy.²

But by the same token, the existence of other instruments that can help to reduce the risk of a financial crisis does not, in general, justify complete neglect of the issue of financial stability in monetary policy deliberations. That would be true only if one could count on the other policy instruments to *completely eliminate* the problem of financial instability, and without other costs of having to resort to those instruments. This is unlikely, and at any rate, it is certainly not the situation in which central banks already find themselves. The recent crisis points up the weakness of the existing regulatory and supervisory regimes in many countries, and while many reforms are currently under discussion, it is too soon to be certain how much will change and how effective the new structures will be at controlling risk-taking in the financial sector. Central banks should certainly applaud the development of other tools that can help to minimize the risks to financial stability, as this can only make their own task simpler and more effective; but until it is clear that the problem has genuinely been solved by those other means, it would be prudent for them to also develop analytical capability for thinking about the impact of their own actions on financial stability.

Still, one might reasonably ask, will there not be a conflict between the use of monetary policy to control risks to financial stability, and the use of it to maintain price stability and stable real activity? Yes, I think there will almost inevitably be a tension between these alternative objectives, as the model in the next section illustrates. But I wish to argue that this tension is no different, in principle, than the conflict between inflation stabilization and output-gap stabilization, in the conventional theory of "flexible inflation targeting." Proponents of inflation targeting generally admit that the interest-rate policy required to maintain complete stability of prices will not always be the same one that would best stabilize aggregate output around its efficient level. And yet, in mainstream accounts

2 Woodford (2011b) illustrates how the creation of an additional macro-prudential policy instrument, such as variation in the interest rate paid on reserves, can improve both financial stability and the central bank's ability to achieve its traditional stabilization objectives of price stability and full utilization of productive capacity.

of inflation targeting – certainly in the view of it espoused by the theorists of inflation targeting, such as Mervyn King, Ben Bernanke, and Lars Svensson, who are actually involved in the conduct of monetary policy – it does not follow that one must therefore set aside all concern with the effects of interest-rate policy on the real economy.³ Rather, it is argued that a sound approach will seek to balance a concern for the effects of policy on real activity with a concern for its effects on inflation; and it is furthermore argued that it should be possible to use policy to mitigate short-run instability of the output gap without any substantial sacrifice of the stability of medium-run inflation expectations.

The view that I wish to propose of the place of financial stability concerns in monetary policy deliberations is a similar one. I think that central banks should admit that monetary policy may well have consequences for financial stability, rather than pretending that the issue should not be their responsibility because they have no influence over it; and that they should recognize that it would require considerable luck for the policy that best serves their traditional stabilization objectives to turn out always to coincide perfectly with the one that is best from the standpoint of financial stability. Accordingly, I believe that it is appropriate for a “flexible inflation targeting” central bank to endeavor to balance financial stability objectives against both its price stability objective and its concern for output-gap stabilization, when choosing among alternative short-run paths for the economy at a given conjuncture. Nonetheless, I shall argue that it is possible to do this through a straightforward adaptation of the way that inflation-targeting central banks already think about the short-run tradeoff between price stability and output stability, and that once again an allowance for other objectives in choosing among short-run transition paths should not require any compromise of the primacy of price stability as the central bank’s longer-run objective.

2 A simple model of optimal stabilization with endogenous financial crises

A simple model may be helpful in clarifying the way in which an inflation targeting regime could be modified to incorporate concerns for the effects of monetary policy decisions on financial stability. In order to address the concerns raised above, it is essential that the occurrence of crises that disrupt financial intermediation not be treated as purely exogenous, as it is in analyses such as those of Cúrdia and Woodford (2009, 2011), Del Negro *et al.* (2010), or Gertler and Karadi (2011), that treat only the question of how central-bank policy can mitigate the effects of a crisis in the event that one occurs. Here I shall not propose any sophisticated model of the endogenous mechanisms that give rise to a crisis – a complex topic that is the subject of much ongoing research – but will instead simply postulate a reduced-form model of the way in which endogenous state variables affect the probability of a crisis, and consider how allowance for such a relationship would

³ See, e.g. King (1997), Bernanke *et al.* (1999), and Svensson (2011).

change the standard theory of optimal monetary stabilization policy.⁴ Analysis on the basis of such a crude hypothesis can at best be regarded as suggestive, rather than prescriptive. Nonetheless, if one believes that a relationship of this general type is important, even though a correct specification would be more complex, a simple analysis of the kind offered here may be more useful than an analysis that assumes there are no such effects at all.

2.1 SKETCH OF THE MODEL

Let us consider a simplified version of the model of the macroeconomic effects of credit frictions developed in Cúrdia and Woodford (2009). The most important effect of the credit frictions in that model is to modify the relation that would otherwise exist between aggregate real expenditure and the path of interest rates. The model is one in which households are heterogeneous, and at a given point in time, some are credit-constrained while others are not, and the marginal utilities of income of the two types differ as a result. (With frictionless financial intermediation, the marginal utilities of the different households would co-move perfectly, despite the differences in their incomes and spending opportunities.) A key additional state variable of the model is Ω_t , a measure of the gap that exists at any time t between the marginal utilities of income of the two types. This variable measures the distortion of the allocation of expenditure due to credit frictions – a larger value of Ω_t means that the marginal utility of borrowers exceeds that of savers to a greater extent, which means that the spending by borrowers is inefficiently low to a greater extent – and hence is a useful measure of the severity of credit frictions. In the Cúrdia-Woodford model, this variable also corresponds to a *credit spread* between two different long-term bond yields: the spread between the equilibrium yield on long-term bonds (of a particular duration) issued by risky private borrowers on the one hand and those issued by the government on the other.⁵ An empirical correlate of this state variable would therefore be an average spread between yields on risky corporate bonds and those on Treasury securities of a comparable maturity.

The reason this variable is important for the positive predictions of the model is that variations in Ω_t shift the predicted relation between aggregate real expenditure and the average marginal utility of income. In a representative-household model (or a model without financial frictions) the marginal utility of income should be a decreasing function of aggregate expenditure; this structural relationship can be shifted by exogenous changes in government purchases, household impatience to consume, or the marginal efficiency of investment opportunities, among other factors (the various sources of “IS disturbances”

⁴ That standard theory, abstracting from financial frictions, is reviewed in some detail in Woodford (2011a).

⁵ In the paper, we show that, to a log-linear approximation, the variable Ω_t (actually denoted $\hat{\Omega}_t$ in the paper) will be a forward-looking moving average of the short-term credit spread (denoted by \hat{w}_t), where the short-term spread is the differential between the one-period interest rate at which private non-financial borrowers can borrow and the one-period interest rate on government liabilities. Hence Ω_t can alternatively be expressed as the difference between forward-looking moving averages of those two different short-term interest rates, which would correspond to the spread between the yields on certain long-term bonds issued by the two types of borrowers. The hypothetical bonds for which this would be exactly the credit spread would be claims to a stream of future payments that are exponentially declining at a certain rate.

in a standard New Keynesian model). In the Cúrdia-Woodford model, this relation is also shifted by changes in Ω_t . Under the calibration proposed there as most realistic, a higher value of Ω_t will lower the marginal utility of income associated with a given level of aggregate expenditure, as a consequence of the less efficient composition of expenditure; an increase in Ω_t thus has effects similar to those of a reduction in government purchases or a reduction in the attractiveness of current private spending opportunities.

Because of this modification, the “intertemporal IS equation” of the basic (three-equation) New Keynesian model takes the more general form

$$y_t - g_t + \chi\Omega_t = E_t[y_{t+1} - g_{t+1} + \chi\Omega_{t+1}] - \sigma[i_t - E_t\pi_{t+1}], \quad (2.1)$$

where y_t denotes the output gap (i.e. the amount by which the log of aggregate real expenditure exceeds the currently efficient level, which latter quantity is assumed to depend solely on exogenous factors), g_t is a composite both of the various exogenous factors that shift the relation between the marginal utility of income and aggregate expenditure even in the absence of credit frictions⁶ and of those that shift the efficient level of aggregate output, i_t is a short-term nominal interest rate, π_{t+1} is the rate of inflation between periods t and $t+1$, and all variables denote deviations from their steady-state values (so that constants are omitted). Under the proposed calibration, the coefficients satisfy $\chi, \sigma > 0$. In the presence of credit frictions, the variable i_t (a weighted average of the interest rates that are relevant for borrowers and savers respectively) is no longer identical with the central bank's policy rate, and this introduces an additional term if the IS equation is instead to be written in terms of the policy rate, as in Cúrdia and Woodford (2009). Here I omit that complication, as I am not interested in deriving a rule for the particular instrument adjustment required to achieve particular macroeconomic targets; for the purposes of the present discussion, it suffices that the i_t in (2.1) is a variable that the central bank can influence (even if the influence is not quite so direct as in the case of the policy rate).

Under this calibration, real aggregate demand depends not only on exogenous factors (such as the evolution of government purchases) and the expected path of (average) real interest rates, but also on the magnitude of the distortions indicated by credit spreads; other things equal, a larger value of Ω_t will depress aggregate demand in period t . Thus the additional Ω_t terms in (2.1) can be thought of as representing what are sometimes called “financial headwinds.”

For similar reasons, the model's aggregate supply relation must be modified relative to the familiar “New Keynesian Phillips Curve” specification, taking now the form

$$\pi_t = \alpha_y y_t + \alpha_\Omega \Omega_t + \beta E_t \pi_{t+1} + u_t, \quad (2.2)$$

where the coefficients satisfy $\alpha_y, \alpha_\Omega > 0$, $0 \leq \beta < 1$, and u_t is a composite term representing various possible exogenous “cost-push” factors. The credit frictions change this relationship

⁶ For example, an increase in government purchases increases the value of the term g_t .

only through the appearance of the Ω_t term, again reflecting the way that changes in Ω_t shift the relationship between aggregate real expenditure and the marginal utility of income. One of the reasons for an upward-sloping short-run aggregate supply curve is that higher real activity is associated with a lower marginal utility of income, which increases real wage demands, and hence the real marginal cost of supplying goods. Since larger credit frictions also reduce the average marginal utility of income, for a given level of real activity, they also increase the real marginal cost and hence the inflationary pressure resulting from a given level of real activity.

The crucial new element that I wish to consider here is some degree of endogeneity of the evolution of the financial distortion measure $\{\Omega_t\}$.⁷ I shall simplify by assuming that Ω_t is always in one of two states: either it takes a low value $\underline{\Omega}$ (the “normal” state) or a high value $\bar{\Omega}$. I shall furthermore suppose that the probability of each period of transition from the crisis state back to the normal state (conditional on being in the crisis state) is $0 < \delta < 1$, while the probability γ_t of transition from the normal state to the crisis state (conditional on being in the normal state) is time-varying, and moreover (at least possibly) a function of endogenous macroeconomic conditions. It is this potential endogeneity of the probability γ_t of occurrence of a crisis that raises the question of the implications of monetary policy decisions for financial stability.

The assumption that financial conditions jump between two discrete states – in one of which credit spreads are low, and in the other of which they are high – is obviously an oversimplification, but it captures something important about financial crises of the kind that we are concerned with here: that they are typically characterized by sudden, substantial increases in credit spreads that are instead relatively stable under normal circumstances. A regime-switching model is a parsimoniously parameterized way of capturing this episodic character of periods of financial stress, as in the empirical model of Davig and Hakkio (2010).⁸ An advantage of this approach is that it responds to a common complaint about policy analyses using DSGE models, namely, that the use of local perturbation methods necessarily abstracts from the possibility of occasional excursions far from the normal range of variation in the state variables as a result of nonlinearities – which extreme outcomes are precisely the ones that one must be concerned about in an analysis of risks to financial stability. A regime-switching model allows for a non-trivial probability of occasional excursions far from normal conditions, and allows the probability of such excursions to be endogenous (the critical issue for the present discussion). It does not seek to model the nonlinear mechanisms that actually allow a relatively abrupt transition to another part of the state space to occur, instead contenting itself with a

⁷ Cúrdia and Woodford (2009) already allow for one specific type of endogeneity of financial distortions: in their model, Ω_t is a forward-looking moving average of the short-run credit spread w_t , which is allowed to depend on the current volume of privately intermediated credit, in addition to various exogenous factors. This endogenous dependence of spreads on the volume of credit can be thought of as movement along a “supply curve for intermediation” of the kind proposed in Woodford (2010); shifts in the location of the supply curve, however, are purely exogenous disturbances in the model of Cúrdia and Woodford (2009).

⁸ In their model, the two states are characterized by different mean levels of the Kansas City Fed Financial Stress Index, many elements of which are credit spreads (Hakkio and Keeton, 2009).

reduced-form model of the probability of such an excursion occurring and a specification of the conditions that result from one on average. But this is about as specific a model as we can expect to parameterize on the basis of available empirical evidence, anyway, given the heterogeneity and relative infrequency of crises. And it allows us to use local perturbation methods to analyze the linkages between the various endogenous variables of such a model – including the transition probabilities and the values of endogenous variables *conditional* on the regime that one is in – without this requiring any assumption that crises do not involve large changes in the values of many variables.

For purposes of illustration, I shall here assume one very simple kind of endogeneity of the transition probability. Suppose that $\gamma_t = \gamma_t(L_t)$, where L_t is a measure of the degree of leverage in the financial sector, and $\gamma_t(\cdot)$ is a function satisfying

$$\gamma_t(L), \gamma'_t(L), \gamma''_t(L) > 0.$$

(The time subscript on the function means that there can also be exogenous shifts in this function over time.) The idea of the positive dependence on leverage is that the more highly levered financial institutions are, the smaller the unexpected decline in asset values required to tip institutions into insolvency – or into a situation where there may be *doubts* about their solvency – and hence the smaller the exogenous shock required to trigger a crisis. Given some distribution function for the exogenous shocks, the lower the threshold for a shock to trigger a crisis, the larger the probability that a crisis will occur over a given time interval. Moreover, not only does greater leverage increase the probability that any given bank will come to be in financial difficulty as a result of an exogenous shock, it also increases the probability that a given bank's financial distress will tip others into distress as well, so that the chance of a chain reaction of significant magnitude occurring increases too. If the overall crisis state represented by $\Omega_t = \bar{\Omega}$ occurs only when such a chain reaction occurs, then the probability is likely to be sharply increasing in the degree of leverage beyond some point, though it might well remain relatively constant (and low) for all degrees of leverage below some threshold.

Of course, both the risk of individual banks' insolvency and the risk of a chain reaction occurring depend on more than just the banks' leverage ratios: for example, the degree of maturity mismatch and liquidity mismatch between their assets and their liabilities is highly important as well. Here I shall use a single variable L_t to stand for a variety of changes of this kind in financing arrangements that increase the risk of financial instability, and all of which tend to increase in periods when there is less risk avoidance by financial institutions. The use of a single variable to summarize the relevant change in financial structure simplifies the calculations below, and allows a fully optimal commitment to be described using fairly simple equations. I do not mean, of course, to suggest that in practice an adequate model will take account of only one dimension of financial structure, still less that precisely the same single variable will be the most useful one for all countries. Local institutional details are likely to matter even more for this aspect of the model than for structural relations such as (2.1) and (2.2); the present analysis is intended as an illustration

of a general approach to the problem, rather than as a presentation of a formula that can be directly applied once one correctly associates local data series with the various symbols.

It remains to connect leverage (or financial risk-taking more generally) with the other endogenous variables of the model. I shall slightly simplify the dynamics of the Cúrdia-Woodford model by postulating a simple law of motion of the form

$$L_t = \varrho L_{t-1} + \xi y_t + v_t, \quad (2.3)$$

where v_t is an exogenous disturbance term and the coefficients satisfy $0 < \varrho < 1$, $\xi > 0$. This reduced-form relation combines two structural equations, one relating the growth of aggregate bank assets (and hence the aggregate leverage L_t) to the rate at which new loans are originated, and one relating the rate of new borrowing to the level of aggregate activity (and hence to the output gap y_t).

The rate of new lending (the equilibrium volume of intermediation) is an increasing function of the level of activity if an increase in incomes increases the demand for intermediation, as in the derivation of the “XD curve” in Woodford (2010). In the model of Cúrdia and Woodford (2009), the relation is increasing because expenditure by the borrowers is assumed to be more sensitive to variations in the interest rate at which they can borrow than expenditure by savers is sensitive to variations in the interest rate earned on their savings. A shift in monetary policy that increases aggregate expenditure also necessarily increases the share of expenditure by borrowers, and so increases spending by borrowers more than it increases their incomes, requiring an increase in new borrowing. The disturbance v_t may reflect any of a variety of factors: a shift in the relationship between bank assets and leverage, or more generally, in the degree of risk that banks must take in order to finance assets of a given volume, perhaps because of events that reduce bank capital or shift the penalties associated with risk-taking; a shift in the relationship between the level of economic activity and the output gap, due for example to a productivity shock; or a shift in the degree to which an expansion of demand requires credit expansion, due for example to shocks with different effects on borrowers and savers. To the extent that the changes in these relationships can be treated as exogenous (and unaffected by monetary policy), they can be lumped together in a single composite disturbance term.

Our simple structural model then consists of the three equations (2.1) – (2.3) together with the regime-switching model of the evolution of financial conditions, to determine the four endogenous variables π_t , y_t , L_t , Ω_t each period, given the central bank’s adjustment of the path of i_t and the paths of the exogenous disturbances (including the timing of the regime transitions).

2.2 A CRITERION FOR OPTIMAL POLICY

I shall further assume that the goal of policy is to minimize a loss function of the form

$$\frac{1}{2} E_0 \sum_{t=0}^{\infty} \beta^t [\pi_t^2 + \lambda_y y_t^2 + \lambda_{\Omega} \Omega_t^2], \quad (2.4)$$

for some weights $\lambda_y, \lambda_{\Omega} > 0$, and a discount factor $0 < \beta < 1$ that is the same as in (2.2). This adds to the usual inflation and output-gap stabilization goals, standard in accounts of flexible inflation targeting (e.g. Svensson, 2011), an additional goal of reducing the incidence of financial crises (reflected by the assumption that $\lambda_{\Omega} > 0$). Cúrdia and Woodford (2009) show that an objective of this form can be justified as a quadratic approximation to the goal of maximizing the average expected utility of households in their DSGE model with credit frictions, in the case that all disturbances are small enough for a second-order Taylor series expansion to give a correct ranking of welfare under alternative policies.⁹ The additional term represents the welfare consequences of the distortion of the composition of expenditure as between credit-constrained and unconstrained households (or between borrowers and savers); because this distortion is minimized when $\Omega_t = 0$ (i.e. the marginal utilities of income of the two types are equal), the welfare effects of this distortion can be approximated by a term of the form $\lambda_{\Omega} \Omega_t^2$.¹⁰

We may now consider how policy should be conducted in order to minimize (2.4). If we abstract from the possibility that the zero lower bound on nominal interest rates can constrain the central bank's ability to move i_t as far as it would otherwise wish, then the problem can be reduced to the choice of state-contingent paths for the variables $\{\pi_t, y_t, L_t, \Omega_t\}$ consistent with constraints (2.2) – (2.3) and the transition equation for the regimes so as to minimize (2.4). Equation (2.1) can then simply be solved to determine the required path for the short-term nominal interest rate $\{i_t\}$ in order to implement the desired evolution of the other variables.

It is perhaps useful first to consider the special case in which the transition probability γ , is independent of L_t . In this case, the evolution of the regimes (and hence the evolution of the financial distortion factor $\{\Omega_t\}$) is purely exogenous, and the third term in the objective is independent of policy. It then suffices to consider how policy affects the expected discounted value of the other two terms in the objective, which is to say, the traditional inflation and output-gap stabilization objectives. Furthermore, the evolution of $\{L_t\}$ has no welfare consequences in this case, so we can ignore constraint (2.3). The problem then reduces to the choice of state-contingent paths for inflation and the output gap to minimize the traditional loss function in analyses of “flexible inflation targeting” subject to the

⁹ Of course, in the present analysis, we do not necessarily wish to assume that the difference between $\bar{\Omega}$ and $\underline{\Omega}$ is small, so that the Taylor series expansion invoked by Cúrdia and Woodford may not be valid. However, the conclusion that welfare is reduced by spending a greater fraction of time in the crisis state – which is the key implication of (2.4) for the analysis below – is also true in the Cúrdia-Woodford model, even in the case that financial distortions in the crisis state are large.

¹⁰ In the derivation in Cúrdia and Woodford (2009), an additional term appears in the loss function relating to resources consumed by the intermediary sector; I here assume those to be negligible, in order to simplify the analysis.

aggregate-supply constraint (2.2). Both the objective and constraint are thus as in standard treatments (such as Clarida *et al.*, 1999) that abstract from financial frictions, with the exception that the exogenous fluctuations in Ω_t result in an additional additive (exogenous) disturbance term in (2.2). Essentially, variations in financial conditions represent another source of “cost-push” disturbances, in addition to the u_t shock already allowed for in Clarida *et al.* (1999).

In this case, as is well known, the first-order conditions for an optimal policy commitment¹¹ imply that the evolution of inflation and the output gap must satisfy

$$\lambda_y y_t - \kappa_y \phi_t = 0 \quad (2.5)$$

$$\pi_{t+1} + \phi_{t+1} - \phi_t = 0 \quad (2.6)$$

in each possible state of the world for all $t \geq 0$, where ϕ_t is a Lagrange multiplier associated with the constraint (2.2) in any given state of the world in period t . (There is also an additional, generally different, constraint linking the initial period inflation rate π_0 and the initial multiplier ϕ_0 ;¹² but we need not be concerned with the form of this additional condition here, as it affects the form of the optimal target criterion for the initial period only).

Elimination of the Lagrange multipliers then implies that the evolution of inflation and output must satisfy

$$\pi_t + \phi(y_t - y_{t-1}) = 0 \quad (2.7)$$

in every period $t \geq 1$, where $\phi_y \equiv \lambda_y/\kappa_y > 0$. Moreover, this condition (plus a modified version of the condition that applies in the initial period only) suffices to uniquely determine the state-contingent evolution of inflation and output.¹³ Hence, satisfaction of the *target criterion* (2.7) is necessary and sufficient for the evolution of inflation and output to correspond to an optimal policy commitment, and the optimal policy can be implemented through a *forecast targeting* procedure, under which each time that policy is reconsidered, the central bank verifies that its intended forward path for policy continues to imply forward paths for inflation and the output gap that are expected (conditional on the economy’s state at the time of the exercise) to satisfy the target criterion at all future horizons.¹⁴

Alternatively, the first-order conditions (2.5) – (2.6) imply that under optimal policy, there must exist a constant price level target p^* such that

$$p_t + \phi_y y_t = p^* \quad (2.8)$$

¹¹ See either Clarida *et al.* (1999) or Woodford (2011a, sec. 1) for derivation of these conditions.

¹² The form of this condition differs depending whether we consider unconstrained “Ramsey policy” or optimal policy “from a timeless perspective,” as discussed in Woodford (2011a, sec. 1).

¹³ That is, there is a unique set of bounded state-contingent paths for inflation and the output gap that satisfy both (2.2) and (2.7) each period, and this is the optimal state-contingent evolution of these variables.

¹⁴ The advantages of forecast targeting as a practical approach to implementation of an optimal policy commitment are discussed in Svensson (2005, 2011), Svensson and Woodford (2005) and Woodford (2007).

for all $t \geq 0$, where p_t is the log of the general price level, so that $\pi_t \equiv p_t - p_{t-1}$. Note that under this formulation, it is possible to write a target criterion with the same form in all periods $t \geq 0$, rather than needing a different criterion for the initial period. A criterion of the form (2.8) implies that (2.7) holds for all $t \geq 1$ regardless of the value of p^* ; it is then necessarily possible to choose the value of p^* so that (2.8) also holds at $t = 0$ under the optimal policy. This alternative formulation of the optimal target criterion – what might be called a flexible price-level target – is particularly convenient when we introduce the additional complications associated with endogenous financial crises.

In the special case that γ_t is unaffected by variations in leverage, then, optimal policy continues to be described by a target criterion that involves only the projected paths of inflation and of the output gap, and that has *exactly the same* quantitative form as in a model without any credit frictions. Monitoring financial conditions is nonetheless necessary for the conduct of monetary policy for two reasons: (i) the state-contingent paths for inflation and output that will be feasible and at the same time consistent with the target criterion will generally depend on the (exogenous) evolution of financial conditions, owing to the “cost-push” effects of financial crises when they occur; and (ii) the interest-rate path required to bring about a given evolution of inflation and output will also depend on financial conditions, owing to the “financial headwinds” terms in (2.1). This simple result is essentially the reason why Cúrdia and Woodford (2009) find that the target criterion (2.7) continues to provide a good approximation to optimal policy even in the presence of (largely exogenous) financial disruptions.

However, matters are more complex if we allow γ_t to be an increasing function of L_t , as assumed earlier. In this case (as shown in the Appendix), the first-order condition (2.5) takes the more general form

$$z_t = \beta \varrho E_t z_{t+1} - \beta \xi X_t, \quad (2.9)$$

where z_t is the expression on the left-hand side of (2.5), and X_t is a variable defined as

$$X_t \equiv \gamma'_t(L_t) \cdot \Delta V_{t+1|t} \quad (2.10)$$

if $\Omega_t = \underline{\Omega}$ (that is, when the economy is in the normal state), while $X_t \equiv 0$ if $\Omega_t = \bar{\Omega}$. Finally, in expression (2.10), the variable $\Delta V_{t+1|t}$ indicates the difference that occurrence of the crisis state as opposed to the normal state will make to the expected continuation value in period $t + 1$, conditional on the state in period t , i.e.,

$$\Delta V_{t+1|t} \equiv E[V_{t+1} | h_t, \Omega_{t+1} = \bar{\Omega}] - E[V_{t+1} | h_t, \Omega_{t+1} = \underline{\Omega}], \quad (2.11)$$

where V_{t+1} is the policymaker’s continuation loss looking forward from period $t+1$ (defined more precisely in the Appendix), and h_t is the state of the world (history of all exogenous disturbances, including the history of regime transitions) in period t . In addition, first-order condition (2.6) continues to apply.

As before, (2.6) implies that under an optimal policy commitment, there must exist a constant log price level p^* such that $\phi_t = p^* - p_t$ for all $t \geq 0$, which in turn implies that

$$(p_t - p^*) + \phi_y y_t = \varkappa_y^{-1} z_t \quad (2.12)$$

for all $t \geq 0$. When γ_t is independent of L_t , (2.10) implies that $X_t \geq 0$ at all times, so that (2.9) can be solved forward to yield the (unique bounded) solution $z_t = 0$ at all times, from which it follows that optimal policy requires that (2.7) be satisfied at all times. But more generally, solving (2.9) forward yields

$$z_t = -\beta \xi \sum_{T=t}^{\infty} (\beta Q)^{T-t} E_t X_T, \quad (2.13)$$

substitution of which into (2.12) yields the more general target criterion

$$p_t + \phi_y y_t + \phi_x E_t \sum_{T=t}^{\infty} (\beta Q)^{T-t} E_t X_T = p^*, \quad (2.14)$$

where $\phi_x \geq \beta \xi / \varkappa_y > 0$. As in the special case, conformity to the criterion (2.14) in all periods is a necessary and sufficient condition for bounded state-contingent processes $\{\pi_t, y_t, L_t\}$ to constitute an optimal policy commitment.

Thus even in the more general case, in which the probability of occurrence of a crisis is endogenous, optimal policy is characterized by conformity to a certain type of flexible price-level target. The difference now is that the target criterion does not depend solely on the paths of the general price level and of the aggregate output gap; it also depends on the projected evolution of another variable, X_t , which for shorthand I shall refer to as the *marginal crisis risk*. As indicated by the definition (2.10), this variable measures the rate at which the expected loss from the occurrence of a financial crisis increases per unit increase in leverage. Under the assumptions that I have made above, the value of this quantity should always be non-negative: equal to zero when the economy is in a crisis state, but always (at least slightly) positive under normal conditions. Even conditional on being in the normal regime ($\Omega_t = \underline{\Omega}$), though, the size of this positive quantity is likely to vary over time. It may be larger than normal either because the amount of damage that a crisis would do (through the distortion of the allocation of resources that will result from a disruption of financial intermediation) is currently greater than usual (a larger value of $\Delta V_{t+1|t}$), or because the amount by which a marginal increase in leverage would increase the probability of a crisis is currently greater than usual (a larger value of $\gamma'_t(L_t)$). If $\gamma_t(L)$ is a strictly convex function, as assumed above, then one reason for the marginal crisis risk to be higher than normal could simply be that leverage L_t is currently higher than its normal level.

3 How much of a change in the policy framework is necessary?

The optimal target criterion (2.14) implies that the central bank should be willing, at least to some extent, to trade off a greater degree of stability of conventional stabilization objectives – namely, price stability and output-gap stability – for the sake of greater stabilization of the marginal crisis risk. Under certain circumstances – specifically, when the current or anticipated near-term marginal crisis risk is unusually elevated – the target criterion implies that an ideal policy would tighten monetary conditions to the point that the price level and/or the output gap undershoot the levels that would otherwise have been considered desirable for these variables. (The target criterion specifies only that there should be undershooting of a certain linear combination of these two variables; but because of the Phillips-curve relation linking short-term variations in these two variables, it is likely that *both* variables would need to undershoot their target paths.) In this sense, the model implies that it is appropriate to use monetary policy to “lean against” a credit boom, even if this requires both inflation and the output gap to be below their medium-run target values for a time.

This statement requires some immediate qualifications. First, the analysis above is purely qualitative; considerable research is still needed to provide a sound empirical basis for a quantitative specification of crucial relationships such as the endogenous transition probability $\gamma_t(L)$ or the law of motion (2.3). Even the correct definition and measurement of the variable L_t in these relationships is far from obvious. I have referred to it as the degree of “leverage” for shorthand, but surely the risk of occurrence of a crisis depends on other aspects of the balance sheets of financial institutions as well, such as maturity mismatch and the degree to which multiple institutions are exposed to the same (or highly correlated) risks. In all likelihood, a model that could be used for practical policymaking would have to replace the scalar variable L_t assumed in the simple exposition above by a vector of financial risk factors; the law of motion (2.3) would have to be replaced by a corresponding equation system. Research should probably focus first on identifying the risk factors that are most important in explaining variations in the endogenous transition probability γ_t ; the approach of Davig and Hakkio (2010) is an example of how this can be done, though they do not consider the predictive value of financial-sector balance-sheet variables. Once the key financial risk factors have been identified, attention can turn to the development of a structural econometric model of the evolution of those variables, with particular attention to the connection between the risk factors and other endogenous variables that are (directly or indirectly) influenced by the central bank’s interest-rate policy. Only with a quantitative empirical model of this kind in hand will it be possible to say anything very specific about the way or degree to which it is appropriate to “lean against” a credit boom.

Indeed, the merely qualitative discussion above does not yet establish how large the variations in the final term on the left-hand side of (2.14) are likely to be, and hence it does not really allow one to say whether a conventional approach to policy (one simply

focused on conformity with a criterion like (2.7)) might not still represent a fairly good approximation to optimal policy. It is certainly possible that, at least over certain periods of time, variations in the forecast of the marginal crisis risk would be fairly minimal, so that in practice a policy based on (2.14) would essentially amount to stabilization of a linear combination of the price level and the output gap. If we suppose that γ_t remains negligible for all values of L_t below some threshold, then $\gamma'_t(L_t)$ will also remain negligible for L_t below that threshold, so that the marginal crisis risk X_t should be minimal as well. If L_t is far enough below the critical threshold to have little probability of crossing it over the horizon that is relevant given the exponentially declining weights in the final term on the left-hand side of (2.14), then the third term in the target criterion might be small and stable for several meetings of the policy committee in a row. Under such circumstances, simple and conventional rules of thumb for monetary policy decisions would likely be adequate. However, even under circumstances of this kind, the more general target criterion (2.14) does not give an *incorrect* signal about whether policy is on track; and reference to the more general target criterion would be necessary in order to answer whether a simpler rule of thumb continues to be adequate or not. It is plausible to suppose that under at least some circumstances, the additional correction for marginal crisis risk *would* be of quantitative significance. At any rate, further efforts to quantify the relations involved in such a calculation would seem appropriate, before dismissing out of hand the possibility that non-trivial adjustment of the acceptable paths for the price level and the output gap might be appropriate at some times.

Nor does the analysis offered here imply in any way that the conventional monetary policy should be assigned the primary responsibility for containing risks to financial stability, so that other regulatory and supervisory safeguards are unnecessary. To the contrary, because the analysis identifies reasons for a tension to exist between the conventional stabilization goals (represented by the first two terms in the loss function (2.4)) and the goal of reducing the distortions resulting from financial crises (over and above their consequences for the stability of inflation and the output gap, as represented by the third term in the loss function), it implies that the existence of additional policy instruments – that could ensure that significant variations in marginal crisis risk never occur, even when conventional interest-rate policy is used purely to minimize the variability of inflation and the output gap – should allow better outcomes on *both* dimensions. Hence the development of such tools, possibly including new instruments of “macroprudential policy” as discussed in Woodford (2011b), is highly desirable to the extent that it proves to be practical. Nonetheless, it cannot be claimed that such tools already exist and have proven their effectiveness, so that there is no ground at present to dismiss the relevance of financial stability considerations for monetary policy deliberations.

In the case that additional macroprudential policy tools (such as variable capital requirements) exist, and can be flexibly adjusted in response to changing conditions, it would be necessary to extend the framework sketched above to allow the law of motion (2.3) and/or the function $\gamma_t(L)$ to be shifted by these instruments of policy. In that case,

an optimal policy regime would involve optimal adjustment of both instruments in response to economic disturbances, and the conditions required for such a joint policy to be optimal could be described by a pair of target criteria, one for each instrument, as in Woodford (2011b). But the target criterion for optimal monetary policy would continue to be of the form (2.14); the intended adjustment of the macroprudential instrument would simply be an additional factor to take into account in forming projections of the future paths of the price level, the output gap and the marginal crisis risk under alternative forward paths for monetary policy. Only under quite optimistic assumptions should one expect allowance for macroprudential policy to completely eliminate variations in projected marginal crisis risk, so that monetary policy decisions can be made without even considering this variable.

Yet while the analysis here suggests that financial stability conditions should be taken into account in monetary policy deliberations – and research on the kind of quantitative models needed to analyze this issue should probably be a large part of the agenda for central-bank research staffs in the near term – it hardly follows that the traditional goals of monetary stabilization policy should no longer be important, or even that inflation-forecast targeting should not still prove useful as an organizing framework for monetary policy deliberations. In the model sketched in the previous section, optimal policy can still be characterized by the fulfillment of a certain linear relationship between the projected paths of three variables, and so a forecast-targeting procedure provides a useful practical approach to the implementation of such a policy. The three variables that must be projected in such a procedure are a price index, a measure of the output gap, and the “marginal crisis risk”; the first two of these are the same two variables as are emphasized in traditional accounts of “flexible inflation targeting” (and in the procedures of forecast-targeting central banks such as the Bank of England, Sveriges Riksbank, and Norges Bank).

It is quite possible that, much of the time, the monetary policy deliberations required by the proposed criterion would be quite similar to those that would be undertaken by a “flexible inflation-targeting” central bank that neglected financial frictions altogether. Under the assumptions made above, γ'_t should be an increasing function of the degree of leverage in the financial sector; but the marginal crisis risk X_t need not be equally sensitive to variations in the degree of leverage at all times. If, as suggested above, the crisis risk is negligible for degrees of leverage below some critical level, then γ'_t (and hence the value of X_t) will be small and relatively insensitive to variations in L_t , as long as L_t remains well below that critical level. At such times, verification that the economy’s projected evolution conforms to the target criterion would reduce to a simple comparison of the projected paths of inflation and of the output gap. Under this conjecture, it would only be at times of particular financial imbalance that the additional term in the target criterion would become a quantitatively significant factor in policy deliberations. At such times, less weight would be put on the traditional stabilization goals, in order to reduce the risk of financial crisis; but this would be done in a way that remained completely continuous with the approach followed in more normal times.

Moreover, even during times when financial stability concerns cannot be set aside, the proposed target criterion would continue to imply a clear medium-run target for the inflation rate; for a commitment to ensure that the economy's projected evolution is consistent with the target criterion at all horizons would necessarily imply that departures of the inflation rate from its optimal long-run level (zero, in the simple model presented here) were purely transitory. In fact, the proposed target criterion implies something stronger: it implies that the forecast of the long-run price level should remain constant over time, so that there is a commitment to *eventually reverse* any changes in the price level that result from temporary departures of the inflation rate from its medium-run target. Thus the inflation target is not merely one that must be satisfied *prospectively*, in the absence of shocks that cannot be foreseen well in advance – it is one that the central bank should commit to fulfill *ex post*, and regardless of the disturbances that may occur, as long as the realized inflation rate is averaged over a sufficiently long horizon. Thus while the target criterion does not involve only the projected inflation rate, it remains true that the policy commitment involves a target for inflation in a sense which is not true for any other variable: the policy commitment about the long run is *only* a commitment about the (cumulative) rate of inflation over the long run, and it is only this variable for which there is a commitment to a definite numerical magnitude which is independent of subsequently realized disturbances.

It might be thought that the credibility of a central bank's commitment to its supposed inflation target would inevitably be weakened by a more complex target criterion of the kind proposed, which makes the justifiable short-run departures from the inflation target depend on additional variables beyond the output gap – and moreover, variables that will likely present even more controversial measurement issues than those connected with the output gap, and that may depart from their normal levels for longer periods of time than has been typical for the output gap (at least, during the "Great Moderation" period in which inflation targeting became popular), so that one might fear that these additional terms in the target criterion could be used to justify departures from the supposed inflation target for years on end. This could easily be a problem, under a certain conception of inflation targeting, under which the target criterion is purely forward-looking and relates only to the rate of inflation that is projected for some fairly short horizon (two to three years in the future), with "bygones allowed to be bygones."

The target criterion (2.14) proposed above is actually quite different, because of the *error correction* implied by a commitment to a price-level target rather than merely to a forward-looking inflation target. Under the criterion proposed above, any departure of the price level from its long-run target path that is justified by an assessment of variations in the projected marginal crisis risk will subsequently have to be reversed. Moreover, a given degree of elevation of the assessed marginal crisis risk will *not* justify ongoing inflation on one side of the long-run target rate, even if it persists for years: it would only justify a given size of one-time increase or decrease in the *price level*, and after this adjustment of the price level has occurred, the persistence of the abnormal crisis risk would require the price

level to continue to grow at a rate equal to the long-run inflation target. Then, when the abnormal conditions eventually subside, even the deviation of the price level from its long-run target path would have to be reversed.

A credible commitment to a (modified) price-level target of the kind proposed here should also help to mitigate a common fear about proposals to use monetary policy to “lean against” credit booms. This is the fear that, if the credit boom occurs during a period when interest rates are being kept low because inflation is undershooting its medium-run target level, tightening policy to restrain the growth of leverage in the financial sector would run the risk of tipping the economy into a deflationary spiral – a risk that central banks treat with exceeding caution, owing to the fear that policy easing will cease to be possible once deflationary expectations set in, due to the zero lower bound on nominal interest rates. (This fear was surely a critical factor in the Fed’s decision during the mid-2000s not to raise interest rates more quickly, despite warnings of a housing “bubble.”) Such a disaster scenario has some plausibility in the case of a central bank with a forward-looking inflation target, for once deflationary expectations result in the zero bound being reached, and as a consequence in the generation of deflation being greater than the central bank would wish, the nature of the target that the central bank would reasonably be expected to pursue later – refusing to allow any excess inflation, even to offset unwanted past deflation – would itself tend to generate a “vicious circle” in which deflation is simultaneously a consequence of and a justification for deflationary expectations (Krugman, 1998; Eggertsson and Woodford, 2003).

But there is much less ground for such fears under a policy commitment of the kind proposed here. With a commitment to an invariant long-run price level target, any period in which the price level falls below its target path should immediately create an anticipation of a future period of higher-than-average inflation to return to the target path. Allowing inflation below the target rate in order to lean against a credit bubble should not create expectations of continuing deflation, because such episodes would predictably be followed by periods of corrective inflation. And even if the zero bound were to bind temporarily, the amount of unwanted deflation that would result should be modest, because the farther the price level falls below the target path, the greater the amount of “catch-up” inflation that should be expected in the future.

I therefore conclude that inflation targeting frameworks can and should be adapted to take account of the possibility of intermittent disruptions of financial intermediation of the kind experienced in 2007-2009. Taking this challenge seriously will require a new research program, in order to put quantitative flesh on the stylized model sketched above. But it should not, in my view, require substantial modification of the fundamental structure of forecast targeting as a framework for making decisions about interest-rate policy, nor abandonment of central banks’ commitment to a quantitative definition of medium-run price stability. These important innovations of the past twenty years are likely to remain highly useful despite the additional challenges that must now be faced. To the extent that fundamental reconsideration is needed, it should be of the interpretation of inflation

targeting as an approach that focuses purely on the prospective rate of inflation a few years in the future (rather than on the cumulative realized increase in prices), and on the length of the horizon over which inflation should be expected to return to the target rate, rather than on the criteria that should determine how large a transitory departure from price stability is justified. These are dimensions on which the theoretical literature on ideal inflation targeting regimes had already argued that actual inflation-targeting procedures could be improved, even before the global financial crisis and even abstracting from concerns for financial stability (e.g. Woodford, 2007). Both the possibility of sometimes hitting the zero lower bound and the possibility of sometimes needing to use interest-rate policy to restrain the growth of risks to financial stability make these reforms of inflation-targeting practice all the more urgent. But the reforms that are needed are a natural extension of the logic of inflation-forecast targeting, rather than a repudiation of its central aims.

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Appendix

Here I explain the derivation of the first-order conditions characterizing the optimal policy commitment. Let us recall that the planner's problem is to choose state-contingent paths for the variables $\{\pi_t, y_t, L_t, \Omega_t\}$ consistent with constraints (2.2) – (2.3) and the transition equation for the regimes so as to minimize (2.4).

This problem can be expressed in a recursive form, if we suppose that in each period t , the planner observes the current values of the exogenous disturbances (including whether a regime transition has occurred), and conditional on these, chooses values of y_t and L_t and a state-contingent commitment specifying a target for π_{t+1} in each of the possible states that may be reached in the following period. These choices must be consistent with equations (2.2) – (2.3) and with the state-contingent target for π_t chosen in the previous period. Under this specification of the planner's strategy set each period, the constraints are all “backward looking,” and it is possible to solve for an optimal policy commitment (equivalent to optimal choice of an infinite-horizon state-contingent plan at some initial date) using dynamic-programming methods.¹⁵

Let $V_t(\pi_t, L_{t-1}; \Omega_t)$ be the minimum attainable value for the continuation loss

$$\frac{1}{2} E_t \sum_{\tau=0}^{\infty} \beta^{\tau-t} [\pi_t^2 + \lambda_y y_t^2 + \lambda_{\Omega} \Omega_t^2],$$

looking forward from period t , conditional upon the current realization of the exogenous disturbances, the inflation target π_t previously committed to for this state, the lagged level of leverage L_{t-1} , and the current regime Ω_t . (The arguments indicating the current realization of the exogenous disturbances have been suppressed, and are instead represented by the time subscript on the function $V_t(\cdot)$.) In such a state, values y_t, L_t and the state-contingent commitment $\pi_{t+1}(\cdot)$ are chosen to minimize

$$\frac{1}{2} [\pi_t^2 + \lambda_y y_t^2 + \lambda_{\Omega} \Omega_t^2] + \beta E_t [V_{t+1}(\pi_{t+1}, L_t; \Omega_{t+1})] \quad (\text{A.1})$$

subject to the inflation pre-commitment π_t , constraints (2.2) – (2.3), and the transition law for the regime Ω_{t+1} . The minimized value of (A.1) is then the value of $V_t(\pi_t, L_{t-1}; \Omega_t)$.

In this recursive version of the problem, the values of π_t and Ω_t are given, so that one can equivalently state the problem as one of minimizing

$$\frac{1}{2} \lambda_y y_t^2 + \beta E[V_{t+1}(\pi_{t+1}, L_t; \Omega_{t+1}) | h_t]$$

subject to the above constraints, where h_t is the complete history of realization of shocks through period t (so that the previous notation $E_t[\cdot]$ can here equivalently be written as $E[\cdot | h_t]$). One can also eliminate y_t as a choice variable by using (2.3) to substitute for y_t as a function of the path of leverage and of exogenous disturbances. The problem can then

¹⁵ See Woodford (2011a) for further discussion and illustration of methods that can be used to characterize optimal policy commitments in models of this kind.

alternatively be stated as the choice of L_t and the state-contingent commitment $\pi_{t+1}(\cdot)$ to minimize

$$\begin{aligned} \frac{\lambda_y}{2\xi^2} (L_t - \varrho L_{t-1} - v_t)^2 + \beta \Gamma_t(L_t; \Omega_t) \mathbb{E}[V_{t+1}(\pi_{t+1}, L_t; \bar{\Omega} | h_t, \Omega_{t+1} = \bar{\Omega})] \\ + \beta(1 - \Gamma_t(L_t; \Omega_t)) \mathbb{E}[V_{t+1}(\pi_{t+1}, L_t; \underline{\Omega} | h_t, \Omega_{t+1} = \underline{\Omega})] \end{aligned}$$

subject to the inflation pre-commitment π_t and the constraint (2.2), where $\Gamma_t(L_t; \Omega_t)$ is the conditional probability of the crisis state occurring in period $t+1$.

Differentiating the Lagrangian for this problem with respect to L_t , one obtains the first order necessary condition

$$z_t + \beta \xi \mathbb{E}_t[V_{L,t+1}(\pi_{t+1}, L_t; \Omega_{t+1})] + \beta \xi \Gamma_{L,t}(L_t; \Omega_t) \Delta V_{t+1|t} = 0 \quad (\text{A.2})$$

where

$$z_t \equiv \lambda_y x_t - \varkappa_y \phi_t \quad (\text{A.3})$$

ϕ_t is a Lagrange multiplier associated with the constraint (2.2), and

$$\Delta V_{t+1|t} \equiv \mathbb{E}[V_{t+1} | h_t, \Omega_{t+1} = \bar{\Omega}] - \mathbb{E}[V_{t+1} | h_t, \Omega_{t+1} = \underline{\Omega}]$$

Similarly, differentiating the Lagrangian with respect to the value of π_{t+1} in any of the possible states of the world in period $t+1$, one obtains a first-order necessary condition

$$V_{\pi,t+1}(\pi_{t+1}, L_t; \Omega_{t+1}) - \phi_t = 0 \quad (\text{A.4})$$

for each possible state in period $t+1$. Note that ϕ_t depends only on the history h_t (as there is only one constraint (2.2) corresponding to each possible history up until period t), as does the variable $V_{t+1|t}$.

Conditions (A.2)–(A.4) are also first-order conditions for a solution to the problem of minimizing (A.1). Applying the envelope theorem to that problem (which defines the value function $V_t(\cdot)$), we can evaluate the partial derivatives of the value function as

$$V_{\pi,t}(\pi_t, L_{t-1}; \Omega_t) = \pi_t + \phi_t, \quad (\text{A.5})$$

$$V_{L,t}(\pi_t, L_{t-1}; \Omega_t) = -\varrho \xi^{-1} z_t, \quad (\text{A.6})$$

where z_t is again defined as in (A.3).

Using (A.5) to substitute for V_π in (A.4), we can alternatively write this first-order condition in the form (2.6) given in the text. Similarly, using (A.6) to substitute for V_L in (A.2), we can alternatively write this first-order condition in the form (2.9) given in the text, where

$$X_t \equiv \Gamma_{L,t}(L_t; \Omega_t) \Delta V_{t+1|t}. \quad (\text{A.7})$$

Thus we obtain first-order conditions (2.6) and (2.9) as stated in the text. Finally, the assumption made in the text about the form of the transition probabilities between regimes implies that

$$\Gamma_{L,t}(L_t; \Omega) = \gamma'_t(L_t),$$

$$\Gamma_{L,t}(L_t; \Omega) = 0.$$

Substituting this for Γ_L , in (A.7), we obtain the definition of the “marginal crisis risk” variable X_t given in the text.

Comment on Michael Woodford, “Inflation Targeting and Financial Stability”*

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Michael Woodford's paper “Inflation Targeting and Financial Stability” presents a case for tighter monetary policy, “leaning against the wind,” in order to reduce the probability of a financial crisis. However, the introduction of financial-stability instruments (macro-prudential instruments) that have a more direct effect on leverage than the policy rate allows monetary-policy and financial-stability policy to be conducted separately, with monetary policy focusing on the traditional objective of stabilizing inflation and resource allocation and financial-stability policy focusing on the objective of financial stability.

Michael Woodford's paper “Inflation Targeting and Financial Stability” Woodford (2012) presents a case for tighter monetary policy, “leaning against the wind,” in order to reduce the probability of a financial crisis. However, the introduction in Woodford's model of financial-stability instruments (macro-prudential instruments) that have a more direct effect on leverage than the policy rate allows monetary-policy and financial-stability policy to be conducted separately, with monetary policy focusing on the traditional objective of stabilizing inflation and resource allocation and financial-stability policy focusing on the objective of financial stability.

As discussed in Svensson (2011), there is a risk of conceptual and practical confusion between monetary policy and financial-stability policy. For instance, it is sometimes stated that the objectives of monetary policy should be expanded to include financial stability and that monetary policy and financial-stability policy should be integrated and conducted together (Eichengreen, Rajan, and Prasad (2011), Eichengreen, El-Erian, Fraga, Ito et al. (2011)). Such suggestions are arguably inappropriate, since they do not take into account the fact that monetary policy and financial-stability policy are distinct and separate policies.

Monetary policy and financial-stability policy are distinct policies with different objectives and different instruments, and in many countries different public authorities have responsibility for them, in the same way as monetary policy and fiscal policy are different policies that have different objectives and instruments, and different authorities responsible

* I am grateful for helpful comments from and discussions with Claes Berg, Per Jansson, Ulf Söderström, Staffan Viotti, and Michael Woodford. The views expressed here are my own and are not necessarily shared by the other members of the Riksbank's Executive Board or the Riksbank's staff.

for them. Fiscal policy has its objectives – such as economic stability, efficiency and an even income distribution – and its instruments – primarily taxation and spending – with the Ministry of Finance and in Sweden, the Riksdag (the Swedish parliament) as the authorities in charge. Monetary policy has its objectives – stable inflation and resource utilisation – its instruments – primarily the policy rate and communication – with the Riksbank as the sole authority in charge. Financial-stability policy has its objective – financial stability – and its instruments – primarily micro- and macroprudential supervision and regulation – with responsibility for this policy divided between Finansinspektionen (the Swedish Financial Supervisory Authority), the Riksbank, the Swedish National Debt Office (SNDO) and the Ministry of Finance. Furthermore, the decision frequency is different. In monetary policy, decisions are often taken 6-8 times a year. In fiscal policy and financial-stability policy, decisions may be taken 1-2 times a year.

Monetary policy is conducted taking the conduct of fiscal policy into account, and vice versa, as in a Nash equilibrium rather than a coordinated equilibrium. I believe that, in the same way, monetary policy should be conducted taking the conduct of financial-stability policy into account, and vice versa. They should be conducted this way regardless of whether the central bank has the sole authority of financial-stability policy or whether it is shared between several institutions.

Importantly, monetary policy and financial-stability policy should not be confused with one another. Confusion risks leading to a poorer outcome for both policies and makes it more difficult to hold the policymakers accountable. Trying to use monetary policy to achieve financial stability leads to poorer outcomes for monetary policy and is an ineffective way to achieve and maintain financial stability.

In a second-best situation, without appropriate supervision and regulation, if the policy rate is the only available tool and there is a trade-off between achieving the monetary-policy objectives and threats to financial stability, that trade-off should be taken into account. Normally, however, the policy rate is not the only available tool, and much better instruments are available for achieving and maintaining financial stability. Monetary policy should be the last line of defence of financial stability, not the first line.

Woodford (2012) sets up a New Keynesian model with credit frictions, a variant of the model in Cúrdia and Woodford (2009). It has an aggregate-demand relation (IS equation) of the form

$$y_t - g_t + \chi\Omega_t = E_t[y_{t+1} - g_{t+1} + \chi\Omega_{t+1}] - \sigma(i_t - E_t\pi_{t+1}). \quad (1)$$

Here y_t is the output gap, g_t is a composite of the various exogenous factors (such as government purchases) that shift the relation between (the marginal utility of) income and aggregate expenditure even in the absence of credit frictions, Ω_t is a measure of credit distortions such as a spread between borrowing and lending rates, E_t denotes expectations conditional on information available in period t , i_t is a short-term nominal interest rate, π_{t+1} is the rate of inflation between periods t and $t+1$, and all variables denote deviations from their steady-state values (so that constants are omitted). Under Woodford's proposed

calibration, the coefficients satisfy $\chi, \sigma > 0$. In the presence of credit frictions, the variable i_t (a weighted average of the interest rates that are relevant for borrowers and savers respectively) is no longer identical with the central bank's policy rate, and this introduces an additional term if the aggregate-demand equation is instead to be written in terms of the policy rate, as in Cúrdia and Woodford (2009). Here that complication is omitted; for the purposes of the present discussion, it suffices that the i_t in (1) is a variable that the central bank can influence via the policy rate.

Under this calibration, real aggregate demand depends not only on exogenous factors (such as the evolution of government purchases) and the expected path of (average) real interest rates, but also on the magnitude of the distortions indicated by credit spreads; other things equal, a larger value of Ω_t will depress aggregate demand in period t .

The model's aggregate-supply relation (Phillips curve) takes the form

$$\pi_t = \kappa_y y_t + \kappa_\Omega \Omega_t + \beta E_t \pi_{t+1} + u_t, \quad (2)$$

where the coefficients satisfy $\kappa_y, \kappa_\Omega > 0$, $0 < \beta < 1$, and u_t is a composite term representing various possible exogenous "cost-push" factors. The credit frictions affect this relationship only through the appearance of the Ω_t term, again reflecting the way that changes in Ω_t shift the relationship between aggregate real expenditure and the marginal utility of income.

The variable Ω_t is assumed to take two values, a low value $\underline{\Omega}$ (a "normal" state) or a high value $\bar{\Omega}$ (a "crisis" state). Let γ_t be the probability of transition from the normal state to the crisis state. Woodford assumes that this probability is increasing in a state variable, L_t ,

$$\gamma_t = \gamma_t(L_t), \quad (3)$$

where $\gamma_t(\cdot)$ is a function that satisfies $\gamma_t(L_t), \gamma'_t(L_t), \gamma''_t(L_t) > 0$. The time subscript on the function allows exogenous shifts in the function over time. The state variable can be interpreted as a measure of leverage in the financial sector. Furthermore, postulate a law of motion for the state variable of the form

$$L_t = \varrho L_{t-1} + \xi y_t + v_t, \quad (4)$$

where v_t is an exogenous disturbance and the coefficients satisfy $0 \leq \varrho < 1$, $\xi > 0$. That is, leverage depends positively on lagged leverage and the current output gap and is also subject to exogenous disturbances. In a more realistic case, the state variable affecting the probability of a financial crisis is a vector that includes not only leverage but, for instance, maturity mismatch and liquidity mismatch.

The social loss function is

$$\frac{1}{2} E_t \sum_{\tau=0}^{\infty} \beta^{\tau} (\pi_{t+\tau}^2 + \lambda_y y_{t+\tau}^2 + \lambda_{\Omega} \Omega_{t+\tau}^2). \quad (5)$$

The first two terms in (5) correspond to the standard objectives of flexible inflation targeting, to stabilize inflation around an inflation target and resource utilization around a sustainable level. The last term represents the welfare effects of the credit frictions. Welfare is lower in the crisis state with a higher value of Ω_t than in the normal state.

Thus, a higher output gap is assumed to increase the probability of a financial crisis. A case for tighter monetary policy, "leaning against the wind," in order to, everything else equal, reduce the output gap and thereby leverage and the probability of a financial crisis obviously follows from these assumptions. Everything else equal, tighter monetary policy will reduce the output gap and thereby leverage and the probability of a financial crisis.

However, the introduction in Woodford's model of financial-stability instruments such as capital requirements, possibly cyclical ones, would allow leverage to be controlled more directly than indirectly and bluntly by the policy rate via the output gap. This modification allows the introduction of financial-stability policy (macro-prudential policy) and suggests that monetary policy and financial-stability policy can be conducted separately, with separate objectives and separate instruments.

Thus, introduce a financial-stability instrument (a macro-prudential instrument), f_t , that has a direct effect on leverage, and assume that the law of motion for leverage is modified to be of the form

$$L_t = Q L_{t-1} + \xi y_t + f_t + v_t. \quad (6)$$

Now we can distinguish monetary policy and financial stability policy. We first write the social loss function as

$$\frac{1}{2} E_t \sum_{\tau=0}^{\infty} \beta^{\tau} (\pi_{t+\tau}^2 + \lambda_y y_{t+\tau}^2) + \frac{1}{2} E_t \sum_{\tau=0}^{\infty} \beta^{\tau} \lambda_{\Omega} \Omega_{t+\tau}^2.$$

Second, we assign financial-stability policy to use the instrument f_t to minimize

$$\frac{1}{2} E_t \sum_{\tau=0}^{\infty} \beta^{\tau} \Omega_{t+\tau}^2 \quad (7)$$

subject to (6). Third, we assign monetary policy to use the policy rate to control i_t and minimize

$$\frac{1}{2} E_t \sum_{\tau=0}^{\infty} \beta^{\tau} (\pi_{t+\tau}^2 + \lambda_y y_{t+\tau}^2) \quad (8)$$

subject to (1) and (2).

For concreteness, assume that there exists a level of leverage, \underline{L} , such that the resulting probability of a financial crisis, $\gamma \equiv \gamma_t(\underline{L})$; is so small that the risk of a financial crisis is not considered a problem. Alternatively, assume that below some level of leverage, \underline{L} , the probability of a financial crisis becomes independent of leverage. Then the function $\gamma_t(L_t)$

has the property that $\gamma_t(L_t)$ takes a minimum level $\gamma_t = \underline{\gamma}$ for levels of leverage less than or equal to \underline{L} , whereas it is increasing and convex for values of L_t above \underline{L} .

$$\gamma_t = \underline{\gamma} \text{ for } L_t \leq \underline{L}, \gamma'_t(L_t), \gamma''_t(L_t) > 0 \text{ for } L_t > \underline{L}. \quad (9)$$

For either of these assumptions, it is then clear that the optimal financial-stability policy is to set f_t so as to keep L_t at or below the level \underline{L} . It follows that the optimal financial-stability policy is to set the financial-stability instrument according to

$$f_t \leq f(y_t, v_t, L_{t-1}) \equiv \underline{L} - \varrho L_{t-1} - \xi y_t - v_t.$$

This keeps the probability of a financial crisis at a small acceptable level or at its minimum level, depending on which assumption is used. Thus, financial-stability policy needs to adjust to past leverage, the current output gap, and disturbances to leverage.

Note that financial-stability policy in the form of $f_t = f(y_t, v_t, L_{t-1})$ in this simple case results in a reduced-form law of motion for L_t that is simply

$$L_t = \underline{L}.$$

In this simple case, financial-stability policy has been able, by adjusting f_t in response to the output gap, lagged leverage (which when this financial-stability policy has been implemented in the past will also equal L), and disturbances to leverage, to change the reduced-form coefficients ϱ and ξ in (4) to zero and has also been able to neutralize the effect on leverage of the disturbances v_t . Financial-stability policy may also employ various measures to reduce the probability of a financial crisis, which can be represented by lowering $\gamma_t(L_t)$ for given leverage. It may also be able to make the probability of a financial crisis less sensitive to the level of leverage by lowering the first derivative, $\gamma'_t(L_t)$. In addition, policy may be able to reduce the impact of a financial crisis on the economy, which in this model would correspond to lowering the level of credit frictions in the crisis state, $\bar{\Omega}$.

This provides an example of how monetary policy and financial-stability policy can be separated, based on the realistic assumption that financial-stability policy has access to instruments that can more directly affect leverage and the probability of a financial crisis than the monetary-policy instrument(s). In this particular example, financial-stability policy needs to take the effects of monetary policy on the output gap into account, since the output gap is assumed in (6) to have an effect on leverage. Monetary policy needs to take the effects of financial-stability policy on financial frictions, Ω_t , into account, since financial frictions enter the aggregate-demand and aggregate-supply curves, (1) and (2). Given that, each policy can be conducted separately, with different objectives and different instruments. This is regardless of whether the central bank is in charge of both monetary policy and financial-stability policy or whether the central bank is in charge of monetary policy only and there is a separate authority in charge of financial-stability policy.

In the realistic case when the state variable affecting the probability of a financial crisis is a vector that includes not only leverage but, for instance, maturity mismatch and liquidity mismatch, it is even more the case that additional financial-stability instruments such as restrictions on maturity and liquidity mismatches are superior to the policy rate in achieving and maintaining financial stability.

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A Swedish framework for macroprudential policy

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Lack of overview of the risks in the financial system as a whole, insufficient tools to counteract those risks and unclear allocation of responsibilities between authorities were circumstances that contributed substantially to the emergence of the global financial crisis. Extensive international work is now in progress to rectify these deficiencies. For example, a completely new policy area, macroprudential policy, is developing. The focus of this is to discover, analyse and counteract risks to the financial system as a whole, unlike traditional microprudential supervision that focuses on the health of individual institutions.

In this article we discuss in detail what macroprudential policy, or the mitigating of systemic risk, is really about. We also discuss a number of criteria that may provide guidance in the choice of a suitable toolkit for macroprudential policy. In conclusion we take an in-depth look at the demands that should be made of an institutional framework for macroprudential supervision in Sweden and analyse the pros and cons of different conceivable models.

1. Background – deficiencies on several levels

Hardly anyone predicted the outbreak of a financial crisis of the proportions that actually took place in 2007/2008. There was certainly no lack of indications that risks in the global economy were increasing: for a number of years before the outbreak of the crisis a buildup of substantial global imbalances could be observed, with large and enduring surpluses in savings in some parts of the world and deficits in others. The surpluses had to be invested and large amounts found their way into the international capital markets. Since the supply of investment capital was good, but interest rates on risk-free assets were low, demand for higher-yield assets increased. Prices on many asset markets around the world increased explosively. Lending expanded considerably, while premiums for credit risk were driven downwards to levels that appeared – and later proved to be – unsustainable in the long term. Hence there was no lack of signs that risks were building up and many people warned of this.

Thanks to Eric Frieberg, Magnus Georgsson, Kerstin Mitlid, Jenny Nordgren, Kasper Roszbach, Per Sonnerby and Staffan Viotti for material and comments. The opinions expressed in this article are the authors' personal opinions and should not be regarded as expression of the Riksbank's stance on the question of how macroprudential policy should be formulated in Sweden.

A. Lack of overview

With hindsight it can be noted that no-one had a sufficient overview of the risks in the financial system, a fact that made it more difficult to understand the seriousness of the imbalances that had built up over a long period. Above all, there was no insight into the domino effect that would ensue if there were to be a drastic and uncontrolled fall in prices on any of the inflated asset markets. Few realised, for example, what repercussions the problems on the American mortgage market would have in the rest of the world. The financial sector had quite simply become too extensive and complicated for an effective overview to be possible with the existing supervisory structure.

B. Lack of action

The signs of increased risks that after all existed did *not* lead to appropriate counter-measures being taken. Since the signs were uncertain it was difficult to raise sufficient support for such measures.¹

A further factor that contributed to passivity was deficiencies in the assignment of responsibilities and authority for financial stability. The financial supervisory authorities have not as a rule had any pronounced systemic perspective to their oversight. Instead, they were primarily focused on the health of individual institutions. On the other hand, the authorities – primarily central banks – which had a more overall systemic and macro perspective in their monitoring of the financial system did not have sufficiently clear mandates to intervene. To this can be added that supervision was mainly conducted on the basis of national mandates and focused on enterprises within the authorities' own jurisdiction. Consequently the authorities' overview of the system and their ability to take coordinated countermeasures deteriorated as the financial sector's internationalisation increased.

C. Lack of effective tools

But even if there had been stronger resolution to take countermeasures, it is doubtful how effective the tools that the authorities had access to would have been. To prevent the emergence of systemic crises it is in fact not sufficient to have tools that focus on the health and behaviour of individual enterprises or actors. The toolbox needs to be supplemented with tools directed at stability in the system as a whole. To some extent existing tools must also be recalibrated to suit broader purposes. It is necessary to take into consideration the *collective* behaviour in the financial sector and the interaction between the financial sector and the real economy in a completely different way than before. This includes counteracting the strong cyclical tendencies that distinguish the financial sector. That is, excessive risktaking in economic upturns and destructive and self-augmenting herd behaviour in contractionary phases. It is also a matter of focusing more on the links

¹ The difficulties of assessing in advance whether strong price growth in a particular market is justified on the basis of fundamental factors or if it is a matter of a "bubble" should not be underestimated.

between different parts of the financial system to reduce the risks of problems being spread within the system.

D. Extensive international reform has been started

In the wake of the crisis, sweeping reforms have been initiated in the international financial supervision and regulation framework. As a complement to traditional institution-focused supervision (microprudential supervision), a framework of supervision focusing on stability in the financial system as a whole (macroprudential supervision or policy) is being developed. This work covers three fundamental components:

The first is the development of methods and forms of cooperation to discover and assess potential threats to stability in the financial system. This includes such things as developing forms of data collection and information exchange between authorities and models that can give early indications of the build-up of risk, as well as different stress tests and contagion models to assess the seriousness of the risks.

The second component concerns the development of different policy tools to counteract and preferably prevent the build-up of systemic risks.

The third component is about drawing up an institutional framework in which responsibility, powers and forms of coordination, decision-making and accountability contribute to making macroprudential policy as effective as possible.

This article focuses on the second and third components of this development work, that is policy tools and the institutional framework within which they are to be used.

But first we need to elaborate on the concept of systemic risk and define in more detail what we mean by macroprudential policy.

2. The dimensions of systemic risk

Systemic risk is the risk of disruptions in the financial system that are serious enough to threaten any of its fundamental functions, i.e. capital mediation, provision of payment services and risk management. Such disruptions could damage the economy as a whole.

A distinction is usually made between two basic dimensions of systemic risk: a **structural dimension** and a **cyclical dimension**.

A. The structural dimension

The structural dimension includes how the concentration of risk and the links between different parts of the financial system at any given time affect the risk of a crisis befalling the system as a whole. The structural dimension is sometimes also called **the cross-sectional dimension**. If a large number of financial institutions have similar exposures, an asset price shock could hit the financial system as a whole very suddenly. But even problems that initially only affect individual institutions can spread rapidly and widely through the financial system as a result of extensive interlinkages between financial institutions, for example through counterparty relations.

Hence the structural dimension of systemic risk is associated with both the concentration of risk in the financial system (exposure to the same types of risk, dependence on the same sources of funding, infrastructure etc.) and the degree of interconnection in the financial system – between different institutions and between different markets – which increases the contagion risk when financial problem clusters appear.

The global financial crisis has shown how extremely extensive contagion effects can be and how difficult it can be to estimate contagion risk in advance. With hindsight it can be noted that the far-reaching securitisation process that was going on long before the crisis led many observers to conclude incorrectly that the system was better diversified – and hence more stable – than it really was.²

Initially during the financial crisis Swedish banks were comparatively mildly affected by the problems that arose in the markets for securitised loans. It was only when Lehman Brothers filed for bankruptcy protection in September 2008 that Swedish banks were drawn into the crisis in earnest. Liquidity in markets of significance for banks' funding deteriorated substantially at that time, which in turn contributed to a deterioration in the functioning of the interbank market. The banks' increased dependence on short-term funding in the global financial markets was of great importance here.

Swedish banks' considerable expansion abroad has also given rise to other, equally serious, contagion risks that could affect the Swedish financial system. For example, Swedish subsidiary banks' extensive lending in euros in the Baltic countries made the banks vulnerable to devaluations in those countries. Thus, there was a risk that problems in the Baltic countries would spread to the Swedish banking system.

B. The cyclical dimension

The cyclical dimension, which is also called **the time dimension**, concerns how risks to the system as a whole can build up over time, either through financial agents' interaction or through feedback between the financial system and the real economy. The crisis and the period that preceded it clearly illustrate the tendency towards excessive cyclical behaviour that often characterises financial markets.

In periods with strong growth, demand normally increases for loans to corporate investment and housing purchases. It also seems common for risk perception to weaken in

2 There had been considerable securitisation of credit risk for several decades in many parts of the world. In the course of time increasingly advanced ways of splitting and repackaging these risks emerged. This also led to the emergence of various artificial intermediaries. In connection with the transformation of credit to traded securities there were also more or less explicit guarantee commitments from the issuers of the original loans. The complicated web of hard-to-value instruments, layers of different intermediaries and ill-defined guarantees made it almost impossible to see where the risks were. When the bottom dropped out of the subprime market, confidence in credit risk instruments in general was affected. The difficulty of determining which investors were risking major losses in their portfolios and which banks had enormous deferred guarantee liabilities meant that many of them found it difficult to obtain renewed funding in the securities markets.

such an expansionary phase. Lenders often relax credit standards and often go far too deep into debt.³

As a rule this means that prices of assets of various kinds, such as property, rise at the same time as risk premiums fall. Competition for profitable transactions increases. The banks expand their balance sheets while trying to increase leverage and finance themselves at shorter maturities. The banks that do not do this are normally punished by the stock market.

But when the cycle turns everyone wants to reduce exposures and sell assets they perceive as particularly risky at the same time. This can be seen as a sound and rational response for individual institutions. It is also a behaviour that is normally encouraged from a microprudential perspective. But when all institutions *simultaneously* sell the same class of asset the prices of these assets will fall dramatically.⁴

This in turn can force the institutions also to sell other assets, which drives down market prices generally. Price volatility and the correlation between different classes of asset then increases. When institutions suffer losses to an increasing extent, liquidity in important markets can disappear. And when at the same time the banks reduce their lending and raise the lending rates, many borrowers may face problems. The number of corporate bankruptcies increases, with resulting increased credit losses for the banks. The adverse feedback loops that arise between the financial and the real economy become a vicious spiral.

The cyclical dimension thus concerns propensities to exaggerate in the expansionary phase (credit expansion, incurring debt) and in the contractionary phase (risk reduction, fire sales) as well as feedback between the financial system and the real economy.

Opinions differ about where excessive cyclical behaviour in the financial sector stems from. Some, such as Shiller (2000), have focused on the irrational element of overenthusiasm that often arises in good times. With an expression borrowed from Alan Greenspan he called the phenomenon "irrational exuberance".⁵ Adopting a similar approach, many people, as once J.M. Keynes did, have recently spoken of the market as being possessed by "animal spirits".⁶

But not everyone is in agreement that the cyclical behaviour is due to the irrational behaviour of the players.

Some economists emphasise instead the dynamic interaction between the price of various assets and the prospects of debt-financing investments in them. Geanakoplos (2010) speaks of "the leverage cycle". According to him, the price of an asset is not only determined by the expected future payment flows, the "fundamentals". Wealth

3 Some Swedish banks' strong credit expansion in the Baltic countries before the crisis can also be seen as an example of disregarding risks in a period of strong growth.

4 This phenomenon can otherwise be seen as reminiscent of Keynes' (1936) savings' (thrift) paradox (when in an economic downturn everyone tries to increase their own savings, total savings in the economy decline).

5 The expression was used by Alan Greenspan in a speech at the annual dinner of The American Enterprise Institute for Public Policy Research on 5 December 1996 in Washington, D.C. The title of the speech was "The Challenge of Central Banking in a Democratic Society".

6 See Akerlof & Shiller (2009) and Keynes (1936).

distribution among various agents, the difference of their perceptions and varying abilities of financing an investment through leverage can have a great effect on the price of an asset. Even if two individuals have access to the same information, according to Geanakoplos, they can have different opinions on the value of an asset. Those who value the asset most highly will buy more of it the better access they have to debt-financing. This means that access to credit has a great effect on the equilibrium price. When leverage increases, prices also rise, and when borrowing opportunities deteriorate a relatively small decrease in expected income flows may be sufficient for the price of the asset to fall drastically.

Other economists, such as Woolley (2010), maintain that it is rather the existence of "principal-agent"-problems that is the most important reason for bubbles and crashes in financial markets. Woolley notes that most financial decisions are not made directly by the end customers/investors, but are delegated to "agents", such as banks, fund managers, brokers and other intermediaries. The ways in which these agents are compensated gives them incentives and time horizons that are not necessarily aligned with those of their clients/principals. For example fund managers are normally evaluated – once or twice a year – on the basis of how well their funds have performed in relation to the "index", that is, a kind of market average. This gives them an incentive to follow the crowd and not diverge too much from others' results rather than seek out any long-term fundamental value. Trend-following strategies, such as "momentum trading", may thus be highly rational from the perspective of the agent.

With such strategies it also becomes natural to try to reinforce a given price trend in various ways. A more powerful lever can be achieved in the strategy, for example by increasing borrowing, raising turnover and using different derivative instruments. An interesting quality of trend-following strategies – unlike strategies that aim to achieve convergence to long-term fundamental values – is that the more people who follow them the stronger they become. According to Woolley, the extensive use of similar procyclical strategies contributes to long-lasting errors in pricing and a more unstable financial system, as well as an inefficient use of resources in the economy as a whole.

With a view that is akin to this, Rajan (2005) maintains for example that the management of a bank, in its capacity of agent for the bank's shareholders, and which is evaluated and rewarded on the basis of the return on the bank's shares, may be tempted in good times to allow the bank to take extra "tail risk", in other words to take risks that have very low probability of being realised, but which would give rise to serious losses to the bank if they did materialise. Offering customers protection against credit losses is an example of a financial service that entails a tail risk for the bank. It gives a good revenue contribution to the bank's profitability "in normal times", while the risk associated with this service easily escapes the shareholders. Since the losses that may arise are only realised extremely rarely, they are not generally identified by conventional risk management models such as *Value-at-Risk*. But when they do materialise they can deal a death blow to the bank, and possibly also to anyone who has relied on a guarantee from the bank.

C. Link between the two dimensions

As has certainly become apparent by this time, the boundary between the structural and the cyclical dimensions is not always clear-cut. Structural problems, such as the difficulty of writing contracts that align agents' incentives with those of their principals, can give rise to cyclical problems. In the same way, cyclical factors can affect the structural side. For example, in an expansionary phase, characterised by strong expansion and high risk-taking, both a greater concentration of risk and more and more complicated links can arise in the financial system. In the search for yields during the run-up to the global financial crisis, a number of new securities and artificial intermediaries were created in the form of various special enterprises in which securities could be grouped and repackaged as new securities. All in all the financial system became more vulnerable, complex and difficult to oversee.⁷

3. The need for macroprudential policy

Systemic risk is not a new subject area. It has long interested many academics and people active in the world of central banking. Nor has it been unknown that traditional financial supervision has found it hard to manage systemic risks. *Macroprudential policy* has been a concept in the world of central banking at least since the end of the 1970s.⁸

One of the reasons for this interest in systemic risk is that many central banks, besides their monetary policy remit, have also long played a role in promoting stability in the financial system. The fact that central banks often play such a role is partly due to their central function in the major payment systems, as well as their unique possibilities of providing liquidity to the banking system and, where necessary, strengthening the functioning of the market. As in macroprudential policy, central banks' financial stability work keeps *the system* in focus. The analytical perspective is, in other words, the same as for macroprudential policy.

As far as Sweden is concerned, the systemic perspective started to find its way into the authorities' monitoring of the financial system in answer to the banking crisis that arose in the early 1990s. The Ministry of Finance, for example, started to review the business regulations for banking operations. Moreover Finansinspektionen (the Swedish Financial Supervisory Authority), besides its consumer protection remit, was later tasked with "promoting stability and efficiency in the financial system". The work of changing the direction of supervision in practice was, however, slow.

It was above all when the Riksbank started to develop an analytical framework for financial stability in the mid-1990s that the systemic risk perspective came into the picture in earnest. Even if the Riksbank does not have an express mandate to promote stability in the financial system, it has been tasked with "promoting a safe and efficient payment system". The Riksbank has interpreted this as a responsibility to promote stability in

⁷ See also Shin (2010).

⁸ See Clement (2010).

the financial system as a whole, with emphasis on the major banks.⁹ This is a natural consequence of the central role of the banks in the payment system and of the special systemic risks associated with the banks' operations.

Since 1997 the Financial Stability Report, published twice a year, has been an essential part of the Riksbank's stability work and an important starting point for public dialogue about risks in the financial system.^{10,11} For example, the Riksbank gave early warnings in that report about developments in the Baltic countries and the unsustainably low premiums on credit risk.

A good analytical framework for identifying and assessing systemic risks is one of the prerequisites enabling the Riksbank and other central banks – in their role as "lender of last resort" – to effectively handle a crisis in the financial system.

But as a rule central banks lack more sturdy tools to *prevent* the build-up of risks that can lead to such systemic crises. The Riksbank, like many other central banks, is reduced to using "moral suasion", i.e. to trying to exert influence through the use of persuasive arguments. Tools of a more sturdy nature, such as the right to issue regulations in the financial area, reside instead with the microprudential supervisory authority.

The political ambition to create a coherent institutional framework with clear mandates for monitoring and suppressing systemic risks was virtually non-existent in the past. Only when systemic risks materialised in the form of the greatest financial and economic crisis since the Second World War did the policy-makers around the world consider it justified to develop macroprudential policy into a new policy area with an appropriate institutional framework and a functional toolbox.

Macroprudential policy could be briefly described as follows:

The objective is to reduce risks to the financial system as a whole and to improve resilience to its disruption, as distinct from microprudential supervision, which is mainly focused on risks in individual financial institutions.

Macroprudential policy does not include crisis management. Even if the work of financial stability is by and large concerned with both reducing the risk of serious systemic crises and minimising the negative consequences if such crises nevertheless arise, it is important to point out that day-to-day macroprudential policy is only concerned with the former, that is the preventive work, even if arrangements for crisis management create the conditions for this work.

In the current situation **tools** for achieving this objective must be specified.

Moreover, **the mandate and responsibility** for macroprudential policy need to be established.

⁹ See Sveriges Riksbank (2010).

¹⁰ Through the Financial Stability Report the Riksbank became a pioneer in publishing such an analysis. Central banks in about sixty countries, as well as international organisations such as the IMF and the ECB, have now followed in its footsteps.

¹¹ Finansinspektionen (the Swedish Financial Supervisory Authority) has published an annual stability report since 2000. In 2009 it was amalgamated with a consumer protection report and called a risk report.

The authority or authorities that are tasked with macroprudential policy will affect and be affected by other policy areas, such as monetary policy, microprudential supervision and fiscal policy, so good forms of coordination and exchange of information with these areas must exist.

The need to develop an entirely new policy area to be able to manage systemic risks is, however, not entirely undisputed. Some critics have maintained that the necessary improvement in systemic risk analysis can be managed within existing policy areas, such as monetary policy or microprudential supervision. According to this view, only clearer objectives and mandates are needed. Others have expressed doubt as to whether macroprudential policy can deliver the desired result, since the type of risk that macroprudential policy is meant to catch is in practice very difficult to identify and assess.

3.1 THE RELATION TO OTHER POLICY AREAS

Let us start by analysing the first part of the criticism, that systemic risk could be managed just as well within the framework of existing policy areas.

A. Monetary policy and macroprudential policy

Many observers consider that an important factor behind the current financial crisis is that interest rates were kept at a low level far too long, not least in the USA. The predominant view up to now, at least before the crisis, was that monetary policy should only react to a rapid increase in house prices and indebtedness if, according to forecasts, this meant a risk of overheating in the economy and thereby far too high an inflation rate. If this is not the case, the central bank should wait and see, but be prepared to rapidly loosen up monetary policy if house prices slump and demand in the economy falls steeply. Hence, according to this view the monetary policy approach to asset bubbles should primarily be to "clean up afterwards".

This view has been called into question more and more, not least since the work of cleaning up afterwards has proved to be potentially rather extensive. This applies particularly if the asset bubble can be linked to credit expansion. In most cases it is such credit expansion – and not asset prices themselves – that is most worrying.

Many people have therefore asked themselves whether monetary policy could be used more actively to dampen an upturn in asset prices by "leaning against the wind". Many central banks will probably also be reviewing their macroeconomic models and specify the role of asset prices in the transmission mechanism.

Even if an expansive monetary policy possibly contributed to the build-up of bubbles in different quarters, many maintain that it was mainly other factors that lay behind the international financial crisis. It was rather the combination of large global imbalances, distorted incentives among the financial sector agents, failures of regulation and supervision, information problems and some specific factors, such as a policy that consciously aimed at increasing home ownership in the USA, which led to the outbreak of the crisis.

It is not likely that monetary policy is the most effective tool in all situations for counteracting the build-up of bubbles and excessive credit growth. Monetary policy risks having too broad an impact, with potentially undesirable effects in sectors that are not overheated. Nor does monetary policy counteract the structural dimension of systemic risk. This indicates that special tools for macroprudential policy are needed.

However, it remains to be seen how well such special macroprudential tools can entirely eliminate the need for monetary policy measures to counteract build-up of systemic risk. In some cases the line between monetary policy and financial stability may be blurred. For example, this is true in turbulent times, when the policy rate approaches zero per cent, and monetary policy must largely be conducted through unconventional means such as purchase of assets ("quantitative easing") or fixed rate lending at longer maturities than normal.

B. Microprudential supervision and macroprudential policy

Microprudential supervision is concerned with identifying and analysing operational and financial risks in individual financial enterprises that can affect their ability to meet their financial obligations. However, the Government's primary focus is not on the enterprises as such. Instead it is the functions the enterprises fulfil, as well as protection to consumers and investors, that are material. Apart from consumer and investor protection, microprudential supervision – just as macroprudential policy – is ultimately aimed at promoting stability in the financial system. (This is true at least for Finansinspektionen, the objective of which is to "promote stability and efficiency in the financial system and ensure effective consumer protection in the financial system".) On the other hand, microprudential supervision and macroprudential policy differ from each other as regards methods and perspective.

Unlike the focus of microprudential supervision on individual enterprises, macroprudential policy is based on a systemic perspective. From that perspective it is important, for example, to analyse the macroeconomic conditions for the financial sector and the financial markets. It is also necessary to analyse how disruptions in the financial sector affect the real economy and how this in turn rebounds on the financial system. Macroprudential policy thus has another analytical focus and requires – to a greater extent than microprudential supervision – well-developed analytical frameworks to study both the macro economy and financial stability, as well as how they affect each other.

A lesson from many financial crises, including the present one, is that the build-up of systemic risk often starts outside the regulated sector, i.e. in enterprises that are not formally subject to supervision (cf. "the shadow banking system").¹² One difficult, but important, task of macroprudential policy is therefore to identify risks that arise outside the perimeter of supervision. In other words, macroprudential policy must be conducted using a wider field of vision than ordinary microprudential supervision.

12 Adrian & Shin (2009), Pozsar et al (2010).

The tools that may become relevant in macroprudential policy are, however, to a great extent the same, or of the same type, as in microprudential supervision, even though they are used in a different way.

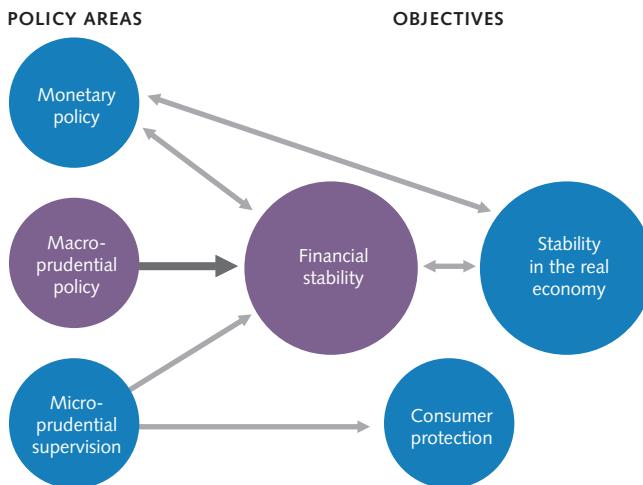
C. The focus of macroprudential policy

We could summarise the area in which macroprudential policy operates as in Figure 1 below. Macroprudential policy can naturally be said to be ultimately aimed at achieving stability in the economy as a whole, but its area of operation is limited to the financial system. The direct objective is to promote stability in the financial system, and a possibly more stable development of the real economy can be seen as an indirect consequence of the fulfilment of this objective. Unlike monetary policy, macroprudential policy is not directly aimed at the real economy.

Even if both macroprudential policy and microprudential supervision ultimately aim to achieve financial stability, the methods for achieving it are different. Microprudential supervision also aims explicitly to protect consumers.

For the most part the different policy areas complement each other, but in some cases a trade-off must be made between them. This is dealt with in more detail in Section 6.1.

Figure 1. The area of operation of macroprudential policy



3.2 WHAT CAN MACROPRUDENTIAL POLICY ACHIEVE?

Let us now discuss the other type of criticism mentioned at the beginning of the section, which is the scepticism about the ability of macroprudential policy to deliver the desired result, since it is so difficult to identify systemic risks.

What macroprudential policy can be expected to achieve is a justified question, since empirical experience of macroprudential policy is limited. In light of this, an alternative way

of trying to answer the question would be to review and consider whether the crisis could have been avoided or alleviated if macroprudential authorities with a clear mandate had existed. Which of the risks that existed, for example in the USA where the crisis started, should such an authority have detected and acted on?

A comprehensive examination of some of the risks that arose in the USA in the years before the crisis gives a mixed result. There were important systemic risks that a responsible macroprudential authority would probably both have observed and acted on, such as the risks that arose in the government-sponsored mortgage institutions *Fannie Mae* and *Freddie Mac*. These risks were identified by the *Federal Reserve*¹³ and it is therefore not unlikely that a macroprudential authority with a clear mandate would have acted more vigorously to manage these risks.

There are also, however, risks that did not lead to problems in the crisis, but which a macroprudential authority might have incorrectly acted on. Examples of these are the US hedge fund developments, which several observers incorrectly predicted would lead to the next financial crisis.

Moreover, there were several important systemic risks that a macroprudential authority would probably not have succeeded in identifying. Among these are the subprime risks, which only became visible in late 2007, even though overvaluation in the housing market had been identified earlier.¹⁴ The supervisory letters written in 2005 and 2006 were rather cautious and mainly focused on consumer protection aspects.¹⁵

Both the fairly mixed outcomes of these counterfactual hypotheses and the limited international experience of macroprudential policy make it difficult to assess what macroprudential policy can achieve.

There are also some fundamentally very difficult assessments that must be made when conducting macroprudential policy. One of these central assessments is to determine whether reaching a specified level of certain indicators reflects increased systemic risk or a basically harmless structural change. For example, it is difficult to assess beforehand whether certain financial innovations are positive for the economy as a whole or not. Macroprudential policy is also made more difficult by lack of data, *inter alia* because some financial activities circumvent regulation and supervision (compare the "shadow banking system"¹⁶) and because banks consolidate their balance sheets globally.

Developing macroprudential policy as a new policy area thus entails major challenges. At the same time we can note that the costs of a global financial crisis are often enormous. Haldane (2010) has estimated the total cost of the global financial crisis in terms of lost growth as roughly between one and five times (!) global GDP.¹⁷

¹³ Statement by Alan Greenspan before the Committee on Banking, Housing, and Urban Affairs in the US Senate on 24 February 2004.

¹⁴ J Dokko et al (2009).

¹⁵ SR 05-11 (<http://www.federalreserve.gov/boarddocs/srletters/2005/SR0511.htm>) and SR 06-15 (<http://www.federalreserve.gov/boarddocs/srletters/2006/SR0615.htm>).

¹⁶ See Adrian & Shin (2009) and Poszter et al. (2010).

¹⁷ Haldane, Andrew G. (2010).

All in all this indicates the importance of trying to prevent the build-up of major systemic risks, but also the need to create realistic expectations among decision-makers and the public about what macroprudential policy can achieve. It will not be possible to prevent all future financial crises, but hopefully a few more than in the past.

Since knowledge and experience of macroprudential policy is still limited, a great deal analytical and empirical work remains to be done. It is particularly important to develop methods of identifying and measuring systemic risk as well as to develop tools for macroprudential policy and assess their effectiveness.

4. A toolkit for macroprudential supervision

Of the tools that may be relevant to macroprudential policy most are fundamentally microprudential tools, though calibrated for macroprudential purposes. Among these tools can be found limits to how much a property may be financed by debt (*Loan-to-Value caps, LTV caps*), borrowing restrictions in relation to disposable income (*Debt-Service-to-Income cap, DSTI cap*), limits on individual large exposures and liquidity ratios.

Today there are only a few tools that can be called “pure” macroprudential tools, that is tools specially designed to tackle systemic risks. These include, for example, countercyclical capital buffers, dynamic provisions and capital surcharges for systemically important institutions. However, it is probable that the number of pure macroprudential tools will increase as development in the area progresses.

Some potential tools would naturally fall within a central bank’s field of operations. For example, it is conceivable to calibrate the banks’ minimum reserve requirements for macroprudential purposes. Theoretically the policy rate could also be used for this purpose. It is another matter how effective these tools would be for macroprudential purposes.

Other conceivable tools would, if anything, be found in the fiscal area. Among these would be deduction rules for borrowers’ interest expenses.

Possible macroprudential tools can thus be found in the province of different authorities, but today most are in the hands of the supervisory authority.

4.1 FACTORS THAT AFFECT THE CHOICE OF POLICY TOOLS

What approach should then be taken in choosing and designing a set of tools for macroprudential policy? There is still no ready-made and generally espoused theoretical framework for this purpose. The choice of tool is, however, largely dependent on both the financial sector’s structure and the relevant context. There are several factors to take into account.

A. *Structural or cyclical problems?*

An important aspect is of course the nature of the specific problem to be counteracted. As has been mentioned, the macroprudential framework aims to counteract two fundamental

types of problem: cyclical and structural. The principles for designing tools for the different problem types may differ somewhat.

When tackling problems of a cyclical nature it is a basic principle to make it more expensive and less attractive in various ways to build up risk in good times, while at the same time wishing to create buffers that can be used in bad times, when the risk materialises.

Examples of tools that can be used to counteract excessive credit expansion and dampen asset price cycles are *countercyclical capital buffers* and *dynamic provisions*. It has been decided to introduce countercyclical capital buffers within the Basel III framework. The idea behind them is to force banks to hold extra capital in good times, so as to be able to reduce capital requirements in a contractionary phase. Dynamic provisions, that have been applied for many years in Spain, mean that the banks must make provisions in their accounts for future expected credit losses.¹⁸ Both tools aim to create buffers in good times, which will soften the fall in a contractionary phase.

To tackle structural problems the ideal is first to measure the institution's individual contribution to the total systemic risk and then calibrate the tool on the basis of these measurements.

Even if some progress has been made in developing measures of systemic risk, a great deal of work still remains to be done before they are practically applicable in macroprudential policy.¹⁹ Examples of tools to counteract structural problems that are currently being developed are *capital surcharges for systemically important financial institutions* (SIFIs), tighter transparency requirements and direct restrictions on certain activities.

In addition there are tools that more specifically tackle structural mechanisms that can augment systemic risks. These tools include for example the *leverage ratio*, i.e. a restriction on a bank's total non risk-weighted assets in relation to its equity. They also include tools to restrict *maturity mismatches*, such as different *liquidity ratios*.

Many tools are flexible in the sense that they can be used for different purposes. Depending on how they are applied, they can either be used to counteract cycles or to influence structural factors.

¹⁸ Even if dynamic provisions did not succeed in dampening excesses in the Spanish credit cycle very effectively, they probably contributed to making the Spanish banks more resilient in the crisis that arose.

¹⁹ For example Adrian and Brunnermeier (2008, revised 2011) develop such a measure on the basis of CoVaR, which is a Value-at-Risk-measure for the financial system, conditional on institutions being in distress.

B. Specific or broad-spectrum tools?

It is also necessary to decide if it is appropriate to use tools with a broad area of impact or tools that are directed towards a specific sub-market, an instrument or an activity.

An example of a tool with a relatively broad impact is countercyclical capital buffers, which are based on total credit expansion and cover all banks. This means the effects of this type of broad-spectrum tool will lie close to the effects of monetary policy.

Broad-spectrum tools have the disadvantage of risking unintended effects in sectors that have no problems. If the problems are clearly concentrated in a single sector or closely linked sectors, more specific tools are preferable. An example of such a tool is the possibility of adapting risk weights of assets to special markets or instruments.

However, it is not certain that there will always be specific tools that are sufficiently effective. In some cases it may be too easy to circumvent them. Credit expansion may, for example, find new channels outside the regulated sector. In such cases perhaps not even countercyclical capital buffers have a sufficiently broad effect, since they only impact banks (cf. shadow banking system).

Other cases where specific tools are less appropriate are when problems initially just happened to manifest themselves in a particular sector, while the real problem is in fact considerably more widespread. It is also conceivable that a specific measure might instead redirect risk build-up to other, possibly even more dangerous sectors.

The conclusion is that there may be a need for both broad-spectrum and more specific tools.

C. Controlling quantity or price?

The tools can be quantitative or price-controlling. *Quantitative* tools are those that set absolute limits for financial agents and force them to act in a certain way. It may be a question for example of introducing rules that set an absolute limit on how much a bank may lend in foreign currency.

By *price-controlling* or incentive-controlling tools is meant tools that instead encourage the agents to restrict their risktaking or otherwise act in a desired way. By using for example fees that make it costly to provide services entailing increased systemic risks, such activities can hopefully be kept within reasonable limits.

Some tools are ostensibly quantitative, but in practice act as a price-control. For example, mortgage ceilings and capital adequacy requirements are expressed as quantitative maximum or minimum requirements, but if anything often work by making certain behaviours more expensive, but without entirely eliminating them. By applying different *risk weights* of capital adequacy for different types of exposure, it is possible to make investments in more risky assets more expensive for the bank than less risky investments.

Economists usually recommend price control rather than quantity control, since price control gives the agents the possibility of weighing costs against expected benefits. The

agents who value for example the possibility of increasing lending sufficiently to pay the extra cost that increased capital requirements entail can then do so.²⁰ As a rule this gives better conditions for effective use of resources in society than a policy that faces all agents with the same quantitative restrictions.

It is not certain, however, that it is precisely the agents that are most sensitive to price control that are the ones that we most want to influence. A quantitative tool includes everyone, for better or worse. In some cases an activity may be so hazardous to society that absolute limits on it are necessary.

The choice between quantitative and price-controlling tools must largely depend on what is most expedient and practical in the particular case, and on the existing experience of the tool in question.

D. Use one or more tools for the same purpose?

There may be more advantage in limiting the number of tools used for one and the same purpose. In the first place communication of policy decisions is simplified if only one or a few tools are in use. In the second place it becomes easier to evaluate the effect of the tool in retrospect and thereby easier to calibrate its use in the future. The costs of regulation are probably also lower.

At the same time single tools may have a limited effect and diminishing marginal benefit. Several tools may be needed to tackle different aspects of the same risk. Several different tools also reduce the risk of attempted circumvention of controls.

To increase the probability of achieving the desired effect there may therefore be greater reason to use several different tools, the greater the uncertainty and the more dangerous the systemic threats are.²¹

E. Static or dynamic application of the tools?

To be able to actively manage credit and price cycles, tools are required that can be applied *dynamically*, i.e. varied over time. More specifically there is a desire to be able to introduce countermeasures in an expansionary phase to dampen some developments, but also to be able to withdraw the measures in a contractionary phase to stimulate the market. The typical example is countercyclical capital buffers.

For such dynamic application to be effective, there must be indicators that can differentiate between real systemic threats and fundamentally justified developments. It is also important to know how long it will take before a policy measure takes effect. If this is misjudged there is a risk that a measure will only start to have an impact when the cycle is already turning.

20 Compare with price-controlling instruments in environmental policy, such as those that allow firms to buy and sell emission rights for a certain amount of greenhouse gases.

21 See for example Brainard (1967).

Static tools, i.e. those that do not change over time, can also to some extent contribute to stabilising asset prices and credit cycles. For example, fixed restrictions on household borrowing may have a price-stabilising effect on the housing market.

If you want to minimise the consequences of sudden and strong asset price corrections it is a good idea to have access to both dynamic and static tools. For example, rules that set limits for credit institutions' or households' borrowing contribute to strengthening the resilience of those players when there are substantial price corrections. In that way the risk of a price fall leading to financial instability or substantial changes in household consumption also decreases. However, dynamic tools have the advantage that they can be corrected in response to how the markets and the economy develop, for example by raising requirements for buffers in the banks in good times and reducing them in bad times.

The conclusion is that both dynamic and static tools may be needed.

F. Automatic application or case-by-case assessment?

Application of dynamic tools of the type mentioned in the section above can be either discretionary or automatic. Application is *discretionary* if it is the responsible authority itself that makes continuous assessments and on the basis of these decides to take measures to steer a certain development in a desired direction.

Automatic tools build instead on measures being taken in accordance with a pre-determined rule. An example of a conceivable automatic tool is a rule that determines how the level of banks' capital requirements is to be adjusted in relation to credit growth in the economy.

Automatic tools are predictable, which facilitates planning and increases legal safeguards for financial sector participants. Another advantage is that being automatic removes some of the authorities' burden of proof and anguish over the need to make uncomfortable decisions.

A disadvantage, however, is that automatic tools reduce precision and can be more indiscriminate than "discretionary" interventions based on assessments of the current situation. Nor is it certain that an automatic tool alone can cover all important risks and imbalances if the tool is based on insufficient indicators. In that case discretionary tools can bring a higher degree of flexibility. The same flexibility can, however, tempt authorities to refrain from action.

Hence there are advantages and disadvantages to both discretionary and automatic tools.

A conceivable way of managing the problems is some form of "semi-automatic" application. For example, similar to what Goodhart (2011) proposes, a formalised decision-making process could be linked to a set of indicators that force authorities to decide whether measures are necessary and report the reasons for their decision (see section 6.2).

In this way predictability could increase while reducing the risk of authorities abstaining from making uncomfortable decisions.²²

5. Possible models

The work of developing a toolkit for macroprudential policy will continue for a long time to come, both nationally and in cooperation at international level. At national level it is also necessary to establish appropriate rules of procedure for macroprudential policy. More specifically, it is necessary to determine which authority or authorities are to be responsible for macroprudential policy and how coordination and decisions on the use of relevant tools should take place. In this section we give a general account of the arguments and recommendations concerning the organisation of macroprudential policy that have emerged to date among a number of international organisations, academics and national bodies.

5.1 IMF: STYLISED MODELS FOR MACROPRUDENTIAL POLICY

In a report, *the International Monetary Fund*, IMF (2011c), describes a number of models for macroprudential policy, created on the basis of surveys in 50 countries. The report distinguishes between the models on five points:

- **Integration of central bank and supervisory agencies.** This can be full, partial (if supervision of banks lies with the central bank) or non-existent.
- **Ownership of macroprudential policy mandate.** Ownership can rest with the central bank, an independent committee or be shared by multiple agencies.
- **Role of Ministry of Finance.** The role of the Ministry of Finance can be active (if it plays a leading role in policymaking or coordinating committees), passive (if it participates in such committees, but has no special role) or non-existent.
- **Institutional separation of policy decisions and control over instruments.** This separation often exists if the responsibility for macroprudential policy lies with a committee or if supervisory functions lie partly with the central bank. If all decisions lie with the central bank or, on the other hand, if different agencies have full responsibility in their sectors, this is not regarded as institutional separation.
- **Existence of separate body coordinating across policies.** When responsibility for macroprudential policy is shared, a separate committee can harmonise different views and coordinate policy and statements.

From the potentially countless combinations the report has created seven stylised models. These are described in Table 1 below.

²² See for example Bank of England (2009) for a more detailed discussion of trade-offs between automatic and discretionary tools ("rules versus discretion").

Table 1. Stylized models for macroprudential policy

| FEATURES OF THE MODEL/ MODEL | MODEL 1 | MODEL 2 | MODEL 3 | MODEL 4 | MODEL 5 | MODEL 6 | MODEL 7 |
|---|---|---|--|--|-------------------|---|--------------------------------------|
| <i>Degree of institutional integration of central bank and supervisory agencies</i> | Full (at a central bank) | Partial | Partial | Partial | No | No (Partial*) | No |
| <i>Ownership of macroprudential policy mandate</i> | Central bank | Committee "related" to central bank | Independent committee | Central bank | Multiple agencies | Multiple agencies | Multiple agencies |
| <i>Role of MOF/treasury/government</i> | No (Active*) | Passive | Active | No | Passive | Active | No |
| <i>Separation of policy decisions and control over instruments</i> | No | In some areas | Yes | In some areas | No | No | No |
| <i>Existence of separate body coordinating across policies</i> | No | No | No (Yes*) | No | Yes | Yes (de facto**) | No |
| <i>Examples of specific model countries/regions</i> | ► Czech Republic ► Ireland (new) ► Singapore* | ► Malaysia ► Romania ► Thailand ► United Kingdom (new) | ► Brazil* ► France (new) ► United States (new) | ► Belgium (new) ► The Netherlands ► Serbia | ► Australia | ► Canada ► Chile ► Hong Kong SAR* ► Korea** ► Lebanon ► Mexico | ► Iceland ► Peru ► Switzerland |

Source: IMF.

The IMF report discusses in some detail the advantages and disadvantages of the different models. An important trade-off is that between centralisation (often to the central bank) and more decentralised responsibilities.

Models 1, 2 and 4 give substantial power to the central bank. One advantage is that the central banks already have a systemic and macro perspective in the analytical framework. Another advantage is that it will be easier to take action when the need for external coordination is limited. The central banks' independence of the political system also makes it easier to take unpopular decisions.

The drawback is that the central bank will grow – macroprudential policy may come into conflict with the monetary policy remit and the central bank's economic-political power may well become too great.

For their part, models 5 and 6 require effective coordination. If this exists, a clear focus on macroprudential policy can be established, with clear division of responsibilities between each institution. The risk is that coordination will be ineffective. In that situation macroprudential policy will lack its own instruments, while those in charge may afford lower priority to macroprudential policy in favour of their other objectives.

5.2 GOODHART AND ROCHE

Goodhart and Rochet (2011), who have made an evaluation of the Riksbank's monetary policy and financial stability work, discuss four possible models for macroprudential policy in Sweden:

- 1. Macroprudential policy as a shared responsibility between several agencies.** The authors envisage the establishment of a systemic risk council in which the Riksbank, Finansinspektionen, the Ministry of Finance and the Swedish National Debt Office would exchange information and cooperate. This model is close to the agreement that exists today between these four agencies for the purpose of promoting financial stability and facilitating crisis management. The disadvantage of the model is that conflict management is made more difficult when there is no participant with clear responsibility. Goodhart and Rochet leave the issue of who should lead the work – the Governor of the Riksbank, the Director General of Finansinspektionen or the Minister of Finance – open.
- 2. A separate macroprudential agency.** The authors believe that establishing another agency would entail extra costs and a complicated structure.
- 3. The central bank in charge of macroprudential regulation, with a separate microprudential regulator.** Reported advantages are that the solution would build on the expertise and staff already present in the Financial Stability Department of the Riksbank and would thus economise on resources and personnel. The model would furthermore give more influence in the European Systemic Risk Board, ESRB, since the Governor of the Riksbank automatically has a voting right in that organisation. Disadvantages specified are that the Riksbank may have too much power and that it may conflict with monetary policy objectives.
- 4. The central bank in charge of both macroprudential and microprudential regulation, with a separate financial product safety regulator.** The model gives advantages through economies of scale and synergies and may make it easier to recruit and retain staff. The disadvantages are that the Riksbank's power would increase even more, while the Riksbank could be exposed to legal and other risks.

Goodhart and Rochet conclude that it is mainly the first and third options that should be considered as far as Sweden is concerned, but they do not specify any clear preference between them.

5.3 FISCAL POLICY COUNCIL

The proposals the Fiscal Policy Council (2011) put forward are to some extent similar to those of Goodhart and Rochet. The Council considers that the framework for financial stability needs to be strengthened and proposes two alternatives.

In the first alternative the Riksbank is given greater responsibility and possibly an increased arsenal of tools. Arguments put forward for this alternative are that the Riksbank

already has powerful monetary policy instruments, is in immediate contact with financial institutions, is responsible for and has best analytical capacity concerning financial stability and already publishes a Financial Stability Report. The counterarguments include that financial stability may come into conflict with monetary policy, that there is a risk of too far-reaching consensus with the financial industry and that the Riksbank already has great power.

In the second alternative, a financial stability council is to be established, tasked with analysing systemic risks and proposing measures. The Fiscal Policy Council's proposal seems to go further than for example the first proposal of Goodhart and Rochet (above), or the IMF's (below) and refer to an authority with its own Director General, even though the Council's only powers would be to report their analysis and recommendations. In that way an actor with an unambiguous focus on systemic risk would be created, which can function as an active warning voice and become yet another participant in the economic-political debate. Among the disadvantages are the facts that the council's secretariat would entail duplication of analytical capacity, that three authorities may be too many, that the Riksbank may feel less responsibility for financial stability and, not least, that the council would lack power to back its recommendations.

5.4 THE IMF PROPOSES A SYSTEMIC FINANCIAL STABILITY COUNCIL ALREADY IN THE SHORT TERM

The IMF (2011a) proposed at the time of its assessment of stability in the Swedish financial system in spring 2011 that a *Systemic Financial Stability Council* be set up at the highest level. The IMF gave this highest priority, and considered that it should be set up as soon as possible (within about a year). The IMF proposes that the Riksbank, Finansinspektionen, the Ministry of Finance and the Swedish National Debt Office be given places on the Systemic Financial Stability Council, together with independent participants that do not represent any government agency. The IMF also considers that the Governor of the Riksbank should chair the council.

The IMF considers that the council should be consultative rather than have its own tools at its disposal. The council should possibly be accountable to the Swedish parliament, Riksdagen. This seems to be similar to Goodhart's and Rochet's first proposal.

It should be pointed out that already now a Stability Council has been set up through an agreement between the Riksbank, Finansinspektionen, the Swedish National Debt Office and the Ministry of Finance to *coordinate management and preparations for handling of financial crises*. According to the IMF, however, this Stability Council for crisis management should not be identical with the cooperation council proposed for monitoring systemic risk.

Pending a decision on a long-term organisational solution for macroprudential policy in Sweden, the Riksbank and Finansinspektionen set up a Council for cooperation on macroprudential policy in January 2012.²³ The cooperation is to be seen as a complement

²³ Sveriges Riksbank (2012).

to the Stability Council for crisis management. It is to discuss assessments of systemic risks and macroprudential policy issues. The introduction of the council does not, however, alter the independence, responsibility and decision-making rights of the respective authorities with regard to their tasks.

5.5 RECOMMENDATION OF THE EUROPEAN SYSTEMIC RISK BOARD

The European Systemic Risk Board, ESRB, published a recommendation on the macro-prudential mandate of national authorities in January 2012. This points out the importance of EU Member States designating an independent authority which will have a clear responsibility for macroprudential policy and appropriate instruments at its disposal. The purpose of the recommendation is to contribute to an effective macroprudential policy in the EU as a whole. The ESRB can issue non-binding warnings and recommendations, but it is the Member States that decide on measures and implement them. Consequently, it is central to have clear national mandates for macroprudential policy.²⁴

The ESRB recommends to the Member States that the objective of macroprudential policy should be to contribute to the safeguard of the stability of the financial system as a whole. Macroprudential policy measures must be possible to take either on the initiative of the macroprudential authority or as a follow-up to warnings or recommendations from the ESRB.

As regards organisation, the ESRB recommends that an institution or a board, composed of the authorities whose actions have a material impact on financial stability, should be responsible for national macroprudential policy. The ESRB also recommends that the central banks should play a leading role in this work.

The recommended tasks of the macroprudential authority are identifying, monitoring and assessing risks to financial stability and taking measures to prevent and mitigate these risks. Moreover, the macroprudential policy authority is also to have control over appropriate instruments to achieve its objectives. Where necessary, clear and rapid procedures for assigning instruments to the macroprudential authority should also be established.

As regards accountability, it is recommended that the macroprudential authority be operationally independent and accountable to the national parliament. In relation to this, the ESRB recommendation emphasises the importance of transparency. The macro-prudential authority is to make public the strategy for macroprudential policy, as well as its decisions and their motivations.

²⁴ The examination of the ESRB recommendation is not comprehensive. For further information see "Recommendation of the European Systemic Risk Board of 22 December 2011 on the macro-prudential mandate of national authorities (ESRB 2011/3)".

6. Motives for various actors' participation in a macroprudential authority

As has been shown there are a number of conceivable models for the institutional framework. The factors that may need to be taken into consideration in the choice of institutional framework and the actors that should play a role in it include the following:

1. The existence of potentially conflicting objectives and synergies between the different policy areas
2. The relative importance of independent decision-making and democratic control
3. Implications for Sweden's international influence.

6.1 THE EXISTENCE OF POTENTIALLY CONFLICTING OBJECTIVES AND SYNERGIES BETWEEN THE DIFFERENT POLICY AREAS

A. Trade-offs between macroprudential policy and monetary policy

In general, macroprudential policy objectives and monetary policy objectives are mutually complementary. Price stability contributes to financial stability in several ways. Firstly, a credible monetary policy with stable inflationary expectations contributes to stabilising economic activity in general, which also benefits stability in the financial system. Secondly, stable prices counteract the development of unforeseen price changes leading to financial strains and potential suspension of payments that can upset stability in the financial sector.

Conversely, a stable financial system enhances the effectiveness of monetary policy. An effective financial system is important to allow monetary policy signals to have a good impact on the real economy. Measures to strengthen stability in the financial system also reduce the risk of disruptions that spill over to the real economy.

But situations can also arise in which stability objectives and monetary policy objectives are not in agreement.

For example, in an environment with stable prices and low long-term interest rates financial imbalances can arise that are a threat to financial stability. Such an environment could become a breeding ground for such things as underpricing of risk, excessive debt and asset bubbles. In the short and medium term perspective a conflict could thereby arise between the objective of maintaining stability in the financial system and the monetary policy objective.

Another example is that of situations in which inflationary pressure increases as a result of something like severe oil and raw material price shocks, while at the same time the financial system is exposed to increasing strains. In such a situation it may be relevant to weigh conflicting measures against each other; both those that dampen inflation and those that promote stability in the financial system, and reduce the spill-over effects in the real economy.

Even if the objectives of monetary policy and macroprudential policy in the long term are compatible with each other, in the short or medium term similar trade-offs may arise as exist between monetary policy and fiscal policy.

Of course synergies may also exist between the two policy areas. If there are specific macroprudential tools at hand to cool down an overheated market, it may not be necessary to the same extent to take these overheating problems into account in monetary policy considerations.

B. Trade-offs between the macroprudential policy and microprudential supervision perspectives

That stability in the financial system benefits from security and stability in individual institutions may sound like a truism. But even if the micro and macro perspectives mostly complement each other, the differences in focus and methods can mean that trade-offs must be made between the two perspectives. Different ways of acting, which for an individual financial institution seem to be highly rational and reasonable from the point of view of risk, may in fact taken together undermine stability in the financial system as a whole. Let us illustrate this with an example.

A typical microprudential rule is the requirement of financial institutions to set aside considerably more capital for an asset with a low credit rating than for an AAA asset, for example. (Another way of expressing this is that assets with a greater risk are assigned a higher risk weight than lower risk assets).

But assume that an economic recession leads to a decrease in the credit rating for a particular asset and that all holders try to sell the asset at the same time so as to avoid higher capital adequacy requirements. The result will be that the price of the asset plummets, making it more difficult for the issuer to finance itself by issuing new securities. The issuer thus faces liquidity problems and ultimately risks insolvency. The asset's credit rating thus falls even more, giving rise to further selling by financial institutions to meet the capital adequacy requirements.

In the resulting turbulence, the risk management systems of the financial institutions also react by recommending an increase in capital to cover the total exposures. This means that the institutions are forced to sell other assets as well, which in turn leads to a general fall in prices, increased price volatility and increased securities market correlation. The risk level measured in firms increases further, and the downward spiral of sales, falling prices and liquidity problems continues.

Microprudential rules that originally seemed very reasonable for individual institutions can thus contribute to turning initially relatively isolated problems into a serious systemic crisis. The notion that the financial system would always be more secure just because individual institutions behave with greater risk awareness and prudence is in other words, wrong, a "fallacy of composition". As we have done earlier in this article, we can draw a parallel to Keynes' (1936) savings paradox ("paradox of thrift").

C. Trade-offs between macroprudential policy and fiscal policy

Fiscal policy measures can have great significance for financial stability, even if the primary purpose of the measure is often something else. But even if macroprudential policy and fiscal policy in the best case contribute to economic stability, conflicts can of course arise between financial stability objectives and other political objectives.

Fiscal policy arrangements, such as taxes and tax deduction rules, which are primarily designed from the perspective of growth or distribution, can affect financial stability. For example, tax deduction rules for interest expense that are too generous could lead to borrowers borrowing too much.

Political initiatives, such as stimulating home loans, can, as was the case in the USA, lead to far too much risktaking in granting credit (and a debt trap for the borrowers).

D. Implications for the institutional framework

When different policy areas overlap so that measures on one front affect decisions on another – either by counteracting or augmenting their effects – it is desirable to achieve some form of coordination. This can be done in different ways.

One way is to **internalise** the decisions, i.e. collect the decisions on different policy areas within one and the same body.

Another way is to use some form of **joint decision-making** or consultation that entails actively weighing different objectives or interests against each other.

In some circumstances, particularly when it is desirable that the decisions are made without political influence, joint decision-making may, however, be less appropriate. A typical example of an area where the need for independent decisions is well-established and where coordination with other policy areas, particularly fiscal policy, is at present conducted “at arm’s length” is monetary policy. Such **coordination “at arm’s length”** means for example that the Executive Board of the Riksbank may take fiscal policy conditions into consideration in its monetary policy decisions without needing to practice any form of active consultation with the Ministry of Finance. Nor does the Ministry of Finance need to seek active consultation with the Riksbank.

6.2 THE RESPECTIVE IMPORTANCE OF INDEPENDENCE AND DEMOCRATIC CONTROL

Macroprudential policy will probably in many cases be a matter of trying to prevent excessive credit expansion, generally or in a specific sector. Such expansion risks leading to “bubbles”, which – when they burst – can cause financial instability and major costs to society. A tool that may be considered to prevent the emergence of bubbles is, for example, a loan-to-value cap. Anyone introducing such measures will not be winning any popularity contests (except possibly right after a major economic crisis). Consequently,

macroprudential policy is often said to be about "*taking away the punch bowl just as the party gets going...*".²⁵

In other words there are – just as for monetary policy – good arguments for taking decisions on macroprudential measures in a forum with some distance to the political sphere. To be able to establish such a forum, accountability is necessary, which would require that it is possible to evaluate how well the task has been executed. This is, however, much more difficult to do for macroprudential policy than for monetary policy.

For monetary policy we have in Sweden mainly *one* quantified target (for inflation) and mainly *one* tool (the interest rate). In addition, forecasts are made for inflation development and there is a relatively good understanding of the transmission mechanism. This is missing when it comes to macroprudential policy. There is no generally accepted quantification of the objective (financial stability), a wealth of conceivable tools could be used, there are no forecasts for financial stability and knowledge of the transmission mechanism is limited.

However, there are various ways of trying to improve accountability. Goodhart (2011) proposed that instead of targets "presumptive indicators" could be used. His idea is that fixed threshold values should be set for some measures that are important for macroprudential policy, such as credit growth in the banking sector, the rate of price increases for housing/commercial property and the development of the *leverage ratio*.

When for example two of these indicators are exceeded there is to be a statutory requirement for the person in charge of macroprudential policy to act, or explain why no action is being taken ("comply or explain"). The latter could be done by means of a public letter to the responsible authority, for example. This system would make it somewhat easier to demand accountability. In addition it would contribute to reducing the problem of tendencies towards passivity, "inaction bias".

It is also of course conceivable to have a "comply or explain" mechanism linked to other indicators than exactly those that Goodhart proposes. For example, it would be possible in principle to use increased concentration of exposures or sources of funding in the financial system as indicators of the build-up of structural risks.²⁶

Clear legislation on the tools that may be considered for use is also central to improving accountability. There are in fact different views on how the toolkit for macroprudential policy should be designed and distributed. Some people argue that it is important for the macroprudential body to have its own tools. The typical example named in this context is countercyclical capital buffers, but other tools, such as capital surcharges for systemically important banks and liquidity ratios, are also discussed. Others believe that the majority of tools that may be considered are those that microprudential supervisory authorities have at their disposal today. The same tools can then be used in both microprudential supervision and macroprudential policy. From this point of view the purpose of the measure will be decisive for how it is classified.

²⁵ The expression is usually ascribed to William McChesney Martin, Jr., who was the Chairman of the Board of Governors of the Federal Reserve System between 1951 and 1970.

²⁶ Of course much work still remains to develop such indicators.

The discussion of macroprudential policy as a policy area is still new. The development of new tools and analysis of the effectiveness of the tools may therefore be expected to continue for many years to come. The toolbox could reasonably be adapted in view of the lessons learned both nationally and internationally.

The structure chosen for the *Financial Policy Committee*, FPC, of the Bank of England in the UK offers a solution to the above-mentioned problem. The FPC can both **decide** on how and when certain tools classified as macroprudential tools are to be used, and give **recommendations** about other tools. *HM Treasury* must give its approval for the FPC to add an instrument to the box of macroprudential tools. In this way flexibility is created, while the decision-making procedure contributes to legitimacy.

Finally, accountability can be improved by requiring far-reaching transparency. Conceivably the same forms for reporting as for monetary policy could be used for macroprudential policy. Important components could be regular reports explaining the background to macroprudential decisions and describing the assessment of risks to the financial system, published minutes of meetings (probably with some time lag) and participation in hearings in the Riksdag Committee on Finance.

6.3 IMPLICATIONS FOR SWEDEN'S INTERNATIONAL INFLUENCE

Extensive international analytical work will be conducted in the area of macroprudential policy in the next few years, not least at the *International Monetary Fund*, IMF, in Washington, where the Riksbank participates, and at the *Bank for International Settlements*, BIS, in Basel, where both the Riksbank and Finansinspektionen participate.

The area also took on a very important European dimension when the *European Systemic Risk Board*, ESRB, was established in Frankfurt in January 2011. This body is tasked with issuing warnings and recommendations for remedial actions if it identifies threats to stability of the financial system in the EU. A "comply or explain" mechanism is linked to the recommendations. This means that the recipient of a recommendation is expected to comply with it or otherwise explain non-compliance. To get a good framework for macroprudential policy in place in Europe it is also necessary to draw up a good and strong framework for macroprudential policy at national level. This is the level at which macroprudential policy decisions must be made and the tools are to be found (see also section 5.5).

Another European body of relevance to macroprudential policy is the *European Banking Authority*, EBA, which is responsible for stress tests at European level, in cooperation with the ESRB. Furthermore, the *European Central Bank*, ECB, and the national central banks in the EU conduct extensive analytical work on macroprudential policy through a common research network.

Being able to participate actively in international cooperation on macroprudential policy issues is important for a country such as Sweden, which has far-reaching cross-border integration of financial activities. The most important international cooperation body for macroprudential policy issues for Sweden is the ESRB, since it gives us the opportunity

to influence the warnings and recommendations that are issued in Europe. These may of course also apply to Sweden.

The ESRB is also the natural forum in the EU when establishing principles for the use of new macroprudential policy tools with cross-border effects, such as countercyclical capital buffers.²⁷ Since a bank's buffer level is dependent on the buffer levels in the countries in which it operates, there are good reasons for trying to harmonise the principles for how the national buffer levels are set.

In the ESRB work the central banks have the greatest influence. The central bank governors have voting rights on the Board, though the heads of the supervisory authorities also participate in the work. The Steering Committee, which monitors the progress of the ESRB's ongoing work and prepares the decisions by the Board, includes some central bank governors (the Governor of the Riksbank is currently one of them), the heads/chairs of a number of European bodies and a few academics. The ESRB also has an Advisory Technical Committee that reflects the composition of the Board, but at a lower level. The Governor of the Riksbank currently chairs the Committee, which has also been given a central role.

The ESRB is a fairly recently established body, but it already conducts extensive work to identify and analyse risks that may affect stability in the financial system of the EU. Following the meetings of the Board, the ESRB chair or vice-chair held press conferences and reported the ESRB's view of the most important threats to stability in the EU financial system. Up to now the ESRB has also issued three public recommendations; on lending in foreign currencies, on US dollar denominated funding of credit institutions and on the macroprudential mandate of national authorities (see also section 5.5).

Moreover the ESRB has managed to work on several other issues of interest to Sweden. The ESRB has, for example, examined the emerging EU legislation for banks, infrastructure and insurance. In this work the ESRB has adopted the line that legislation should provide scope to national authorities to establish stricter rules than are decided at EU level, for example as regards capital adequacy requirements for banks.

6.4 CONCLUSIONS

We have shown that there are potentially conflicting objectives between macroprudential policy and the monetary policy, microprudential supervision and fiscal policy areas. In all three cases the natural approach is that those responsible for the different policy areas must take macroprudential policy as a given and vice versa.

The analysis also indicates that the Riksbank should play an important role in macro-prudential policy. In the first place, the analytical perspective of macroprudential policy lies close to that of both the monetary policy analysis and the financial stability analysis already being conducted. In the second place, the Riksbank participates actively in the international

²⁷ The Basel Committee on Banking Supervision has made a decision to successively introduce this macroprudential tool at national level during the period 2016-2019.

bodies where most analytical work concerning macroprudential policy will be conducted in the next few years. The ESRB is in a special position here. In the third place, the importance of the fact that decisions can be made independently of the political sphere indicates that the Riksbank should play a central role.

At the same time Finansinspektionen should play an important role in macroprudential policy. The main reason is that Finansinspektionen currently has most of the tools that may be used in macroprudential policy. In addition Finansinspektionen makes some overall analysis of financial stability and has operative knowledge and practical experience of regulation and implementation of supervisory measures.

Consequently, a reasonable conclusion is that both the Riksbank and Finansinspektionen should play central roles in macroprudential policy.

In a *crisis management phase* the Ministry of Finance would also play a clear role, since measures that could affect the central government budget may then be under consideration. Likewise the Swedish National Debt Office would have an important function as state aid agency. As has been mentioned, since 2008 there has been a financial stability council for financial crisis management established through a Memorandum of Understanding between the Riksbank, Finansinspektionen, the Ministry of Finance and the Swedish National Debt Office. These four authorities meet at least twice a year to discuss preparedness for financial crisis management.

In the every-day *preventive* work that a macroprudential body is intended to carry out, it is, however, difficult to see a clear role either for the Ministry of Finance or the Swedish National Debt Office. On the contrary, there may be reason to keep the political system at arm's length from decisions on macroprudential policy and the Swedish National Debt Office has no obvious role to play in this work.

Apart from the authorities, a number of independent members, such as academics and people with experience of the industry – though not active industry representatives – could contribute complementary perspectives and angles of approach.

In summary, a reasonable point of departure for continued discussions seems to be that macroprudential policy should be exercised by a body in which both the Riksbank and Finansinspektionen play prominent roles, referred to below as a *macroprudential council* (the Council). (We will illustrate alternative organisation models in section 8). In addition, it may be justified to involve independent members. However, it is difficult to find strong motives for the active participation of the Ministry of Finance or the Swedish National Debt Office.

7. Considerations in the choice of institutional model

The next question is how such a macroprudential council should best be designed. It is important to find the structure that creates the best conditions for both identifying threats to stability in the financial system and for counteracting them. The structure should also be as cost-effective as possible for society. To find that structure we first need to discuss the

tools, mandate and forms of decision-making of the Council, as well as the legal conditions for its operations and funding.

A. What should be the tools of the Council?

As pointed out earlier, certain “pure” macroprudential tools will be introduced in the next few years. The *Basel Committee on Banking Supervision* within the Bank for International Settlements (BIS) has for example decided to introduce countercyclical capital buffers and special surcharges for global systemically important financial institutions, SIFIs. It is highly likely that further macroprudential tools will be developed in the course of time, since a lot of research and development work is being conducted in this new policy area.

Many of the already existing tools that could be used for macroprudential purposes exist in Finansinspektionen’s toolbox. This applies for example to capital adequacy requirements, risk weights, liquidity buffers, mortgage ceilings etc.

The Riksbank could also potentially be given tools that can be used for macroprudential purposes. For example the possibility of using minimum reserve requirements to promote financial stability has been discussed.

Other bodies, such as the Swedish Competition Authority or the Swedish Consumer Agency also have tools that could be used to reduce the threats to financial stability.

B. What decision-making powers should the Council have – and how is accountability affected?

One basic question is how far the Council’s mandate is to extend. Should it be able to decide, i.e. issue binding instructions on, concrete macroprudential policy measures, issue non-binding recommendations, or only be a discussion club?

Since there is a tendency towards passivity in macroprudential policy it is important to create structures that facilitate prompt decision-making. This would suggest that the Council should have its own decision-making powers with the right to issue binding instructions. If there is a council with decision-making powers, this also shows clearly that macroprudential policy is a separate policy area, which has a responsible body with its own tools. The tools on which the Council could issue binding instructions are the “pure” *macroprudential tools* discussed above. These tools should also be clearly specified in law.

There will only be a few of these “pure” macroprudential tools, at least in the next few years. There are therefore reasons to discuss whether a decision-making council should not also have the possibility of influencing the use of *other tools* to the extent they can be used in macroprudential policy. This mainly applies to the tools that Finansinspektionen has. If the Council were to get direct decision-making powers over these tools the boundary between the Council’s and Finansinspektionen’s mandates would, however, become unclear. At the same time it would be unfortunate if the Council did not have the possibility of influencing their use, if they are effective in reducing systemic risk. One way of balancing these various considerations would be to give the Council a mandate to

recommend to different authorities, such as Finansinspektionen, the use of traditional tools for macroprudential purposes. A "comply or explain" mechanism could be linked to the recommendations.

Another – and opposite – alternative would be to create a council that only constitutes a discussion club. This would certainly reduce the problem of conceivable tools being in the domain of several different authorities, since each actor would then have to act within the framework of its own mandate with its own tools. However, at the same time such a structure risks creating an unclear distribution of responsibilities, and in the worst case, an unfortunate interplay between the actors involved. This may for example result in no-one acting, with reference to the argument that the other party can do it more effectively, or in the parties making different assessments and counteracting each other's measures by the use of their tools. A further problem of divided responsibility is that there will be no creation of a body where the "pure" macroprudential tools to be introduced in the next few years under the *Basel Committee on Banking Supervision* decision can be naturally placed.

A middle variant would be to have a council that only gives recommendations, possibly linked to a "comply or explain" mechanism. This would make macroprudential policy clearer as a new policy area than a discussion club would, but a council without decision-making powers over its own tools would pull less weight than a decision-making council. Having an advisory council and one or more responsible authorities would also make accountability more difficult.

C. What would be the voting rules and allocation of votes?

For good decision-making capability the Council should make decisions by simple or possibly qualified majority. Even though the ambition is consensus, this should not be a requirement for a decision. If there is concern that the Council will act too easily, a qualified majority may be appropriate, which the ESRB requires for adopting recommendations and publishing warnings and recommendations (while only a simple majority is required to adopt warnings). However, historical experience tends rather to show recurring difficulties in taking these uncomfortable decisions, which points towards choosing a simple majority and facilitating decision-making as much as possible.

How are the votes in the Council to be allocated? Bearing in mind the need for decision-making powers, it would be best if the votes were not allocated 50/50 between the Riksbank and Finansinspektionen. In that case one of the parties must have a casting vote. Given the considerations discussed above, it would be preferable for the Riksbank to have a slight majority, which could be achieved for example by making the Governor of the Riksbank the chair with a casting vote.

If there are only two parties in the Council, this would mean, however, that the Riksbank would always draw the longest straw in decision-making situations, if the Riksbank representatives were unanimous. This means that Finansinspektionen's influence would risk being well restricted.

An alternative would be to also include some independent experts on the Council and, as a suggestion, to give the three participant groups a third of the votes each. This would create better balance in that neither the Riksbank nor Finansinspektionen would have an independent majority. The independent experts would in that case have special knowledge of the financial markets, but not in any way be or be seen as representatives of the industry. They could, for example, be appointed by the other representatives in the macroprudential council, who would probably have a good overview of the people who might be suitable. If the Council were to be an authority under the Riksdag it could also be conceivable – for the purpose of strengthening legitimacy – for the Riksdag Committee on Finance to appoint them. One way of both deriving benefit from the knowledge of other council experts and strengthening legitimacy would be to have a process in which the independent experts were appointed by the Riksdag Committee on Finance after first being nominated by the members of the Council.

As mentioned before, it is necessary (regardless of how the Council is composed) to decide if the Ministry of Finance (and possibly the Swedish National Debt Office) should participate, with or without the right to vote. The argument in favour of the participation of the Ministry of Finance is that the Government prepares the decisions on some of the tools that could be considered (such as rules concerning tax deductions). The argument against the participation of the Ministry of Finance concerns what can be gained from independence, as discussed above. The conclusions of these considerations depend on the importance attached to each aspect. The international literature often presents independence as central. This would be an argument against the participation of either the Ministry of Finance or the Swedish National Debt Office, at least as regards voting rights.

D. What are the possible legal structures for the Council?

It is also essential to identify what is legally possible and appropriate in relation to Swedish administrative tradition.

According to the Government Agencies Ordinance there are three government agency formats for government authorities:

- Agencies led by a director-general, which are solely accountable to the Government for the agency's operations. A Director-General governed agency is chosen if more direct management of the agency is needed, where political decisions must be implemented without delay.
- Agencies led by a board, where the board is responsible while the day-to-day work is conducted by a director-general or equivalent. Finansinspektionen is a board-governed agency. Characteristic of a board governed agency is that the operations are extensive, which increases the need for a strong leadership. Other reasons for choosing this management structure may be that the operations are conducted as a business, entail extensive financial liability or entail research-intensive and knowledge-generating activities.

- Agencies where a committee makes the decisions, i.e. collective decision-making (committee agencies). A committee agency is characterised by having a defined and limited area of responsibility, a small organisation and business that requires a collective form of decision-making. The functions are often regulated by law.

The Government Agencies Ordinance applies to administrative agencies under the Government. The Government Agencies Ordinance does not apply to authorities under the Riksdag, but these authorities are usually committee agencies.

If several different authorities are to be represented and exert influence on equal terms the committee structure would be the most appropriate.

E. How do constitutional provisions and EU rules affect the choice of institutional structure?

Apart from certain provisions in the Instrument of Government there are above all three rules in the Treaty on European Union that may be significant for the choice of institutional structure for macroprudential policy, since they affect the conditions of the Riksbank's participation. They are the prohibition on giving instructions, the financial independence requirement and the monetary financing prohibition.

(i) *The EU Treaty prohibition on instructions*

Under Chapter 9, Section 13 of the Instrument of Government, the Riksbank has responsibility for monetary policy. No authority may determine the decisions made by the Riksbank on issues relating to monetary policy.

This ban on giving instructions is based on Article 130 of the Treaty on European Union, where it states that no national central bank (or member of its decision-making body) shall seek or take instructions from other bodies, including the Government. The governments of the Member States undertake to respect this principle and not to seek to influence the members of the decision-making bodies in the performance of their tasks.

The ban on instructions, under the EU Treaty, covers all monetary policy decisions and other central bank tasks specified in Article 127, including holding and managing the official foreign currency reserves and promoting smooth operation of payment systems.

The interesting question in the choice of institutional form for macroprudential policy is how broadly the last-mentioned task should be interpreted; that is promoting smooth operation of payment systems. It is not likely that the EU countries in general had financial stability in mind when the Maastricht Treaty was written. A more reasonable assessment is that the Treaty on European Union was referring to the payment system in a narrow sense, in other words the central infrastructure for payments that is necessary to conduct effective monetary policy.

It is also difficult to imagine that it was intended to give the central bank exclusive responsibility for financial stability. A more reasonable interpretation is that the ban on

instructions in the EU Treaty, as far as the Riksbank is concerned, applies to monetary policy and the RIX system, but hardly macroprudential policy measures in general.

(ii) *Other prohibitions against instructions in the Instrument of Government*

Apart from the special prohibition on instructions in the Instrument of Government, Chapter 9, Article 13, see above, in Chapter 12, Article 2 there is also a prohibition in principle on an authority deciding how an administrative authority should decide in a particular case relating to the exercise of public authority in relation to an individual or relating to the application of law. The provision is intended to protect *due process* and in part sets limits, above all on the influence of the Government and individual ministers over government authorities. However, the provision should not prevent the allocation of responsibility between a decision-making and an executing authority through legislation. The question of the authorities' independence in relation to each other must, however, be observed carefully in the legislative work.

(iii) *The financial independence requirement*

The same Articles (127 and 139) in the EU Treaty that establish the prohibition on instructions also entail an implied requirement that the central banks must be financially independent. This means that a central bank must have sufficient financial resources to independently perform its duties and meet its commitments.

The Riksbank's financial independence was the subject of a review a few years ago.²⁸ However, pending further processing in the Government Offices the issue of how the (implicit) financial independence requirements of the EU Treaty are to be interpreted has not yet been finally decided. The interesting question in this context is to what extent the requirement affects the possibilities of choosing different funding solutions for a macroprudential body. The question of financing is developed further in section F.

(iv) *Prohibition on monetary financing*

Under the Maastricht Treaty it is not allowed for a central bank to participate in issues of government debt or otherwise directly purchase debt instruments from its own state or otherwise provide credit to its own government. This is the prohibition on monetary financing in Article 123(1) of the EU Treaty. Put differently, it is not allowed to inflate the balance sheet of your own country by printing your own money. The exception is intraday credit to ensure the functioning of the payment system.

The background to the prohibition is that if a central bank finances the central government budget deficit it is in conflict with the primary task of the central bank of maintaining price stability.

Sweden is subject to the prohibition as of its membership of the EU in 1995 and has incorporated it into Chapter 8, Article 1 of the Riksbank Act: "The Riksbank shall not

²⁸ Swedish Government Official Report SOU 2007:51.

extend credit to or purchase debt instruments directly from the state". In consequence, the Riksbank also decided to change to purchasing government securities on the secondary market instead of directly from the National Swedish Debt Office as it had done previously. In the preparatory works the Government writes that "An abolition of all possibilities of monetary financing of public budget deficits will contribute to increasing the credibility of monetary policy and thereby the possibilities of achieving permanently low and stable price growth and low interest rates".

Another way of granting credit to the government may be to carry out, i.e. meet the cost of, central government commitments and in that way finance the budget by printing money. For example, if the Riksbank were to give liquidity assistance to an evidently insolvent bank then the Riksbank would have assumed a commitment that is not the task of a central bank – but that of central government – and thereby be guilty of monetary financing.

There are various conceivable models for financing a macroprudential body's operations. The interesting question is if the prohibition on monetary financing in any way restricts the possibilities of the Riksbank to finance part of the operations, such as a secretariat. This is developed further in section F below.

F. How should the Council's work be prepared and financed?

It would seem neither socio-economically desirable nor cost effective to build up a new body with major analytical resources of its own. The knowledge and experience required is already available, mainly at the Riksbank and Finansinspektionen. In addition, in a small country like Sweden, access to the necessary qualified analytical capacity is limited. The body should therefore utilise the resources of the Riksbank and Finansinspektionen.

Since the analytical focus of macroprudential policy is close to that of the Riksbank, it is reasonable for the Riksbank to assume the major part of the analytical preparatory work ahead of decisions, recommendations and advice. This would be an argument for setting up a secretariat for the Council within the Riksbank.

The work of checking compliance with the measures decided, which is considerably less resource-intensive than the preparatory work, would, however, most naturally lie with Finansinspektionen, at least as regards countercyclical capital buffers and extra surcharges for SIFIs.

Financing of the resources for analysis from the Riksbank and Finansinspektionen that the Council needs could be done in various ways. One possibility is that the Riksbank and Finansinspektionen themselves pay for the work contributed by the respective organisation to macroprudential policy. Another option is for the Riksbank to pay for the Council's entire operations. A third possibility is that the Council receives its own funding, for instance via fees from the financial sector, and pays the Riksbank and Finansinspektionen for the resources they contribute.

The *first* alternative – that the Riksbank and Finansinspektionen themselves pay for the resources they contribute to the Council – seems to be a simple and straightforward

solution. It should not be difficult to legislate to give the Riksbank responsibility for financing a secretariat and the preparatory analysis for the Council. As long as the Council carries out tasks that are within the scope of the activities a central bank can be expected to conduct it is not a matter of monetary financing.

In light of the fact that Finansinspektionen, which is an authority under the Government, can be subject to future changes in political priorities, there may be some uncertainty about Finansinspektionen's ability to make a stable contribution to macroprudential policy for a long time to come. When the crisis starts to be forgotten it may be more difficult for Finansinspektionen to obtain the resources needed for macroprudential policy than in times when these issues are high on the political agenda.

A *second* alternative is therefore that the Riksbank also meets the cost of the analysis and follow-up of macroprudential decisions made within Finansinspektionen.

The ECB has deemed it compatible with the monetary financing rules that a national central bank puts resources at the disposal of a supervisory authority. However, this is on condition that the financing is within the statutory remit of the central bank or that the central bank contributes to, or has influence over, the supervisory authority's decisions.

Both these financing solutions would work, provided the Riksbank is responsible for macroprudential policy or a macroprudential council is established under the Riksdag. In both cases, however, the Riksbank must have a statutory remit that entails an active role in macroprudential policy. If on the other hand Finansinspektionen was to be responsible for macroprudential policy it would be neither appropriate nor possible for the Riksbank to finance the activities, as this would probably be classified as monetary financing. The macroprudential policy would then instead be covered by the Government budget.

The *third* alternative – that the Council finances its activities through fees – would mean that the Riksbank and Finansinspektionen would receive compensation from the Council for the costs they have incurred in contributing to its activities. The fees that would in that case finance activities should be paid in by the financial sector institutions in accordance with a formula that needs to be specified. An advantage of such a solution is that financing of the Council would be transparent. The solution also implies that the costs of macroprudential policy will be charged to the financial sector, which seems reasonable from a socio-economic point of view. As a comparison it can be mentioned that the activities of Finansinspektionen are almost entirely fee-financed.

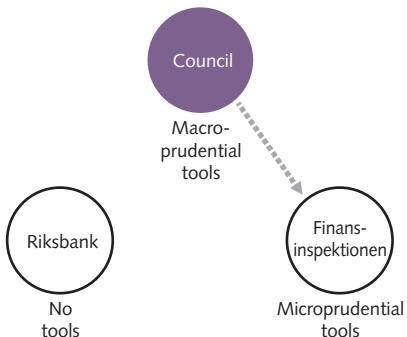
8. Alternative models

In light of the arguments put forward we present two possible models based on the idea of a council. The alternative would be that either the Riksbank or Finansinspektionen would be independently responsible for macroprudential policy or that the Riksbank issues recommendations to Finansinspektionen on the use of tools. A total of five conceivable institutional models are described in this section.

- A. Separate decision-making authority (council) under the Riksdag
- B. Separate recommending authority (council) under the Riksdag
- C. The Riksbank issues recommendations and Finansinspektionen is responsible for the tools
- D. The Riksbank is responsible for macroprudential policy
- E. Finansinspektionen is responsible for macroprudential policy

The most important advantages and disadvantages of the various models are discussed below.

A. Separate decision-making authority (council) under the Riksdag



This alternative means that a macroprudential council (the Council), with representatives of the Riksbank, Finansinspektionen and independent experts, will be established as a separate authority under the Riksdag. It will have the powers to decide on the use of "pure" macroprudential tools, at present mainly the countercyclical capital buffers. At least as important is that the Council is able to give recommendations, from a macroprudential perspective, concerning tools that are currently available in the toolboxes of Finansinspektionen or other authorities. It would be appropriate to link a "comply or explain" mechanism to the recommendations.

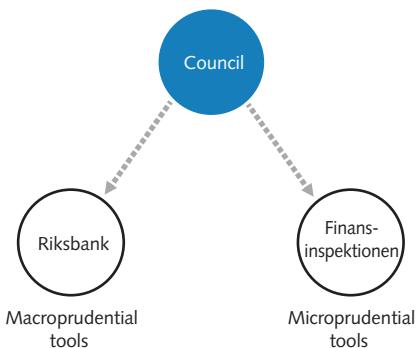
This solution has many advantages. An important advantage is that it will become clear that macroprudential policy is a new policy area, with a separate responsible authority. Clear responsibility is very important from an accountability perspective. The solution further implies that the Riksbank's and Finansinspektionen's different types of expertise are utilised in the decisions on macroprudential policy. The location on "neutral territory" creates a balance between the Riksbank's and Finansinspektionen's influence on the work. Moreover decisions on macroprudential policy measures will be taken quite independently of the political system. With this structure the Council will have good prospects of learning from international bodies that conduct research and analysis on macroprudential policy. This solution also means that the Council can more easily influence decisions in the

macroprudential policy area in both the EU (via the ESRB) and international bodies (such as the BIS and the IMF), which may be of great importance to Sweden.

The arrangement has many similarities with the structure created for the *Financial Policy Committee*, FPC, in the Bank of England.

Thus this solution gathers all the “pure” macroprudential tools with the Council. As described earlier, in the current situation there are not many of these tools, but more will probably be developed as new knowledge and experience is gained in this policy area. The Council should therefore also be able to increase its macroprudential toolkit by making a submission to the Riksdag.

B. Separate recommending authority (council) under the Riksdag



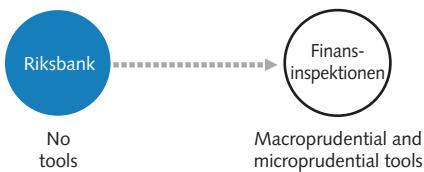
In this alternative we establish an authority under the Riksdag, with the same composition as in the previous case, which can issue recommendations to both the Riksbank and Finansinspektionen (and also to other authorities), but not make decisions on the use of any tools. In this case too we imagine that a “comply or explain” mechanism will be linked to the recommendations.

Allowing an authority under the Riksdag to issue recommendations on how the Riksbank should use its macroprudential tools is constitutionally possible, provided these tools are not covered by the prohibition on instructions. As earlier analysis has indicated, “pure” macroprudential tools should not create any problems with the prohibition on instructions.

A recommending council, however, has a number of drawbacks in relation to a decision-making council. The Council will be weaker and less clear as a representative of a new policy area where it has no tools of its own to enforce the measures it wishes to see. Decision-making in the area of macroprudential policy will probably be more sluggish and there is a greater risk that the measures the Council sees as necessary will not be implemented. Moreover, it will be more difficult to demand accountability and macroprudential policy will also be less transparent when there is not just one responsible body.

However, the structure also shares several of the advantages of the previous structure. Both the Riksbank's and Finansinspektionen's joint competence is used (albeit only in recommendations and not decisions). The Council is located on "neutral territory". The independence from political influence will possibly be even stronger, as the Riksbank in the end will decide on the use of its own macroprudential tools. Finally, the conditions for efficiency in international work should be approximately the same.

C. The Riksbank issues recommendations and Finansinspektionen is responsible for the tools



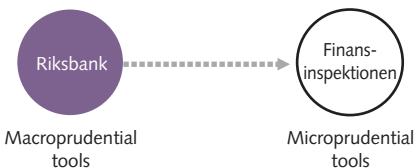
A third solution would be to give the Riksbank the possibility of issuing recommendations on macroprudential policy measures, linked to a "comply-or-explain" mechanism, instead of having a Council to do this, as in the previous case. Responsibility for decisions concerning macroprudential tools is placed with Finansinspektionen.

This structure has the same drawbacks as the previous one, with lack of clarity concerning responsibility for macroprudential policy, sluggish decision-making and accountability problems. Another weakness is that the knowledge and skills of the Riksbank and Finansinspektionen will not join together in the decisions, which is unfortunate since previous analysis has indicated the value of such cooperation.

In terms of resources, the structure is also inefficient, since it leads to duplication of work, in that both the Riksbank and Finansinspektionen must have separate analytical frameworks to assess which macroprudential measures should be taken. Further, macroprudential policy will be less independent, since the decisions will be made by an authority under the Government. Conditions for international cooperation will probably also be worse, since Finansinspektionen – which makes the decisions on macroprudential policy measures – does not have the same access as the Riksbank to international bodies which are active in this field.

An advantage of this solution is that Finansinspektionen would gain access to almost all tools that may be used in both macroprudential policy and microprudential supervision, and thereby be well placed to decide which instruments are best in a situation that arises.

D. The Riksbank is responsible for macroprudential policy



A fourth solution would be to assign responsibility for macroprudential policy, including the responsibility for macroprudential tools, to the Riksbank. This would mean that decisions on macroprudential policy would be taken by the Executive Board, without any outside party sharing in the decision-making. In addition the Riksbank could be given the opportunity to give recommendations to Finansinspektionen on the use of their tools for macroprudential purposes, again linked to a "comply-or-explain" mechanism.

Advantages of this solution are that it creates clarity concerning responsibility and makes it possible to demand accountability in a sound way, macroprudential policy can be conducted independently of political influence and Sweden will be well equipped to receive and give input in the international work relating to macroprudential policy. The solution also makes it possible for the Executive Board to deal with any conflicting objectives between monetary policy and macroprudential policy and weigh up the use of the different tools in the best way.

There are, however, also disadvantages associated with this solution. Finansinspektionen's knowledge is not utilised in macroprudential policy decisions. Additionally, it would be unfortunate if decisions on macroprudential policy and microprudential supervision were taken in isolation from each other.

E. Finansinspektionen is responsible for macroprudential policy



A fifth solution would be to assign entire responsibility for macroprudential policy to Finansinspektionen. This solution is seldom mentioned in international literature and neither the IMF, Goodhart and Rochet nor the Fiscal Policy Council mention this structure when they discuss possible allocation of responsibility for macroprudential policy (see section 5). It would, however, be theoretically possible, and consequently we nevertheless discuss it here.

There are natural reasons for this proposal not being mentioned very often in the literature – it has several disadvantages.

In the first place – in light of the fact that macroprudential policy has considerable points in common with monetary policy – it would be problematic if the Riksbank did not play any part in macroprudential policy. In the second place, the Riksbank's financial stability analysis would not be put directly to use in macroprudential policy. In the third place, macroprudential supervision would be considerably less independent of the political sphere, since Finansinspektionen is an authority answerable to the Government. In the fourth place, Sweden's opportunities of influencing international research and analysis on macroprudential policy would probably be weakened.

A considerable disadvantage of this solution is that it cannot be regarded as economically efficient. Most of the resources for analysis needed for macroprudential policy exist within the Riksbank, but if responsibility for macroprudential policy lay with Finansinspektionen then Finansinspektionen would also have to do the preparatory work. This would mean considerable duplication of work, since the Riksbank must also make similar analyses in the course of its ordinary work. To this can be added the risk that the quality of macroprudential policy would suffer as Sweden – being a small country – has only a few people with the special skills needed to make the difficult analytical assessments required by macroprudential policy.

The advantages of this solution are that it creates a clear allocation of responsibilities and gives Finansinspektionen plenty of scope to determine which instruments are best in a situation that arises, since almost all tools that can be used in both macroprudential policy and microprudential supervision would be gathered in the same place.

9. Conclusions

The global financial crisis has shown how necessary it is to reform financial supervision. The traditional institution-focused microprudential supervision needs to be supplemented by system-oriented macroprudential policy. Both the Riksbank's and Finansinspektionen's competence need to be utilised for macroprudential policy to be effective.

Pending a decision on a long-term organisational solution for macroprudential policy, as mentioned before, the Riksbank and Finansinspektionen set up a council for cooperation on macroprudential policy in January 2012 in order to discuss assessment of systemic risks and macroprudential policy issues. The council for cooperation is a good beginning. However, it is more in the nature of a discussion club than a decision-making body. In the long term macroprudential policy needs an even more clear-cut role and distinct status as a separate policy area. To create an appropriate framework for macroprudential policy that will be effective in the long-term we consider that the following factors are of crucial importance.

- **Effective decision-making powers:** Good decision-making powers assume a clear mandate as well as effective and clearly defined tools. Since macroprudential policy is

an emerging policy area, legislation also needs to clarify the forms for complementing the tools that are currently available with new tools in the future.

- **Independence:** The body that is made responsible for macroprudential policy needs to stand free of pressures, both from politicians and the financial industry.
- **Accountability:** If the macroprudential body is given considerable independence then it must be possible to demand accountability for how it has acted or refrained from acting. A precondition for effective accountability is that the mandate and tools are clearly defined. The mandate, for example, could include a requirement that the macroprudential body acts, or explains publicly why it refrains from taking action, when some pre-determined levels for key variables are reached. Demanding accountability would also be facilitated by requirements for far-reaching transparency and reporting, for example to the Riksdag.
- **Analytical capacity:** Another requirement is a large and sustainable capacity for analysing risks to the financial system as a whole and what may be appropriate measures for preventing these risks. Stable financing of the macroprudential body is required to guarantee this capacity over time.
- **Sweden's international influence:** A macroprudential supervisory body also needs to be able to act effectively internationally, above all within the framework of the European Systemic Risk Board, ESRB.
- **Efficient and effective use of public resources.**

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Taxing financial transactions

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The idea of taxing financial transactions is an old one. However, it came up again recently when the European Commission presented a proposal on a financial transaction tax within the EU in September 2011.¹ The aim of the tax is twofold. First, the transaction tax is intended to improve the workings of the financial markets, which could reduce the risk of financial crises in the future. Second, the tax is intended to generate revenues and thus to get the financial sector to contribute to covering the costs that arise as a result of financial crises.

The hypothesis is that the tax would reduce any elements of speculation in financial markets as it would increase the costs of transactions with financial instruments. This in turn would result in a more realistic valuation of the returns that the financial assets can provide in the future. Although a reduction in speculation would reduce the base on which the tax is levied, that is the tax base would shrink, it would also reduce the risk of financial crises.

In this article we show that there is no clear evidence that the financial markets would function better with a transaction tax. On the contrary, such a tax would increase firms' cost of capital, which would reduce investment and thus lead to lower GDP. The negative effects on economic activity could be considerable in relation to the expected tax revenues. One can also question the value of a transaction tax as a source of revenue. It will probably be difficult, not to say impossible, to avoid an increase in transactions with untaxed financial instruments, and equally difficult to prevent trading in financial assets from migrating to markets that do not have transaction taxes. The financial markets are global and until the tax is introduced globally there is an obvious risk that trading will move to other countries.

We begin by looking at the background to the discussion about taxing the financial sector. We then describe the Commission's proposal and give an account of the previous experience of transaction taxes. After this we discuss the arguments for the tax and, finally, we present our conclusions.

* We are grateful for comments from Claes Berg, Kerstin Mitlid, Joanna Gerwin, Göran Lind, Martin W Johansson, Fabian Wallen, Bo Stoltz and Peter Höglund. The article expresses only the personal views of the authors on this issue.

1 See the European Commission (2011), "Proposal for a Council Directive on a common system of financial transaction tax and amending Directive 2008/7/EC", COM (2011) 549.

1 Background

The economist and Nobel laureate James Tobin launched the idea of taxing currency trading in 1972. Tobin proposed a tax of between 0.2 and 1 per cent in connection with foreign exchange transactions with the aim of stabilising exchange rates to some extent following the breakdown of the international system for foreign exchange cooperation, the so-called Bretton Woods system. The proposal had some impact on the political debate and similar taxes have been discussed on several occasions since then. In 1995, for example, the French prime minister at that time, Lionel Jospin, proposed a tax of 0.1 per cent on foreign-exchange transactions. In 1999, the European Parliament presented a report claiming that a tax of 0.5 per cent would generate USD 360 billion per year (European Parliament, 1999). The idea was then also taken up by Attac and the global fairness movement.

The financial crisis that began in 2007 led to government support measures for the financial sector in many countries. The effects of the crisis on the real, or non-financial, part of the economy demonstrated the need for a more robust financial system. In June 2010, the International Monetary Fund (IMF) therefore published a report commissioned by the G20 countries: *A Fair and Substantial Contribution by the Financial Sector, Final Report for G-20*. The report takes up measures in the form of taxes and charges that could be levied on the financial sector in order to strengthen public finances, fund support measures for the sector in the future and reduce the probability of future financial crises. The IMF report also discusses the issue of a tax on financial transactions.

This issue has also been discussed in the EU. The discussion resulted in a proposal for a transaction tax at the EU level that the Commission presented in September 2011. The Commission proposes that such a tax should come into force on 1 January 2014. This would entail taxing the buying and selling of securities within the EU.

2 The Commission's proposal

The Commission proposes that a tax should be levied in connection with trading in shares, mutual fund units and bonds, and also in connection with trading in derivatives, including foreign-exchange derivatives. It also proposes that the tax rate should be 0.1 per cent for shares, mutual fund units and bonds and 0.01 per cent of the nominal value of the underlying asset for derivatives.² The intention is that the EU countries should levy the tax on both the buyers and the sellers. In the case of a share transaction the tax would therefore total 0.2 per cent. The tax rates are intended to be minimum rates; that is the Member States will be able to opt for higher rates if they so choose.

² Options and forwards are examples of derivatives whose value depends on the value of another, underlying asset, for example a share.

Transactions on the primary market should not be liable to tax, according to the proposal.³ However, we question the value of this exemption. New issues of both shares and bonds would be indirectly affected by the tax because the buyers on the primary market would have to pay the transaction tax when they subsequently sell the assets concerned. We would also expect to see lower prices on the secondary market, where both buyers and sellers will be liable to the tax.

The liability to pay tax will apply to all the financial institutions that are established under the tax jurisdiction of the EU. The definition of financial institutions is broad in the proposal and covers a wide range of financial companies: everything from banks and insurance companies to investment funds. Non-financial companies may also be covered by the liability to pay tax if they conduct financial transactions on behalf of the company. The Commission also includes the marketplace itself in the definition. This means that the tax will cover all the transactions with financial instruments that take place on a regulated marketplace, irrespective of who is registered as the buyer or seller.

The Commission gives two main reasons for its proposal. The first is that the tax could improve the workings of the financial markets, for example by reducing the element of speculation. The second is that the transaction tax could get the financial sector to contribute to covering the costs of financial crises. The Commission also says that coordinated action on a transaction tax by the EU countries could constitute an important step towards global coordination.

The Commission has also analysed the consequences of a transaction tax in the EU. In the main scenario of this analysis (European Commission, 2011) the Commission calculates that the revenues would be more than EUR 57 billion per year with a tax of 0.1 per cent on share-, bond- and foreign-exchange transactions, and on transactions with stock exchange-, foreign exchange- and OTC derivatives. The calculation is based on trading in financial instruments in 2010 and the revenues correspond to 0.5 per cent of GDP in 2010, which is a relatively high figure compared with previous fiscal experience of transaction taxes (see section 6 for an account of previous fiscal experience). The Commission assumes in this calculation that the tax base will shrink when the tax is introduced; it assumes that the so-called transaction elasticity will be 1.5, which means that trading in financial assets will fall by 1.5 per cent when the tax is increased by 1 per cent. However, there are grounds for believing that elasticity will actually be much higher. We can compare the elasticity assumed by the Commission with the elasticity of the securities transaction tax that was introduced in Sweden in 1984 and abolished in 1991, which Lindgren and Westlund (1990) have calculated as 0.85-1.35 (see section 4 for a more detailed description of this tax). This tax was in force during a period in which the mobility of capital in Sweden was limited due to regulations in force at the time. As a result of these regulations, the transactions

³ The stock market comprises trading in shares in companies and this trading takes place on stock exchanges or bilaterally between the parties concerned (so-called OTC trading). In the case of a share issue, the money paid by the shareholders to buy the shares directly benefits the company in that it increases the company's equity. This is trading on a primary market. If the shares are bought on a stock exchange or bilaterally by another investor, then this is instead a case of trading on a secondary market, as the shares have already been issued.

were not able to migrate to the extent that would have been possible if there had been free movement of capital. When the Commission assesses to what extent the transaction tax will be able to uphold the tax base on today's financial markets with free movement of capital, its assumptions do not therefore deviate significantly from the calculated elasticity on the strictly-regulated Swedish financial market in the 1980s. There is thus a risk that the size of the tax base will be much smaller than the Commission expects.

What then will be the overall economic effect of the Commission's proposal? In its impact analysis, the Commission (2011) notes that one can expect a tax of 0.1 per cent on shares to reduce the level of GDP by at least 0.5 per cent annually and possibly by as much as 1.8 per cent when the full force of the tax comes into effect. However, there is great uncertainty regarding this cost. In its assessment, the Commission assumes that the tax will improve the workings of the financial markets and that this will help to reduce the economic cost of the tax. According to the Commission, the fall in GDP will stem from the fact that companies' capital costs will increase when they have to compensate investors on the financial market for the transaction tax. The higher capital costs will in turn reduce investment and thereby GDP. These costs may also increase further if bond and foreign-exchange transactions, and transactions involving stock exchange-, foreign-exchange- and OTC derivatives are also taxed. At the same time, the Commission claims in its main scenario that a transaction tax of 0.1 per cent could generate approximately 0.5 per cent of GDP in tax revenues. We wish to emphasise, however, that this assessment is also highly uncertain. Unlike the calculation of costs, the assessment includes the revenues that arise when bond and foreign-exchange transactions, and transactions involving stock exchange-, foreign-exchange- and OTC derivatives are taxed. The estimate is also high in relation to the previous experiences of those European countries that have, or have had, a transaction tax (see section 6).

If the Commission's assessment is correct, then the proposal entails the introduction of a tax resulting in an economic cost that will reduce economic activity in the long term. This cost may thus be remarkably high in relation to the revenues from the proposed tax. A decline in economic activity also means that revenues from other taxes will fall; a factor that the Commission has not taken into account in its assessment. Given this background we find it hard to justify the Commission's proposed legislation in economic terms.

3 International experience

A number of countries have or have recently had some form of transaction tax. Below we briefly describe the transaction taxes that are currently in force in the UK and Switzerland, two countries that are usually regarded as financial centres. Other countries that have a transaction tax at present are Belgium, Finland, Greece, India, Italy, Poland, Singapore, South Africa, South Korea and the United States. In the case of the United States the tax takes the form of a very low charge that is levied in connection with share trading in order to fund the financial supervisory authority, the US Securities and Exchange Commission

(SEC). Transaction taxes on derivatives are comparatively unusual, but they do exist in, for example, India and Taiwan (Matheson, 2011).

The transaction tax in the UK is a so-called stamp duty. It thus corresponds to the charge a buyer pays when acquiring real estate or site leaseholds. Stamp duties have primarily been introduced for fiscal reasons. The transaction tax amounts to 0.5 per cent of the sum paid in connection with the purchase and sale of shares in companies registered in the UK. It is thus levied on transactions that take place outside the UK too, if the company issuing the share is registered there. The tax also covers the underlying shares in the case of trading in options and forwards.

Various forms of tax relief are offered to brokers who trade in shares on their own behalf, while more long-term investments are taxed in full. The aim of the tax relief measures is to uphold the role of the London Stock Exchange as a financial centre. As a result of these exemptions, over 70 per cent of the trade in shares in the UK in 2005 was not taxed (Oxera, 2007). The tax yields annual revenues corresponding to just over 0.2 per cent of the nation's GDP (Matheson, 2011).

Switzerland taxes shares, bonds and some types of derivative.⁴ As in the UK, the transaction tax in Switzerland is a stamp duty, that is a tax that has above all been justified on fiscal grounds. Other declared aims of the tax have been to avoid excessive capital inflows and a too strong currency (Wrobel, 1996). Both domestic and foreign investors are subject to the tax, while brokers that trade in shares on their own behalf are exempt. Exemptions also apply, for example, to Swiss investment funds, foreign banks, foreign insurance companies and foreign brokers.⁵ The many exemptions are generally regarded as one of the explanations why Switzerland is seen as a financial centre despite the tax (Brondolo, 2011). The tax yields annual revenues of approximately 0.5 per cent of GDP.

What effects does a transaction tax have in countries with less well-developed financial markets and fewer generous tax deductions? Let us discuss this in the light of experience in Sweden.

4 Experience in Sweden

A securities transaction tax (popularly referred to as the "financial yuppie tax") was introduced in Sweden in 1984. One of the aims of the tax was to reduce volatility, that is the variation of prices of assets, on the financial market. Another reason for the introduction of the tax is said to be that the Swedish Trade Union Confederation advocated such a tax, as reflected in the criticism directed by Stig Malm, the President of the Confederation at that time, at the high payments made to "financial yuppies".

Initially the tax rate was 0.5 per cent in connection with both the purchase and sale of shares; that is a total of 1 per cent for a transaction. Brokers and companies that traded

⁴ The tax rate is 0.15 per cent for trading in shares in domestic companies and 0.3 per cent for trading in shares in foreign companies.

⁵ Swiss investors can also avoid the tax if (i) the transaction is conducted through a foreign bank rather than through a domestic broker, (ii) buyers and sellers own shares worth less than CHF 10 million.

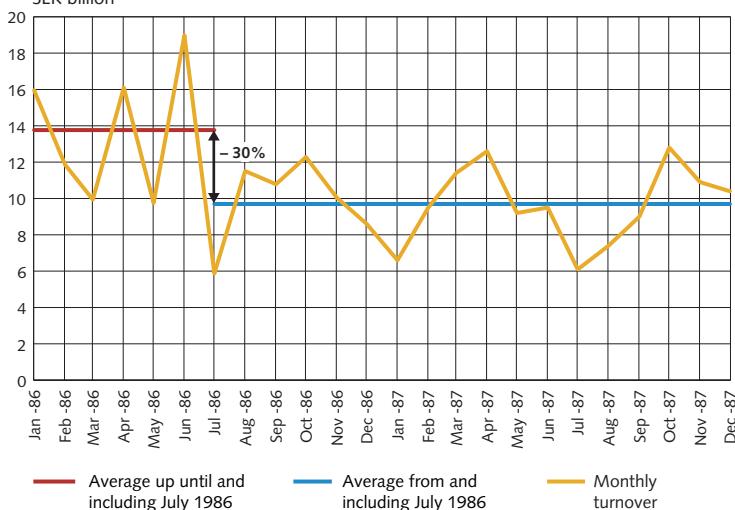
securities to a value of at least SEK 500 000 during the course of half a calendar year were liable to pay the tax. The tax was geographically limited, unlike the British transaction tax which taxes all share trading in companies registered in the UK irrespective of where the trading takes place. The Swedish tax thus covered only Swedish securities traded on a Swedish marketplace.

The revenues from the tax amounted to 0.13 per cent of Sweden's GDP for the budget year 1984 (The Swedish National Financial Management Authority, 2011). On 1 July 1986, the tax rate was doubled to 2 per cent per transaction and the tax base was broadened so that it also covered share options and convertibles.⁶ As a result, revenues increased to 0.33 per cent of GDP for the budget year 1986 (The Swedish National Financial Management Authority, 2011). However, it must be remembered that these tax revenues came in a period when the outflow of capital from Sweden was limited by the foreign exchange controls that were in force from 1939 to 1989. These controls meant that Swedish investors had little chance of moving transactions to markets abroad, which affected the tax revenues.

Figure 1 illustrates how trading on the Stockholm Stock Exchange (yellow line) changed when the taxrate was doubled and the tax base was broadened. Average turnover on the Exchange fell by approximately 30 per cent during the second half of 1986 and throughout 1987 (blue line) compared with the first half of 1986 (red line). The tax increase also coincided with a 60 per cent fall in trading in the 11 most traded shares (Umlauf, 1993). The reasons for the lower turnover were that foreign investors reduced their share trading in Sweden and that Swedish investors reduced the quantity of share transactions (Wrobel, 1996). The lower turnover may of course also have been due to other factors than just the change in the tax rate. However, it is difficult to identify other factors that could have affected turnover so significantly at the time.

⁶ A convertible is a debt instrument that can be converted into shares in the issuing company at a predetermined price.

Figure 1. Turnover on the Stockholm Stock Exchange 1986-1987
SEK billion



Note. On 1 July 1986, the tax rate was doubled and the tax base was broadened to include share options and convertibles.

Source: Nasdaq OMX.

After the tax base was broadened once more to include forward contracts for shares and share indexes on 1 July 1987, it showed further signs of erosion and tax revenues did not increase to the extent expected; in the budget year 1987, tax revenues amounted to 0.37 per cent of GDP (Swedish National Financial Management Authority, 2011).

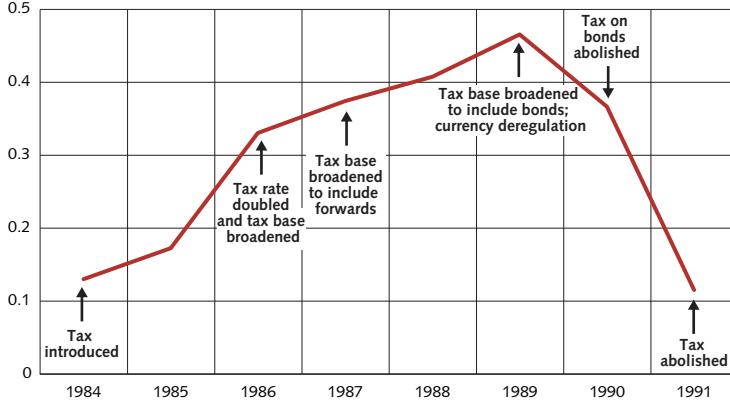
The tax base was broadened yet again in 1989 to also include bonds. The reason for this was the desire to create neutrality between the taxation of bonds and the taxation of shares. It was believed that this would avoid trading in untaxed assets. Trading in bonds fell by 85 per cent in connection with this broadening of the tax base. Trading in bond-based derivatives fell by 98 per cent, and trading in options practically came to a complete halt. The increase in tax revenues resulting from this broadening of the tax base was therefore relatively small and amounted to SEK 80 million, or less than 5 per cent of the expected revenues (Campbell and Froot, 1993). At the same time as turnover declined, trading in untaxed, but similar, debt instruments such as debentures, forward-rate agreements and variable-rate notes increased. These were instruments that could recreate the risk and return profile that bonds had had. Thus the total trade in debt instruments did not fall significantly as trading increased in similar but untaxed assets (Campbell and Froot, 1993). We therefore question to what extent the tax actually reduced speculation on the bond market.

By 1990, over 50 per cent of the trading in Swedish shares had moved to the London Stock Exchange (Umlauf, 1993). This was shortly after the last vestiges of the currency controls were abolished in Sweden. The tax on bonds was subsequently abolished in July 1990. The tax on other financial transactions was halved on 1 January 1991, and, finally, the securities transaction tax was abolished completely in December 1991. By then, the

tax revenues had fallen to 0.12 per cent of Sweden's GDP (The Swedish National Financial Management Authority, 2011). Once the tax was abolished, trading on the Stockholm Stock Exchange began to increase again: in 1992, over 50 per cent of trading in Swedish shares took place on the Stockholm Stock Exchange, compared to 40 percent in 1991 (Campbell and Froot, 1993).

Figure 2 shows the tax revenues as a percentage of GDP. The figure shows that the increase in revenues from the gradually-broadened tax base was limited after 1986.

Figure 2. Tax revenues as a percentage of GDP
Per cent



Note. The revenues relate to the budget year, that is the period that applies for the government budget. Prior to 1997, the budget year ran from and including 1 July to and including 30 June.

Source: The Swedish National Financial Management Authority.

The tax gave rise to a number of legal complications during the period it was in force. There were, for example, problems in defining what should constitute a taxable transaction. Taxable transactions were defined as completed transactions. Consequently some types of derivative were not taxed, which undermined tax neutrality. The lack of neutrality in turn led to increased trading in similar but untaxed financial instruments.

The tax was introduced in a period in which the financial markets were regulated. The mobility of the tax base has increased significantly since the 1980s as a result of the deregulation and internationalisation of the financial markets in combination with the computerisation of securities trading. It is therefore not probable that the tax would generate the same revenues today. The number of financial instruments has also increased over time, as has the complexity of these instruments. This means it would be more difficult to uphold tax neutrality between different assets if a transaction tax was introduced today. If the tax increases trading in untaxed assets then one may question to what extent it would reduce speculation on the financial markets.

Those who argue in favour of a transaction tax say that the securities transaction tax in Sweden was not effectively designed and that a better designed tax could correct for market deficiencies. We give an account of these arguments below.

5 The workings of the financial market

A common starting point for economic analyses of taxes is that the distorting effects of a tax should be as limited as possible. Examples of such effects are when a tax favours certain investments more than others, or when it means that some exchanges of goods and services do not take place. The revenues provided by the tax should be weighed against the economic costs it gives rise to in the form of reduced economic activity. Expenditure should therefore be funded by taxes that have as limited distorting effects as possible.

However, a transaction tax explicitly aims to create distortions. This is justified by saying that the tax can correct for so-called negative externalities and that it can thus improve the workings of the financial market. A negative externality arises when the costs of the goods or services involved are not fully borne by the parties to a transaction and thus affect external parties. A correctly designed tax can in such circumstances increase economic efficiency by getting the parties to take into account the costs that they generate for society as a whole. The tax will then be a second-best solution that corrects for one distortion by introducing another distortion. From this point of view, a transaction tax is similar to environmental taxes or to so-called sin taxes on items such as alcohol and tobacco.

5.1 NEGATIVE EXTERNALITIES AS A RESULT OF HIGH VOLATILITY

One argument that is sometimes put forward is that short-term and speculative transactions damage the workings of the financial markets. High-frequency trading is often mentioned as an example of such transactions. A transaction tax would then be justified because it reduces transaction volumes and thus improves the functioning of the financial markets.

However, the link between transaction volumes and the workings of the markets is unclear. A market can be considered to be functioning well if it is:

(i) liquid, that is if the turnover is substantial and single transactions do not affect the market price to any great extent;

(ii) effective, that is if the prices reflect all the relevant and available information.

A further development of (ii) is that volatility should be in proportion to the volatility of the economic fundamentals that the market reflects.

In simple terms, one can say that modern financial markets are usually liquid and relatively efficient. At the same time, however, the volatility of the prices of certain assets is higher than is justified by the volatility of the fundamentals that the prices should reflect (Shiller, 1981; LeRoy, 2008). This excess volatility can be seen as a negative externality, particularly if it entails risks to financial stability or increases firms' cost of capital.

According to Summers and Summers (1989), one can expect a transaction tax to reduce volatility because it is detrimental to short-term investors but favours long-term investors. Summers and Summers (1989) say that excessively large price movements arise because some investors speculate that an observed price change will continue in the same direction,

that is that it will have momentum. Small price movements may then be temporarily reinforced in a way that is not justified by the fundamental economic variables. In such a situation, a transaction tax may reduce volatility, if long-term investors are more prone than short-term investors to base their investments on economic fundamentals and also on average conduct fewer transactions. In practice, however, it is difficult to distinguish between short-term and long-term investors. Nor have theoretical models of the micro structure of financial markets resulted in any unequivocal conclusions about the link between transaction taxes and volatility.⁷

Moreover, empirical studies provide no clear evidence that transaction taxes reduce volatility.⁸ Studies of high-frequency trading indicate that these transactions probably help to reduce volatility, although it cannot be ruled out that they may have a negative impact on the workings of the market during particularly turbulent periods.⁹

To sum up, the main arguments for a transaction tax as a means of reducing volatility are threefold:

- (i) volatility on the financial markets is greater than is economically optimal;
- (ii) volatility decreases if transaction volumes decrease;
- (iii) a transaction tax leads to lower transaction volumes.

Even if (i) is correct, (ii) is at best a hypothesis, both theoretically and empirically, and (iii) presupposes that the transaction volumes do not migrate to other countries or to untaxed investment instruments.

We would also like to point out that a larger transaction volume usually entails greater liquidity on the financial market. This can be regarded as positive, as liquidity improves risk management and enables an efficient supply of capital to households and companies. If a transaction tax reduces trading volumes it is therefore a tax on liquidity rather than on volatility. On highly-liquid markets, asset prices are not affected by the size and frequency of trading, while trading can have a significant impact on prices on an illiquid market (Habermeier and Kirilenko, 2003). A transaction tax therefore increases, rather than reduces, volatility on the market to the same extent that it reduces liquidity.¹⁰

There is also research that shows that high-frequency transactions improve liquidity in share trading, reduce transaction costs and make pricing on the financial markets more efficient (Hendershott et al., 2011). There are also several studies that examine the link between liquidity on the stock market and long-term growth.¹¹ In these studies, liquidity on the stock market is positively correlated with long-term growth, capital build-up and productivity growth. According to the studies, a transaction tax would thus lead to lower economic growth as it would reduce liquidity.

⁷ See for example Subrahmanyam (1998); Dupont and Lee (2007); Pellizzari and Westerhoff (2009).

⁸ See the European Commission (2010b) for an overview, or Umlauf (1993) for a detailed study of Swedish experience in the 1980s.

⁹ See for example Brogaard (2010); Zigrand et al. (2011); Linton and O'Hara (2011).

¹⁰ See for example Suvanto (2001) or the European Commission (2010a).

¹¹ See for example Levine (1991); Holmström and Tirole (1993); Bencivenga et al. (1995); Levine and Zervos (1998); Beck et al. (2000).

5.2 NEGATIVE EXTERNALITIES AS A RESULT OF SHORT-TERM INVESTMENT HORIZONS

Another related argument that is sometimes put forward is that a transaction tax promotes a long-term investment horizon among investors. The tax should thus lead company managements to attach less importance to short-term consequences. The argument is not convincing. There is no evidence that there is a simple and clear link between how often investors buy or sell a company's shares or bonds and the decisions that the company's management makes. Ultimately, the valuation of a company's shares should reflect the current value of expected future profits. It is hard to see how a transaction tax could affect expected future profits apart from the negative effect arising from an increase in capital costs.

It should also be pointed out that the link between the investment horizon and the degree of speculation is unclear. It is difficult to determine whether an investment entails an economic cost to society solely on the grounds of its time horizon. *Hedging*, which is sometimes characterised as a short-term transaction, is for example an investment strategy that aims to reduce or eliminate financial risk. It can be questioned whether it entails an economic cost to society. Many short-term investments also reflect a company's need to insure itself against fluctuations in exchange rates and commodity prices. An investor will also need to adjust the balance of an optimal portfolio that contains both risk-free and risky assets when the value of the risky assets changes. This applies irrespective of whether it relates to long-term saving or a short-term investment. Investments with short maturities may thus reflect needs other than speculation.

5.3 NEGATIVE EXTERNALITIES AS A RESULT OF THE SIZE OF THE FINANCIAL SECTOR

There is extensive research that demonstrates the importance of the financial sector to economic growth.¹² Well-developed financial markets facilitate access to capital and make it more profitable for companies to invest. The social functions of the financial sector are to promote the allocation of capital to where the return is highest and to make it easier to diversify risk. Financial transactions are therefore positive for the economy to the extent that they contribute to an efficient allocation of capital.

Although a growing financial sector has a positive effect on capital allocation, and thus on the economy, this effect should be weighed against the fact that the financial sector in itself represents a drain on society's resources. This is firstly because some form of authority is required to supervise financial stability. The larger the financial sector, the more resources are required for this supervision. And secondly because human capital is also required.

Tobin (1984) argued that the high salaries in the financial sector attracted many highly-educated people whose human capital could provide a higher social return if they worked elsewhere. If this is the case, then this alternative cost and the costs of supervision should be included when the advantages and disadvantages of a tax on financial transactions are weighed against each other.

¹² See for example Beck et al. (2000) or Levine (2005) for an overview.

In addition to these costs there are probably also other diffuse costs that stem from having a large and unrestrained financial sector. Such costs may arise, for example, if the reputation of business and industry as a whole is damaged because a certain culture within the financial sector affects the public perception of other parts of the business sector, or if the social contract is put under pressure, for example because a group of individuals are highly remunerated for work that is not considered to be to the benefit of society. The debate in the wake of the financial crisis provides some evidence that there are such links. However, even if there were some substance to these arguments, it is far from clear that a transaction tax would be the right way of handling the problem. Ultimately, a transaction tax could increase costs for households and companies by increasing the costs of financial services. In the United States, for instance, the financial intermediaries (banks, insurance companies and investment banks among others) pass on the charges for share trading to their customers (Matheson, 2011).

There is, however, some support for the view that the financial sector's share of the economy has grown in recent decades. In 1960, turnover in the US financial and insurance sector accounted for only 4 per cent of the nation's GDP; in 2007 it accounted for 8 per cent (Krugman, 2009). The financial sector's share of GDP in the United States has also quadrupled over the last 60 years, if we look at the total for profits and wages in the sector. In the UK, the banking sector's assets increased from 50 per cent of the country's GDP in the 1970s to 300 per cent in 2000, and to as much as 550 per cent in 2007.¹³

The international financial crisis during the autumn of 2008 demonstrated that an excessively large financial sector creates risks that can inflict substantial costs on the economy. This applies above all if the financial market becomes so concentrated that it is dependent on only a few financial companies that cannot be allowed to go bankrupt as this would have devastating effects on financial stability. The financial crisis in Iceland is an example of how an excessively large banking sector can create a degree of financial instability that has consequences for the real economy. This is also confirmed in several studies. These studies support the view that a larger financial sector increases growth in countries with a lower level of financial development, while a larger sector reduces growth in countries that already have well-developed financial markets.¹⁴ One reason given for this is that excessive lending increases the risk of unproductive investments. The results in Arcand et al. (2011) indicate that an upper limit for lending to the private sector is approximately 110 per cent of GDP. However, more research is needed before we can draw any conclusions about the appropriate size of the financial sector in individual countries.

At the same time, the course of the financial crisis demonstrated that it is important for the companies that there are banks that have sufficient capacity to supply the economy with credit. One of the most basic functions of the financial market is to mediate loans between those who want to save and those who want to invest or consume but lack

¹³ Speech by Lorenzo Bini Smaghi, a member of the Executive Board of the European Central Bank, at the Nomura Seminar on 15 April 2010.

¹⁴ See Arcand et al. (2011); Rioja and Valev (2004); Deidda and Fattouh (2002).

sufficient funds. If the banks decline to lend to households and companies that have profitable investment schemes, then credit rationing will arise and will have negative effects on consumption, investment and GDP.

It is not self-evident that a tax on financial transactions would affect the size of the financial sector either. When analysing taxes, it is of central importance to distinguish between who in purely formal terms pays the tax and who actually bears the economic cost. It is difficult to assess the economic incidence, that is the actual allocation profile, of a transaction tax. For example, the tax may ultimately burden financial institutions, marketplaces, or non-financial firms by changing capital costs. Firms' cost of capital will increase if investors are to be compensated for the tax (which is the case, for example, if the return requirement after tax is determined in international capital markets). This will lead to a fall in investment and thus to lower GDP. The tax may also burden households and non-financial companies by making financial services more expensive and increasing the costs of risk diversification. To the extent that the tax would lead to more costly risk diversification for the households and be passed on to firms' cost of capital and the costs for government borrowing, it would not be a tax on the size of the financial sector.

There are other instruments that are more appropriate for dealing with an excessively large financial sector. The IMF (2010) has, for example, outlined a *Financial Activities Tax*. This tax would be in proportion to the total wages and profits of the financial companies, which means that the tax base can be compared to the added value that is liable to VAT. The aim of such a tax would therefore be to compensate for the fact that most financial services are exempt from VAT. This exemption from VAT means that the financial sector is indirectly subsidised and is possibly larger than it would otherwise be.

A transaction tax thus gives rise to several negative externalities. Those who advocate such a tax claim that, despite this, a properly-designed transaction tax could strengthen the central-government budgets in those countries that introduce the tax. We discuss the fiscal aspects below.

6 Fiscal aspects

The fiscal arguments for a transaction tax are based in part on the claim that the tax revenues would help to strengthen the weak public finances that have followed in the wake of the financial crisis in many countries. The idea is that the tax will also fund support measures for the sector in the future. However, there is an incongruity here between the two aims of the tax: improving the workings of the financial market and generating income. To the extent that the tax affects the volume of speculative transactions it will have a negative impact on revenues; to the extent that the tax generates revenues it will not, on the other hand, affect the speculative transactions.

The financial crisis that began in 2007 led to extensive government support measures for the financial sector in many countries. Although parts of the government guarantees were not used in full, the financial sectors in, for example, Belgium, Ireland, Germany, Greece,

the Netherlands, Spain, the United Kingdom and the United States were in total offered public resources that averaged 7 per cent of GDP. If we take into account the fact that some of this support has been repaid, the costs average 5 per cent of GDP: 38 per cent in Ireland, 6 per cent in the United Kingdom, 12 per cent in Germany and 3 per cent in the United States (IMF, 2011). However, if we look at the economy as a whole the costs have been much larger: the loss of production as a result of the financial crisis during the severest downturn averaged 26 per cent of GDP in the G20 countries (IMF, 2010). The intention is that the revenues from the transaction tax will partly cover these costs.

So how large are the potential revenues? The expected revenues vary depending on the tax rate, the extent of the geographical area covered by the tax and the trading volumes. Until there is international support for a transaction tax, the revenues will also be affected by the possibility to avoid the tax. The size of the revenues will, for example, depend on to what extent the transactions migrate to untaxed markets. As mentioned earlier, the Swedish transaction tax led trading in Swedish shares to migrate to the London Stock Exchange when currency regulation was abolished. Subsequent technological developments and the globalisation of the financial markets suggest that the tax base is probably even more mobile today.

Table 1 shows revenues as a percentage of GDP in a number of countries that have or have had a transaction tax.

Table 1. Revenues as a percentage of GDP

| COUNTRY | 1990 | 1995 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|
| France | 0.05 | 0.01 | 0.03 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 0 |
| Germany | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hong Kong | n/a | 2.10 | 1.32 |
| India | n/a | n/a | n/a | n/a | n/a | n/a | 0.02 | 0.07 | 0.12 | 0.19 | 0.1 | n/a |
| Italy | 0.08 | 0.12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Japan | 0.18 | 0.11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Korea | 0.12 | 0.18 | 0.62 | 0.37 | 0.45 | 0.32 | 0.26 | 0.41 | 0.43 | 0.58 | n/a | n/a |
| South Africa | n/a | n/a | n/a | 0.34 | 0.36 | 0.36 | 0.46 | 0.54 | 0.58 | 0.49 | 0.51 | n/a |
| Switzerland | 0.56 | 0.38 | 0.85 | 0.67 | 0.5 | 0.46 | 0.47 | 0.44 | 0.46 | 0.46 | n/a | n/a |
| Taiwan | n/a | n/a | n/a | 0.65 | 0.77 | 0.72 | 0.85 | 0.65 | 0.79 | 1.07 | 0.77 | n/a |
| United Kingdom | 0.12 | 0.17 | 0.45 | 0.27 | 0.23 | 0.22 | 0.22 | 0.27 | 0.28 | 0.29 | 0.22 | n/a |

Source: Matheson (2011).

The tax revenues in France, Japan, Germany and Italy amounted at most to 0.2 per cent of GDP. In South Africa, South Korea, the United Kingdom and Switzerland the tax generated revenues corresponding to 0.2-0.7 per cent of GDP, while the revenues in Hong Kong and Taiwan amounted to 1-2 per cent. Table 1 thus reveals that the Commission's estimate of the revenues from a transaction tax at the EU level, that is 0.5 per cent of GDP, is in the upper range for those European countries that have or have had such a tax.

The tax revenues will also vary depending on how the tax base is defined and to what extent transactions in similar untaxed instruments increase. Table 2 shows how the revenues are expected to vary depending on how the tax base is defined.

Table 2. Forecast revenues from the taxation of transactions

| SOURCE | TAX BASE | TAX RATE (%) | FORECAST REVENUES (USD BILLION) |
|----------------------------|-------------------------------------|--------------|---------------------------------|
| Pollin et al. (2008) | USA, shares | 0.5 | 28-55 |
| | USA, forwards | 0.002 | 1-3 |
| | USA, options | 0.5 | 3-7 |
| Schmidt (2007) | USD, spot, forward and swap | 0.005 | 28.4 |
| | GBP, spot, forward and swap | 0.005 | 12.3 |
| | EUR, spot, forward and swap | 0.005 | 5.6 |
| | JPY, spot, forward and swap | 0.005 | 5 |
| Schulmeister et al. (2008) | Shares, global | 0.01 | 6.6-7 |
| | Bonds, global | 0.01 | 1.4 |
| | Derivatives, stock exchange, global | 0.01 | 110-147 |
| | Derivatives, OTC, global | 0.01 | 83-111 |
| Spratt (2006) | USD, spot and derivatives | 0.005-0.01 | 10.7-20.9 |
| | GBP, spot and derivatives | 0.005-0.02 | 4.3-8.4 |
| | EUR, spot and derivatives | 0.005-0.03 | 2.5-4.9 |
| | JPY, spot and derivatives | 0.005-0.04 | 2.1-4.1 |

Sources: Pollin et al. (2008), Schmidt (2007), Schulmeister et al. (2008) and Spratt (2006).

Table 2 shows that revenues vary considerably depending on the size of the tax base. Revenues are also dependent on transaction elasticity, which indicates how the tax base is affected by changes in the tax rate. There is a high degree of uncertainty in the assessment of the transaction elasticity. Pollin et al. (2008) assume that a transaction tax of 0.5 per cent on shares and options would reduce trading in the United States by 50 per cent or that trading volumes would remain unchanged. Schulmeister et al. (2008) assume that trading in shares, bonds and derivatives would fall by 10-40 per cent if a 0.25 per cent tax were introduced at the global level.

Here we would once again like to refer to the experience in Sweden, which shows that the revenues from a transaction tax can be volatile for several reasons:

- (i) On deregulated and internationalised financial markets it is easy to move transactions to untaxed markets. The development of automated and computerised trading has probably made it even easier to do so. This erodes the tax base.
- (ii) It has proven to be problematic to legally determine what constitutes a taxable transaction. This makes tax inspection more difficult and increases the trade in untaxed financial instruments, which in turn erodes the tax base. Increased trading in untaxed financial instruments also gives us cause to question whether the tax reduces the element of speculation on the financial market.

(iii) If the tax performs its function and makes the market more efficient – contrary to the claims made in this article – the tax base will shrink when trading in financial instruments declines. This undermines the fiscal arguments for the tax.

7 Concluding comments

At first glance, a tax on financial transactions may seem to be an attractive policy instrument with the potential to affect the workings of the financial markets and to generate tax revenues. However, this picture does not really stand up to a closer examination.

There is a lack of clear evidence that it would be possible in any desirable way to affect the workings of the financial markets with the help of a transaction tax. Neither economic theory nor empirical experience support the claim that transaction taxes help to reduce volatility. Nor can we see that such taxes would help to establish a level of financial risk taking that is more in line with society's interests. It is true that a proportion of the computerised trading in financial instruments would no longer be profitable if a transaction tax was introduced, but we believe that it is highly uncertain whether this would be desirable. If computerised trading helps to reduce transaction costs for investors and to make price setting more efficient, then the tax would create problems rather than resolve them. There is also a direct conflict between the two aims of the tax. Either the volume of speculative transactions is not affected – and the tax then generates revenues – or these transactions decline at the expense of the tax base. Nor is it self-evident that a tax on financial transactions would affect the size of the financial sector. There is, for example, a risk that the tax would increase the cost of risk diversification and that these costs would be passed on so that they increase the companies' capital costs and the costs of central-government borrowing. In this case it would not be a tax on the size of the financial sector.

The value of a transaction tax as a source of revenue can also be questioned. Taxes generate revenues, but also usually entail costs in the form of economic distortions. These distortions reduce economic activity. When choosing between different taxes, the starting point should be that public expenditure should be funded at the lowest possible cost to the economy; in other words, taxes that entail severe distortions should be avoided. Taxes that correct for externalities are an exception, but as can be seen above it is not clear that a transaction tax performs such a function. Studying the economic effects of different taxes makes it possible to rank the alternatives in relation to how costly they are in terms of economic efficiency. Measured in this way, a tax on financial transactions would probably be seen as a poor way of generating tax revenues. Major distortions can be expected in the form of transactions migrating to other countries or to untaxed financial instruments, or coming to a complete halt. The tax would also increase firms' cost of capital, which would reduce investment and thus lead to lower GDP. Government borrowing costs would also increase and this would have to be met by other tax increases or by spending cuts.

Following a closer analysis, a tax on financial transactions appears to be primarily a political symbol. There is no doubt that there is a need to reform the financial system, and many countries are in need of tax revenues to strengthen their public finances. The financial crisis has led to an international debate on how to reform the financial system and how it should be regulated. The debate has also concerned what policy instruments are available to strengthen financial stability. This has led, among other things, to a new, extensive regulatory framework for banks, Basel III. This framework imposes tighter, countercyclical capital requirements on the banks, which means that they must restrict their lending in boom periods. The banks must also retain a larger proportion of equity on their balance sheets, and they are subject to new demands regarding liquidity management.

There are also measures that aim to minimise the costs to the taxpayers in the event of a banking crisis. For example, the Swedish stability fee, which the government introduced in 2009, is an instrument that aims to safeguard the interests of the taxpayers and to strengthen financial stability in the long term. The fee is levied on a base that, in simple terms, consists of the liabilities side of a relevant credit institution's balance sheet. The Swedish stability fee provides revenues for a stability fund that can then be used to manage financial crises. Several other EU countries are considering whether to introduce stability fees, including Belgium, Denmark, France, the United Kingdom and Germany. A new EU authority, the European Systemic Risk Board (ESRB), has also been set up recently to supervise the financial system in the EU at the macro level. The ESRB will work to prevent and reduce systemic risks that can threaten financial stability in the EU.

The *Financial Activities Tax* described by the IMF (2010) has also been widely discussed. The European Commission, for example, has discussed this alternative but not presented any concrete proposals. A tax on financial activities may take different forms, but the idea is that the tax could balance the VAT exemption that covers large parts of the financial sector. Denmark is an example of a country that has introduced such a tax.

The effects of a transaction tax should be evaluated in relation to these measures. Otherwise, there is a risk that several economic policy instruments will be introduced to achieve the same ends; in other words there is a risk that a transaction tax will be introduced at the same time as there are other planned or existing measures that are better suited to improving the workings of the financial market.

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