Macroprudential policy rules

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Tatiana Fic[1]

The crisis has shown that to reduce systemic risks and minimise the probability of future crises, the monetary policy needs to be complemented with the macroprudential policy. This paper argues that for transparency and communication reasons the macroprudential policy may need to have a quantitative target. We consider various macroprudential policy tools and targets, and propose a stylised framework for (monetary-) macroprudential policy rules. Two macroprudential policy rules are estimated: a countercyclical capital buffer rule and a loan-to-income ratio rule.

[1] Dr Tatiana Fic, National Institute of Economic and Social Research.
Contact details: 2 Dean Trench Street, Smith Square, SW1P 3HE London. Tel.: +44 207654 1915.
Email address: t.fic@niesr.ac.uk
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Macroprudential policy instruments and target(s)

The objective of macroprudential policy is the stability of the financial system.

There are two distinct types of systemic risk (Bank of England, 2011): time-varying (cyclical) and structural (cross-sectional) and there is a broad set of macroprudential policy instruments that could address them. This set of instruments encompasses three groups of tools: those that affect the structure of the balance sheets of financial institutions, those that affect the terms and conditions in which financial institutions operate; and those that influence market structures. The first two groups relate to cyclical risks, and the third category – to cross-sectional risks.

The Bank of England has recently proposed that the Financial Policy Committee should initially have powers of direction over the following tools: the countercyclical capital buffer, sector capital requirements and a leverage ratio.

The effectiveness of macroprudential policy will be measured by the scale of reduction (or non-increase) in systemic risk. This may imply the need to quantify the macroprudential policy objective and to set a **quantitative target**.

There seems to be a certain degree of analogy with monetary policy. The objective of monetary policy is to ensure price stability. There is a broad set of indicators taken into account when assessing risks to price stability, but it is the inflation target that constitutes the benchmark against which the effectiveness of monetary policy is measured.

The potential quantification of the macroprudential policy objective is difficult not only because the measurement of risk is difficult (risk is unobservable), but also because one will probably need to decide on the hierarchy of different types of risk. If the set of instruments is to remain narrow (Bank of England, 2011), the set of measurable objectives, that is targets, should remain narrow as well, as, according to the Tinbergen rule, for each policy target there must be at least one policy tool (if there are fewer tools than targets then some policy objectives will not be achieved).

The set of key targets, and the effectiveness of transmission channels (both in terms of the impact and the speed) would help determine an optimal set of macroprudential instruments, and the patterns of their use (frequency, scale, etc).

There are several indicators of systemic risk (Bank of England, 2011): quantity- and price-based indicators, composite and model-based indicators, indicators of concentration risk, opacity and complexity, and survey-based indicators.

The set of the above indicators could constitute a set from which possible macroprudential targets could be chosen. In particular, the quantitative indicators encompass inter alia: various measures of excess credit growth such as credit-to-GDP ratio or a credit-to-GDP gap (the difference between the ratio of the indebtedness of the household and corporate sectors to GDP and its long term trend), and other measures that can be built around credit growth or various types of credit. The price-based indicators such as asset prices and, in particular in the context of the recent crisis, property prices could potentially form one of the quantitative targets. The composite and model-based indicators as targets of the macroprudential policy would to a large extend rely on the appropriateness and adequacy of the method of their construction.

The relative weights of individual targets would probably differ over time reflecting changing macroeconomic and structural conditions; they would also reflect preferences of the macroprudential policy authorities.

Macroprudential policy rules

While the macroprudential policy regime will to a large extent rely on judgement (especially in the beginning (that is during the learning phase)), introducing rule-based elements into it may bring advantages.

Firstly, it may help organise the thinking about policy.

Secondly, in the future, it can contribute to increased transparency and better communication of macroprudential policy decisions. It would relieve the pressure of policy makers to abstain from policy adjustments during economic expansions, when any discretionary tightening might be challenged by public myopia.

Assuming that macroprudential policy would want to address three types of risks (risks arising from the inadequate structure of financial institutions' balance sheets, risks corresponding to the terms and conditions of financial transactions, and market structure risks), a stylised framework for **macroprudential policy rules** can be written in the following way (monetary policy rule added for comparison and completeness):

Table 1. Monetary and macroprudential policy rules

Risks	Rules
	Monetary policy rules
Inflation	Interest rate = f(inflation gap; output gap)
	Macroprudential policy rules – examples
Cyclical risks	
Balance sheets composition	Balance sheet structure instrument* = f(cyclical risk target*) E.g. Countercyclical capital buffer = f(Credit-to-GDP)
Terms and conditions of financial transactions	Terms and conditions instrument*= f(cyclical risk target*) E.g. Loan-to-Income = f(house prices)
Cross-sectional risks	
Market structure	Market structure instrument*= f(cross-sectional risk target*)

* Balance sheet instruments: e.g. countercyclical buffer, sectoral capital requirements, leverage ratio, liquidity buffer, etc.; targets: credit-to-GDP, credit gap, credit growth, lending margins etc
* Terms and conditions instruments: e.g. LTV, LTI, margining requirements; targets: house price growth, deviation of house prices from equilibrium (complementarily also GDP (wealth) or housing construction)
* Market structure instruments: e.g. wholesale funding taxation[2], targets: e.g. a composite measure of interconnectedness, indicators based on survey information

Future research and decisions will determine what the optimal instruments and targets under the three categories of risks: balance sheets, market terms and conditions and structural risks, might be. The current set of instruments as proposed by the Bank of England – the countercyclical capital buffer, sectoral capital requirements and a leverage ratio – (directly) addresses only risks emanating from the composition of bank balance sheets. If targets are specified quantitatively, it will remain to be verified empirically which of the instruments are most effective. This will require identifying the channels of macroprudential policy transmission.

Preliminary estimates

Assuming that there was an (imperfect) invisible hand of macroprudential policy before the crisis (or that the banks set their prudential policy themselves), below we attempt to estimate pre-crisis rules that could potentially have been addressing (unsuccessfully) risks emanating from the structure of bank balance sheets and the terms and conditions in which financial institutions operate.

[2] I thank Philip Davis for this idea

The rules are specified as:

Countercyclical buffer = f(Credit-to-GDP)

Loan-to-Income = f(house prices)

We use quarterly data from the NIGEM UK banking sector model over 1991-2011 and construct the countercyclical buffer and the loan-to-income rules using error correction modelling techniques (both the instruments (the countercyclical buffer and the loan to income ratio), as well as the targets (the ratio of credit to GDP and real house prices) are integrated of order 1).

In case of the countercyclical buffer rule, we do not find a long run relationship[3] between the countercyclical buffer and the ratio of credit to GDP. Therefore, we augment the countercyclical buffer equation with a new variable - the rate of return on equity. If it was the banks themselves, who set the rule, their possible target could be formulated in terms of profitability. We also introduce a break in the sample in 2007Q3 allowing for a structural change reflecting the start of the crisis and the ensuing increased regulation.

In case of the loan-to-income ratio, we construct a "long run" relationship between the loan to income, real house prices and the output gap.

Results of the above estimation exercise are shown below[4].

Countercyclical buffer rule:

$$d(ccb_t) = -\underset{3.89}{0.28}(ccb_{t-1} - \underset{4.1}{1.39}\frac{credit_{t-1}}{GDP_{t-1}} * D_{crisis} - \underset{3.78}{0.39}(1 - D_{crisis}) * REQ_t)$$

where: ccb- countercyclical buffer (computed as the difference between the capital adequacy ratio (NIGEM definition) and Basel II minimum of 8 per cent), credit – credit to the private sector (NIGEM definition), GDP – GDP, D_{crisis} – dummy variable equal to 1 from 2007Q3 onwards, 0 otherwise, REQ – return on equity (NIGEM definition).

The preliminary results may suggest that before the crisis banks probably extended their capital buffers in response to higher profitability - higher profitability could reflect higher risks taken by banks (and the need to extend capital buffers

[3] The relationship that we find is spurious (a structural break may introduce spurious unit root behaviour in the cointegrating relationship).

[4] We report t-Statistics, however, we would not like to interpret them in terms of statistical significance, as much more testing would need to be done. We would not like to interpret the "long run" relationships in terms of cointegrating relationships neither, as much more testing would need to be done.

(insufficiently)) or an opportunity to retain profits in the form of capital. After the crisis hit, the new regulation (possibly taking into account the credit-to-GDP ratio as one of the important risk indicators) has forced banks to increase their capital levels.

Loan-to-income rule:

$$d(LTI_t) = \underset{4.56}{1.8} - \underset{3.7}{0.18}(LTI_{t-1} - \underset{3.7}{1}\, HP_{t-1}) - \underset{4.4}{1.33}\, OG_t + \underset{3.8}{1.14}\, d(HP_{t-1})$$

where LTI – loan to income ratio, HP – real house prices (log), OG – output gap (NIGEM definition)

The results show that over the sample period higher house prices corresponded to higher loan to income values[5] – this suggests that the "invisible hand" of macroprudential policy (or the banks) did not perceive risks emanating from house price developments as requiring a response. On the contrary, the loan-to-income ratio was allowed to grow indefinitely (the series is integrated of order 1 I(1)).
The issue of unit roots in instrument series is worth investigating further; unit roots can be a symptom of an explosive (unsustainable) behaviour which can lead to crises. The nonstationarity of the instrument series may also suggest that the long run equilibrium (between financial stability instruments and targets (or indicators of systemic risk) – that is financial stability – may have not been achieved yet.

It should be emphasised that the objective of the above estimation exercise is illustrative. It is to help organise the thinking about how macroprudential policy may potentially respond to risks, rather than to provide any policy recommendation. A lot of research (and time) will be needed before the relationship between potential targets of the macroprudential policy and its instruments can be established.

[5] Output gap is a control variable (controlling for changes in the denominator of the dependent variable)

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