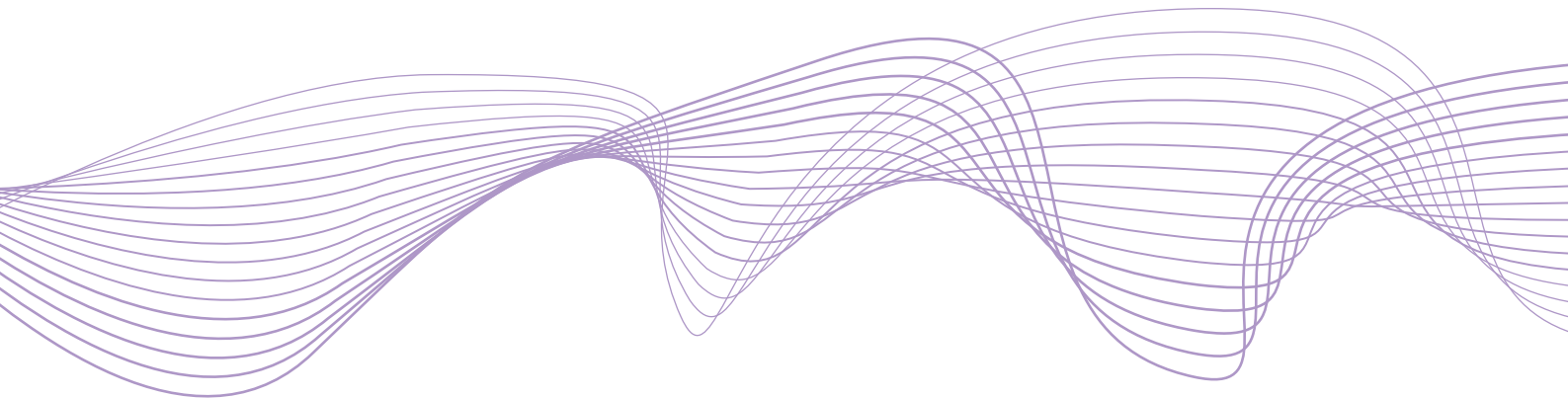# Working Paper Series

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Evaluating macroprudential policies

by
Claudia M. Buch
Edgar Vogel
Benjamin Weigert

ESRB
European Systemic Risk Board
European System of Financial Supervision

Abstract

Macroprudential policy is a relatively new policy field. Its goal is to preserve financial stability and to prevent the build-up of systemic risk that may have adverse effects for the functioning of the financial system and for the real economy. New institutions have been tasked with the implementation of macroprudential policies, and new policy instruments have been introduced. Nonetheless, uncertainty about the state of the financial system and the effects and effectiveness of these policy instruments is high. This uncertainty entails two risks: the risk of acting too late (inaction bias) and the risk of choosing an inappropriate instrument or inadequate calibration. In this paper, we argue that both risks can be mitigated if macroprudential policy is embedded in a structured policy process. Such a policy process involves four steps: defining policy objectives for macroprudential policies, choosing intermediate objectives and appropriate indicators, linking instruments to these indicators through *ex-ante* evaluation studies, and analyzing the effects of these policies through *ex-post* evaluation studies. We argue that the infrastructure for this policy process can be further improved by providing data for policy evaluation, establishing or strengthening legal mandates for policy evaluation, establishing mechanisms for international cooperation, and building up repositories of evaluation studies.

JEL-codes: G01, F34, G21

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1 Background

In response to the financial crisis, financial sector regulation has been intensified and expanded in scope. Macroprudential regulation has been established as a new policy field complementing microprudential regulation and other macroeconomic policies, notably monetary policy. A key lesson of the Global Financial Crisis has been that proper microprudential supervision of financial institutions and their risks is a necessary, but not a sufficient condition to ensure financial stability. Conceptually, microprudential regulation and supervision follows a partial equilibrium approach which essentially treats the (macroeconomic) risks faced by financial institutions as being exogenous (Hanson, Kashyap, and Stein 2011). By construction, general equilibrium effects and macroeconomic implications are not taken into account. In this respect, macroprudential regulation and supervision complement microprudential regulation and supervision by adding a system-wide perspective, including general equilibrium effects. Linkages across the financial system and linkages to the real economy are explicitly taken into account. As a consequence of this shift in focus, systemic risk has been referred to more frequently (Figure 1).

"Systemic risk" addresses endogenous risks to financial stability. Systemic risk is the risk of a shock to a single agent in the real or financial sector translating into economy-wide distress. The degree of systemic risk and the probability of such a situation materializing can depend on the risk of individual financial institutions failing (which is the focus of microprudential regulation and supervision), the size of institutions and the degree of market concentration ("too big to fail"), their degree of interconnectedness ("too connected to fail"), and their exposure to common risks ("too many to fail"). Often, these risks take the form of externalities that are not borne by the originator but by others, such as the public sector or other private market participants (Admati and Hellwig 2013). Macroprudential policy seeks to identify and internalize the costs emanating from these risks, i.e. risks that may threaten the functioning of the financial systems and that adversely affect the real economy. Surveillance of risks is therefore a key element of macroprudential policy. Should macroprudential surveillance signal a build-up of systemic risk, various policy instruments can be used, ranging from (public) communication to instruments such as the countercyclical capital buffer, buffers for systemically important institutions, or borrower-based instruments (Box 1). As macroprudential tools have become standard tools for policymakers, the measures taken will need to be revisited and adjusted on a regular basis (Figure 2).

Most designated macroprudential policy instruments have become available only after the financial crisis. Broad experience with specific macroprudential instruments is thus scarce (IMF-FSB-BIS 2016),[1] which means that the effects and the effectiveness of macroprudential measures will have to be verified through *ex-post* policy evaluation. While evaluation of macroprudential policies is, at present, often a by-product of academic research, it should become a regular and well defined part of the policy process. Unlike for monetary policy, numerical targets are not yet readily available for financial stability. Evaluations are thus one way to establish accountability of macroprudential policy, to increase transparency of the policy process, and to improve communication of policy effects - intended and unintended. At the same time, there are many challenges when evaluating macroprudential measures. It is sometimes difficult to identify causal effects and to quantify the aggregate impact of policy measures.

In this paper, we sketch the elements of a structured process of evaluating macroprudential policies. The paper does not develop a normative view on the design and scope of macroprudential regulation. Rather, we take the set of available policy instruments as given and discuss how macroprudential policy evaluation can be structured to improve our understanding of their effects. Finally, we briefly discuss ways how the structured policy process sketched in this paper can enhance the efficiency and effectiveness of the existing macroprudential framework in Europe.

Policy evaluation should be seen as part of a process which involves four interlinked steps.[2]

In a first step, the **policy objective(s)** of macroprudential policy need to be specified. Macroprudential authorities use different definitions of the policy objective, but all aim at reducing systemic risk arising from externalities. Ideally, the policy objective is derived from an analytical framework which links systemic risk externalities and the functioning of the real economy.

In a second step, **intermediate objectives** need to be specified and appropriate indicators need to be chosen. Intermediate objectives are linked to the drivers of systemic risk such as leverage, risk-taking incentives, connectedness, or exposure to common shocks. In many cases, it will not be possible to specify a direct, simple, and linear relationship between intermediate objectives and financial stability. For example, the link between the

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[1] For surveys of the evidence from individual countries, see CGFS (2010) and IMF (2013) or, in a historic context, Brunnermeier and Schnabel (2016).

[2] See Houben, van der Molen, and Wierts (2012) for a similar structure (Figure 1).

connectedness of financial institutions and the probability of financial contagion is non-linear (Allen and Gale 2000). Intermediate objectives can thus be state-dependent because their relationship to financial stability depends on the structure and the state of the financial system and the real economy.

In a third step, the activation or recalibration of policy instruments that address systemic risk externalities needs to be considered. The decision on whether and how to activate policy measures should be based on a structured process of ***ex-ante* policy evaluation**. Such an *ex-ante* evaluation provides information about the relative performance of different instruments in contributing to reducing systemic risk. Trade-offs between stability and other policy objectives can be taken into account when performing such a cost-benefit analysis and when calibrating instruments.

In a fourth step, and once sufficient time has elapsed, the effects of the instruments need to be assessed in an ***ex-post* evaluation**. This step provides information about the effectiveness of the measure(s) taken, about intended or unintended side effects, and it also serves as an input into a possible recalibration of the policy instruments.

Ultimately, policy evaluation provides information going beyond the assessment of specific policy instruments by answering the question „how to get there". Instead, it can also contribute to addressing the question „where to go" by providing information about the appropriateness of the specific policy objectives and targets, which may be revised if needed. This is particularly important given that macroprudential policy is a relatively new area and given that experience with the above policy cycle is limited.

In addition to the conceptual challenges of measuring the degree of financial stability and the level of systemic risk, the evaluation of macroprudential policy faces methodological challenges. Macroprudential policy instruments have a macroeconomic impact and in most cases affect the entire population. Many micro-econometric methods that are used to identify causal policy effects can provide information about the effects of policies on individual incentives and behavior but not the effects on the system as a whole. In addition, identifying causal effects by designing a „laboratory" experiment comparing treatment and clearly delineated control groups is typically not feasible. But macroprudential policy can learn from the experiences made in many other policy areas facing similar challenges. Approaches that are routinely used to assess the effects of other macroeconomic policies, notably monetary policy, can be applied to issues of financial stability as well. Also, micro-data sets can be used to analyze whether policies work through the intended microeconomic adjustments.

But policy evaluation is not only about choosing the right (empirical) methodology. Policy decisions require democratic legitimacy. Macroprudential measures can, for example, have distributional consequences, and authorities that potentially activate such measures need a clear legal mandate for doing so. At the same time, political interests or electoral cycles may stand in the way of an objective weighing-up of the costs and benefits of regulations in the best public interest. In a broader sense, a structured policy process can thus be a key element in ensuring that policy decisions are based on the best available knowledge, on independent assessments, on transparent decisions, and that decision-makers are accountable to the public.

In section 2, we describe a stylized policy process for macroprudential policy and the methodological challenges involved. The evolution of monetary policy over time is used to illustrate the nature of such a policy process. In section 3, we describe the elements of an infrastructure that needs to be in place in order to make policy evaluation operational and cost efficient. Large parts of the required infrastructure are already in place. But we argue that further improvements are possible with regard to the provision of and access to data for policy evaluation, the specification of legal mandates, the establishment of mechanisms for international coordination, and the building up of a repository of evaluation studies that provides an overview of the available evidence. The last section offers tentative conclusions and lays out the way for further policy work and research.

2   Specifying the Macroprudential Policy Process

Knowledge about the (causal) effects of macroprudential policies on the economy is limited. Macroprudential policy making takes place under a high degree of uncertainty, both with regard to the triggers of policy actions and the effects of measures taken. Decisions have to be made with regard to the definition of policy objectives, the specification of intermediate objectives and indicators, and the choice of policy instruments. Considering the analytical aspects of financial stability, choices have to be made with regard to the degree of granularity of the database and the conceptual models that should guide policy making. The associated uncertainty entails risks. There is the risk of an inaction bias and the quest for "more data" and "more analysis" before introducing and activating policy measures. And there is the risk of choosing an inappropriate instrument or inadequate calibration.

In this section, we lay out elements of a structured policy process which should help to mitigate these risks by addressing methodological and procedural issues. We begin by describing the steps involved in this policy process, and we then draw parallels to the development of such a process for monetary policy (Box 2).

2.1 Step 1: Defining Policy Objectives

Macroprudential policy requires clear objectives. Generally, systemic risks in financial systems arise if the distress of one institution (or group of financial institutions) threatens the functioning of the entire financial system with adverse impacts for the real economy (Hellwig 1998). The stability of a financial system can thus be judged against its ability to provide its core economic functions, even in times of distress. These functions comprise the allocation and provision of credit, the allocation of risks, and the provision of a stable payments system.

Systemic risk can build up endogenously through domino effects: if one institution fails, others with direct contractual linkages might fail as well. But there can also be informational contagion, leading to runs on the assets of other financial institutions, even those without any direct contractual linkages. If one institution becomes distressed, it will try and raise equity capital and/or sell assets. This has effects on markets: the price of capital increases and asset prices fall. Other institutions will be also affected by these price effects, even if they have no direct financial linkages amongst each other and have not been subject to runs. The smaller the original capital buffers against shocks, the larger will be the endogenous price response in the system. Also, the risk management of individual financial institutions will take insufficient account of externalities that decisions have for the system as a whole. Ultimately, understanding the sources of systemic risk, deriving policy objectives and indicators requires a conceptual framework that comprises the relevant frictions that can lead to systemic risk externalities.

While it is difficult to collapse the degree of „financial stability" into a single number, the importance of systemic risk externalities yet depends on features of financial systems that can be observed and measured: the size of financial institutions, risk-taking incentives, the degree of interconnectedness, and the exposure to common shocks are indicators of systemic risk externalities. These indicators can be used to operationalize the policy objective „financial stability" and to evaluate policies against this objective.

Ultimately, it may also be necessary to modify the concrete specification of the objective, if needed, based on a structured process. If, for example, *ex-post* policy evaluation shows that specific targets have not been met, the question needs to be raised why there is a missing (causal) link. Is it due to a lack of effectiveness of the instruments or their implementation, due to the missing conceptual link between instruments and objectives — or due to an intermediate policy objective that is insufficiently linked to financial stability?

2.2   Step 2: Measuring Intermediate Objectives Using Indicators

Operationalizing macroprudential policy requires the definition of appropriate intermediate objectives and indicators that are linked to relevant aspects of financial stability. The relevance of these intermediate objectives for the stability of the financial system depends on the structure and state of the financial system, and on overall economic conditions.

There is no shortage of potential intermediate objectives. A list of intermediate objectives with associated policy instruments is, for instance, provided by the European Systemic Risk Board (2013, 2014) and reproduced in Table 1. These include credit growth and leverage, maturity/currency/liquidity transformation, direct and indirect exposure concentrations, misaligned incentives and moral hazard as well as disruptions to financial market infrastructures. As the stability of the financial system ultimately needs to be judged against the services the system provides for the real economy, this list could be expanded by including indicators capturing the state of the real economy.

The challenge for research is to identify the most relevant subset from the universe of potential statistics. For this purpose, a range of methodological tools is available, including signal-extraction and early-warning models (Kaminsky and Reinhart 1999; Lo Duca and Peltonen 2013; Tanaka, Kinkyo, and Hamori 2016). Bisias, Flood, Lo, and Valavanis (2012) survey the literature and count up to 31 quantitative measures of systemic risk. All of these indicators capture relevant aspects of systemic risk. They show, most importantly, that frequently used indicators like credit growth, the credit-to-GDP gap, or measures for liquidity mismatch may not always capture systemic risk adequately. Moreover, measures of systemic risk cannot be mapped into a single numerical target for macroprudential policy. A range of indicators related to the sources of systemic risk will thus have to be used to assess the degree of financial stability, and an assessment of the macroprudential policy stance will involve the use of qualitative information as well.

2.3   Step 3: *Ex-ante* Evaluation of Macroprudential Instruments

Macroprudential policy instruments aim at mitigating system risk externalities. Irrespective of the specific policy instruments considered, their likely impact on financial stability should be assessed *before* activation, and actual effects and effectiveness need to be evaluated *after* implementation (and an endogenous adjustment of the systems). Hence, policy evaluation narrows the range of options and the degree of uncertainty about potential outcomes.

Beyond currently designated macroprudential instruments (Box 1), on which this paper focuses, policy instruments from other policy areas may also influence financial stability.

Box 1: A Typology of Macroprudential Policy Instruments

Macroprudential policy instruments broadly fall into two groups. A first set of instruments is related to the cyclical state of the financial system. These instruments will have to be calibrated fairly frequently or even on a regular basis. In the European Union, for instance, the Countercyclical Capital Buffer for banks has to be set on a quarterly basis (ESRB 2014a); many emerging markets have established loan-to-value (LTV) limits for mortgage loans and have changed these limits several times (McDonald 2015).

A second set of instruments addresses structural sources of systemic risk to the financial system. Examples for the banking sector include structurally higher capital ratios for all banks, capital buffers for globally and other systemically important institutions (GSIB and OSII-buffers respectively), a systemic risk buffer that can be used to address structural risk resulting from certain features of the domestic banking sector (Austria, hosting a number of banks with a large network of foreign affiliates, especially in Central- and East-Europe, uses this buffer to address the spillover risk to the Austrian banking sector) or mandatory resolution plans ("living wills") for large banks. These policies require less frequent action.[3]

Depending on whether macroprudential instruments affect financial intermediaries' capital (see above), liquidity (LCR or NSFR) or asset choices (LTV) their effect unfolds in different ways and should be used in different circumstances (CGFS 2012, ESRB 2014).

This list of instruments is by no means exhaustive and will be updated as experience is gained. For instance, after identifying a set of suitable macroprudential instruments for the banking system (ESRB 2014), the ESRB recently published its strategy to mitigate risks from non-banking entities (ESRB 2016). A list of currently available and active instruments and an overview over recent developments in the EUs macroprudential framework are provided by the ESRB (2017).

Most prominently, monetary policy has an impact on credit cycles and thus on risks to financial stability. Before the financial crisis, the consensus view was that monetary policy can largely ignore asset price swings or financial cycles. Bernanke and Gertler (2001, p. 253) argued that "*changes in asset prices should affect monetary policy only to the extent that they affect the central bank's forecast of inflation.*" Yet monetary policy may have been one of the factors that contributed to the global financial crisis (Taylor 2007). This has triggered an

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[3] For instance, the O-SII buffer must be reviewed at least annually (CRD IV Article 131 Lit. 6b).

ongoing debate about the possible extension of monetary authorities' mandate to include financial stability. [4] However, monetary policy instruments are rather blunt tools that cannot be targeted at specific risks to financial stability. This is one of the reasons why monetary policy should be reserved for its key purpose, ensuring price stability (Bernanke 2015). [5] Moreover, in an already fragile macroeconomic environment, monetary policy might not even be available as a macroprudential policy option (Brainard 2015).

Other policies besides macroprudential policy or monetary policy might also affect the stability of the financial system. Examples are tax policies, implicit and explicit subsidies or bail-out guarantees to financial institutions that affect leverage and risk choices, industrial policy supporting "national champions", or policies affecting the flexibility of the economy. Such policies include labor market regulations, bankruptcy laws, supply restrictions for housing, or barriers to entry and exit.

2.4 Cost-Benefit Analysis

Before specific policy decisions are taken, *ex-ante* evaluation provides information on their likely costs and benefits. Policy evaluation builds on the policy objectives and intermediate objectives of macroprudential policies as benchmarks. Such benchmarks can include qualitative objectives, such as improving the resilience of the financial system, but these should ideally be linked to the policy objectives through a measurable metric (indicator) such as the degree of capitalization of the financial system. Once such a metric has been identified and quantified, work needs to be done to examine how alternative policy choices affect the probability of reaching that target. Comparing alternative ways of reaching the same target allows cost-benefit analysis to be performed.

Given the current state of knowledge on macroprudential policy, cost-benefit analyses in this policy area have to take a broader perspective: they contribute to our knowledge about the optimal level of financial stability and examine the best way to attain it. Cost-benefit analyses of macroprudential policies are also required to help policymakers select from among the available instruments by comparing the effectiveness of different instruments. *Ex-ante*

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[4] For a review of the interaction between monetary policy and financial stability, see Deutsche Bundesbank (2015).

[5] The US Federal Reserve has a dual mandate: keeping inflation at 2% and ensuring maximum sustainable employment (https://www.chicagofed.org/research/dual-mandate/dual-mandate). The latter has a close relationship with the former via the well-known cyclical (co)movement of employment, wages, and prices.

analyses of macroprudential policies must not only answer the question "how to get there" but also "where to go".

One important advantage of a structured cost-benefit analysis is that it provides transparency about the decision-making process. By specifying how decisions are taken, which costs and which effects are taken into consideration, it becomes possible to compare actual outcomes to expected effects and to analysis deviations from expectations.

In this process, two important issues arise.

First, cost-benefit analyses for financial regulation can be more complicated and be surrounded by a considerably higher degree of uncertainty than in other policy fields (Cochrane 2014). In environmental regulation, for example, limiting the emission or concentration of toxic gases will improve public health and save lives. Such intuitive causal relationships are not available for most financial regulations. Most financial regulations have (first order) dynamic general equilibrium and feedback effects which affect the quantification of costs and benefits. Changing capital requirements for banks will, for example, affect the cost of lending. This may lower lending by domestic banks and, through this channel reduce investment and cross-border capital flows. However, other intermediaries, such as insurance corporations or foreign banks not affected by the regulation, may offer services in those parts of the markets which banks do not service any more. This may, in turn, weaken the intended effect of regulation. This feeds back into the stability of the financial system with an *ex-ante* unknown total effect.

Similar issues arise in other policy areas, however, and they do not necessarily provide an argument against structured cost-benefit analyses. To the contrary, without a structured framework for policy evaluation, general equilibrium effects are even more difficult to assess.

Second, cost-benefit analyses help identifying relevant policy tradeoffs. While macroprudential authorities have the legal mandate of targeting financial stability, there might be tradeoffs with regard to other policy areas. For example, containing credit growth to reduce excessive borrowing may have a negative short-term impact on output. Also, macroprudential measures targeting excessive mortgage lending might have distributional consequences and affect in particular younger families with low equity. In short, there will always be winners and losers, and the costs of regulation might be an issue particularly in the short run (Arregui, Beneš, Krznar, Mitra, and Santos 2013).

2.5   Step 4: *Ex-post* Evaluation of Macroprudential Instruments

Ex-ante policy evaluation *assumes* that certain macroprudential policy measures have causal effects on financial stability. But only *ex-post* analyses based on actual data can corroborate these assumptions, identify unintended consequences, reveal positive but unexpected effects, or uncover other channels through which a policy measure affects the economy. Only after measures have been implemented and after sufficient time has elapsed during which the system has reacted to these measures can causal *ex-post* impact assessments be conducted. The quality of such impact assessments increases with the design of the policy process and the quality of the data. *Ex-post* evaluation is needed in order to assess whether the targets that were chosen *ex-ante* have been reached. Good policy evaluation is thus based on two key ingredients – methods for causal identification and sufficiently granular data.

The challenges associated with robust *ex-ante* estimation and causal *ex-post* inference are not unique to macroprudential policy. Most policy areas suffer from the problem of policy endogeneity: the decisions of economic agents, including policy makers, are reactions to changes in the economic environment. The economic environment, in turn, changes in response to these decisions. Drawing on experiences made in other policy areas can address and mitigate methodological difficulties in evaluating the effects of macroprudential policy.

First, randomized field experiments, which are employed for instance in development economics, labor market research and educational economics, require a clear distinction between treatment and control groups. Ideally, the assignment of subjects to these groups should be random. Macroeconomic policies, by definition, affect all agents (financial institutions, firms, and households) in an economy with certain characteristics. Hence, a clear delineation of treatment and control groups is typically not possible, and agents that are affected are not randomly chosen.

Second, variations in macroprudential policies are a prerequisite for identification, but these variations are typically not exogenous. Macroprudential polices are endogenous: policymakers react to the (expected) economic environment. Therefore, observed policy changes cannot be used at face value to identify exogenous changes.

Third, macroprudential policy is not conducted in isolation. Interference with other policies – other prudential regulations, monetary policy, or fiscal policy – makes it more difficult to find a clear association of causes and effects.

Fourth, macroprudential policies are channeled through individual responses into aggregate outcomes. However, linking indicators of aggregate systemic risk to micro-level adjustments is challenging because of externalities and general equilibrium feedback effects.

Macroprudential policies aim to mitigate the adverse effects that shocks to individual institutions or parts of the system can have for the functioning of the entire financial system. Modeling and quantifying these effects thus requires an empirical framework which allows both, studying the effects of shocks in a macroeconomic, general equilibrium framework while at the same time providing information on microeconomic adjustments.

These challenges and in particular the issue of endogeneity are inherent in most policy decisions. There are several ways of addressing them. Fuchs-Schündeln and Hassan (2015) provide a comprehensive survey of identification strategies in macroeconomics and the use of quasi-experimental methods, a field in which significant progress has been made over the past decades. In order to test whether macroprudential policies have the intended microeconomic effects, standard micro-econometric tools such as difference-in-difference estimates and regression discontinuity designs can be used.[6] Heterogeneity in adjustment can be exploited for causal identification: prudential measures are applied differently to different financial market participants, there has typically been ambiguity about the exact design of the measures *ex-ante*, and the specification of the policy measures may have changed over time.

Methods for evaluating the effects of macroeconomic policies have also been the subject of intensive research. Vector autoregressive models – the most important empirical counterpart of theoretical macroeconomic models – are being extended. Factor-augmented VAR models (FAVAR) can be used in order to capture feedback between the micro- and the macro-level (Buch, Eickmeier, and Prieto 2014); global VAR models (GVARs) provide techniques to study feedback between different markets or market segments (Dees, di Mauro, Pesaran, and Smith 2007; Pesaran and Smith 2006).

The microeconomic (banking) literature provides new modeling approaches which allow for an analysis of contagion effects and systemic risk. For example, the seminal theoretical work by Allen and Gale (2000) on the contagion of liquidity risk in financial markets has subsequently been extended to incorporate fire sales, asset risk, and various policy measures. Research such as that by Gersbach and Rochet (2012) provides a modeling framework to conceptualize boom and bust cycles in bank lending.

Micro data are key to the identification of risks that are building up in the financial system and an assessment of causal policy effects. By their very nature, risks to financial stability

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[6] The Journal of Economic Perspectives ("Symposium: Recent Ideas in Econometrics") provides a collection of articles on how technical difficulties around causal identification in evaluations can be solved (Journal of Economic Perspectives 31(2)).

arise from the impact that the distress of one institution (or group of financial institutions) can have on the functioning of the financial system (endogenous risks). In order to detect risks to financial stability and to evaluate the effects of specific policy measures, policymakers thus require information about the distribution of risks within the system. This information is embedded in granular data but not in aggregate time series.

From a conceptual point of view, the challenges go beyond the availability and use of micro-data. While in some policy areas it might be sufficient to trace the effects of policy measures on individual behavior, understanding the impact of micro-behavior on aggregate dynamics is crucial for financial stability policies. Hence, methods are needed to aggregate data from the micro-level.[7]

Fortunately, the past decade has witnessed much improved availability of micro-data for research and policy analysis. The use of these data has enriched knowledge of policy measures in many fields: the effects of labor market policies on labor market outcomes, the effects of (unconventional) monetary policy on risk-taking incentives for banks, and the effects of trade liberalization on firm-level productivity are now much better understood thanks to the widespread use of detailed credit registers as well as firm-level and household-level datasets. Micro-data on individual households, consumers, firms, or banks allow heterogeneous responses to be modeled to the same economic policy measure, and such data provide ample scope for identifying causal effects. Such causal effects are much more difficult to detect using aggregate, time series information. As regards research on financial stability, new datasets and monitoring tools can be developed to analyze (direct or indirect) network effects (Acemoglu, Vasco, Carvalho, Ozdaglar, and Tahbaz-Salehi 2012; Allen and Babus 2009) or the exposure of a financial system to liquidity risk through a "Risk Topography" (Brunnermeier, Gorton, and Krishnamurthy 2011).

At first sight, the described policy process might seem too complex and overly challenging. In essence, however, it describes the steps that are taken in many policy decisions, be they implicit or explicit. Moreover, policy institutions such as central banks have a long tradition of basing policy decisions on rigorous analytical work. Monetary policy is a point in case. Box 2 sketches the emergence of a "monetary policy process" and shows modern monetary policy is the result of a long-term development.

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[7] For instance, Principle Component Analysis can be used to perform a reduction in the dimensionality of the data and combine (bank-level) data with macroeconomic aggregates.

Box 2: What Can We Learn from Monetary Policy?

Monetary policy has evolved through a process that started with the formulation of a policy objective, the specification of indicators of the policy stance, and *ex-ante* and *ex-post* policy evaluation using state-of-the-art empirical and theoretical modelling. Close interaction between policymakers and academia, including learning from mistakes, has contributed to the evolution of monetary policymaking over time.

At the current juncture, there is fairly widespread agreement on what the objectives of monetary policy are, which (conventional) instruments to use, and which intermediate indicators to consider. The targets and the institutional setup of monetary policy have changed over time though. In the 1950s and 1960s, there was wide-spread consensus that monetary policy can systematically exploit the unemployment-inflation trade-off. Later, empirical evidence and theoretical considerations meant that this assumption was questioned. The impossibility of exploiting this trade-off systematically was shown theoretically by Friedman (1968) and Phelps (1968), who pointed to the importance of expectation formation. Later on, the time-inconsistency of such policies was analytically shown (Barro and Gordon 1983; Kydland and Prescott 1977). The response of macroeconomic aggregates to the oil price shocks of the 1970s further fuelled skepticism and raised more questions about the existence of a systematic trade-off between inflation and output (or unemployment).

As these developments have unfolded, the benefits of central bank independence in order to overcome issues of time-inconsistencies have become increasingly apparent. Empirical and theoretical research has shown that central banks can best contribute to stable growth by keeping inflation rates low and stable (Barro 2013; Schmitt-Grohe and Uribe 2011).

Over the past decades, the optimal policy target has been discussed, and some consensus has emerged that an inflation rate of around 2% for developed economies should be close to an optimum (Coibion, Gorodnichenko, and Wieland 2012).[8] In 1998, the ECB defined its policy target of a year-to-year change in the HICP of below 2%. Based on a collection of background studies, the target was confirmed and clarified in 2003 to be (below, but) close to 2% over the medium term (Issing 2003).

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[8] See http://www.centralbanknews.info/p/inflation-targets.html for a list of (explicit or implicit) inflation targets.

In parallel to a discussion about targets for monetary policy, new theoretical and empirical tools have been developed. It has particularly been recognized that micro-evidence is needed in order to assess channels of monetary policy, to analyze potential side effects of monetary policy, and to separate demand and supply effects (Khwaja and Mian 2008). A vast literature has documented the risk-taking channel of monetary policy by looking at the disaggregated responses of banks which are subject to different capital and liquidity constraints to monetary policy shocks (Kashayp and Stein 2000). The field is still rapidly evolving, as the global financial crisis forced central banks to rethink their strategies, to incorporate more richly specified financial markets into their models, and to re-assess the set of instruments that they use, such as asset purchases or unconventional liquidity operations.

Both macroprudential and monetary policy are conducted under a considerable degree of uncertainty. Counterfactuals are, by definition, not known and are hard to construct synthetically. In order to address uncertainty about potential policy actions, central banks employ a suite of models capturing different channels of monetary policy. Using a range of models and data helps promote robust policy decisions and makes explicit uncertainty regarding the quality of data, models, and estimated model parameters. Decision-makers are regularly confronted with the (expected) outcomes of different policy options. Monetary policy departments routinely prepare a set of projections, usually taking the "consensus" policy as the baseline (e.g. keep policy rates unchanged) and quantifying the expected effect of alternative policy decisions (e.g. change rates by 25 basis points). Such a step is crucial, as it helps gauge the effects of policy action *and* inaction and may, thereby, mitigate inaction bias. Furthermore, it puts monetary policy decisions on a formal basis and enables a quantitative evaluation, i.e. it allows for a simple and intuitive comparison of the pre-specified targets, expectations, and outcomes.

Learning about monetary policy has gone beyond developing better models and data. Central banks have increasingly understood that communication about the policy stance is crucial. Central banks have experienced quite a remarkable transformation from being relatively opaque institutions to institutions actively using communication strategies (Blinder 2004). Accountability, transparency, and communication have moved to the fore of monetary policymaking. For instance, the Federal Reserve started to publish transcripts of its meetings in 1994 and to announce targets for the Federal Funds Rate in July 1995. Since December 2004, the minutes have been made public three weeks after the decision and, since 2011, the Fed Chairman holds a regular press conference. Developments in Europe have also followed the general trend towards more central bank transparency. The European Central Bank held

press conferences right from its inception and started publishing accounts from meetings of the Governing Council in February 2015.

Summing up, differences between monetary and macroprudential policy exist. Macroprudential policy is a new policy area and many instruments and measures have been implemented only recently. Hence, the state of knowledge on the economic effects of macroprudential policy on macroeconomic outcomes is limited. This is not much different from where monetary policy started originally. Also, macroprudential policy faces an additional layer of complexity because the range of instruments and (intermediate) targets is, arguably, larger than that of monetary policy.

But macroprudential and monetary policy also share important similarities. In both cases, policymakers use instruments that affect micro-level incentives to ultimately affect macroeconomic outcomes. The analytical framework is similar, as central banks are typically involved in macroprudential surveillance. Not least, there are interactions with other policy areas such as fiscal policy and micro-prudential regulation that need to be taken into account. In short, a similar learning process, on the part of both research and policymaking, that we have seen for monetary policy lies ahead for financial stability policies. Macroprudential policy is in the early stages of developing a regular policy process, including *ex-ante* and *ex-post* evaluation and communication strategies.[9]

3   The Infrastructure for Macroprudential Policy Evaluation

The policy process that we have described so far can build on a solid foundation of experience gained in other policy areas, methodologies and conceptual frameworks that have been developed in academia and policy institutions, and, not least, advances that have been made with regard to the availability of and access to (granular) data. In the following, we argue that the infrastructure for macroprudential policy evaluation can be further improved by specifying legal mandates for policy evaluation, ensuring data availability for external researchers, improving mechanisms for international coordination, and building up repositories of evaluation studies.

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[9]   The Committee on the Global Financial System (CGFS) of the Bank for International Settlements (BIS) has recently published a report on communication strategy for macroprudential policies (CGFS 2016).

3.1 Analytical Approaches

Quantifying the expected effects of the selected instruments *ex-ante* requires the use of models — theoretical or empirical, formal or informal. Because the available (macroeconomic) models do not capture all relevant features of systemic risk, qualitative aspects will have to be considered as well. The current situation is comparable to the early stages of monetary policy making with fairly stylized models, incomplete theoretical foundations, and often insufficient data. Therefore, and in order to enhance the robustness of the decision-making process, a suite of models should be employed. This is a necessary ingredient in the policy process in order to assess the expected (quantitative) impact of a specific instrument. This process should also involve an analysis of the time horizon over which expected effects are likely to materialize.

The ideal modeling approach is one which allows endogenous responses of the economic system to policy decisions (Lucas 1976) in general equilibrium. Dynamic stochastic general equilibrium (DSGE) models are a possible starting point for an analysis of the macroeconomic effects of microeconomic distortions.[10] Yet DSGE models have been criticized for providing only limited and stylized information on adjustments by heterogeneous agents such as banks or households to shocks, for neglecting (in most cases) non-linearities, and for not capturing tail risks (Blanchard 2016). Recent work attempts to mitigate these shortcomings and to capture features relevant during financial crises (Asonuma and Trebesch 2016; Bianchi and Mendoza 2015; Boissay, Collard, and Smets 2016; Cúrdia, Del Negro, and Greenwald 2014).

Stress tests are another tool commonly applied for *ex-ante* policy evaluation and identification of risks to financial stability.[11] In contrast to DSGE models, stress tests are usually based on estimated reduced-form relationships. While stress testing tools shifted into the focus of the general public only after the onset of the Great Recession, they have been used regularly by banking supervision for a number of years.

Stress tests start with macroeconomic scenarios, i.e. assumptions about growth, unemployment, asset prices, interest rates, or risk premia. These inputs are then fed into the balance sheets of financial institutions like banks, or insurance corporations. Then, a number

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[10] Galati and Moessner (2013) provide a comprehensive survey of the state of the art of DSGE models in the context of macroprudential policies.

[11] For a review of stress testing methodologies, see IMF (2012), Bank of England (2015), or European Banking Authority (2014). The IMF provides information on its stress testing methods online: http://www.elibrary.imf.org/page/stress-test-toolkit.

of assumptions about market participants' reactions are needed, often derived from theoretical models and calibrated with estimated parameters. Most stress tests focus on the solvency or liquidity of financial institutions by asking whether, in the case of an adverse scenario materializing, individual institutions have sufficient capital or liquidity to stay solvent and to meet regulatory criteria. First generation stress tests obtain their conclusions by linearly aggregating individual institutions' results. Identifying macroeconomic vulnerabilities stemming from network externalities, fire-sale effects, or liquidity dry-ups using stress tests is more difficult (Borio, Drehmann, and Tsatsaronis 2012, Battinston et al. 2012).

The way forward needs a paradigm shift. Instead of just summing up across individual institutions, next generation stress tests should have a general equilibrium perspective, focus on the resilience of the financial system as a whole, and test the robustness of the financial system across a larger range of macroeconomic scenarios (Demekas 2015; Elsinger, Lehar, and Summer 2006; Schmieder, Puhr, and Hasan 2011; Boss, Krenn, Puhr, and Summer, 2006).

3.2   Legal Mandates

Financial systems and their regulation are highly political. Historically, financial regulations have often been used to promote or protect the interest of incumbent firms or to promote specific types of investment.[12] Often, short-term costs of financial regulations to the private sector tend to be better visible than the longer-term benefits a stable financial system brings to society.[13] In addition, policymakers and regulators might not always be interested in an unbiased evaluation process. An unexpected outcome of the evaluation may affect the ability to pursue future policy projects, or it may even lower the chances of being re-elected or re-appointed. This may lead to less effort being put into and fewer resources spent on evaluation programs. And, finally, abandoning or changing legislation once a compromise has been reached is difficult.

Establishing and strengthening legal mandates for policy evaluation can help to overcome this political „bias". In order to allow for an independent assessment of policies and to disconnect evaluation from political cycles, enshrining compulsory evaluation into a legal act

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[12]   Rajan and Zingales (2003), Barth, Caprio, and Levine (2012), or Calomiris and Haber (2014) provide vivid accounts of the political economy of the financial services industry and its regulation.

[13]   In the context of the Savings and Loans crisis in the US in the 1980s, the risk of regulatory capture has been documented (Kane 1989, 1990).

can be a useful step forward. It can help to overcome the implicit bias not to change legislation by making a routinely conducted evaluation of the effects of policy instruments part of the legal framework. Experience from other policy areas can provide useful examples on how to align incentives and sustain structured policy evaluations (Box 1).

In Europe, responsibility for macroprudential policy is shared between national and European institutions (Table 2). At the European level, the European Systemic Risk Board (ESRB) has an implicit mandate for *ex-ante* policy evaluation as it provides opinions on macroprudential measures. Similarly, national financial stability councils such as the German *Ausschuss für Finanzstabilität* (AFS) evaluate the need to activate policy measures. The AFS meets regularly on a quarterly basis, performs the surveillance of systemic risks, and it decides on the specification of macroprudential measures — including the evaluation of their effects.

As regards explicit mandates for *ex-post* evaluation, the legal situation is less clear-cut. Typically, neither national financial stability boards nor the ESRB are tasked with an explicit *ex-post* policy evaluation. But both the ESRB and the ECB Financial Stability Committee (FSC) have an implicit mandate for the *ex-post* evaluation of macroprudential measures by monitoring compliance with its warnings and recommendations. More recently, the global Financial Stability Board (FSB) has published a first monitoring report on prudential regulation, which stresses the need for causal impact assessment (FSB 2011, 2016).

No matter where responsibility for policy evaluation is located and who is (legally) in charge, conflicts of interest are likely to arise. One way to address these conflicts and to ensure that evaluations can be performed independently is to make the data used in the evaluation process accessible to independent researchers and the public. In cases where data protection prevents data from being published, data confidentiality can be assured through other channels. Finding legal ways to give external researchers access to data that would otherwise be unavailable can also provide incentives for academic researchers to actively participate in evaluation projects. For instance, researchers could be allowed to use stand-alone computers without access to the internet on the premises of the data-collecting institution. Alternatives include anonymizing data (which may involve deleting information) or prohibiting researchers from accessing the data on an observation-by-observation basis, but allowing access to the data by remote execution (e.g. running only regressions). These solutions may seem cumbersome, even prohibitive. Yet they are needed in order to tread the fine line between keeping to data confidentiality rules and allowing independent assessments of policies.

Also, transparency about the methods that are used for policy evaluation is important so that methods can be challenged by outside experts. This need for transparency has to be balanced against the risk of reverse engineering though: providing full transparency about evaluation methods used to assess the effectiveness of regulation to those institutions being affected by the regulation might lead to an endogenous adjustment of their behavior (Glasserman and Tangirala 2015). This risk, however, does not prevent the publication of general information about methodologies used.

Quality management, through the replication of results by external researchers, should be part of any *ex-post* policy evaluation process. But involvement of academics is no panacea, and issues related to incentives need to be addressed as well. First, academics may have little incentive to participate in evaluation projects that cannot be published in academic journals. Such incentive problems can be overcome by giving them access to otherwise non-available data. But a higher appreciation of replication and policy-relevant evaluation studies in academic journals might also be needed. Second, academics are under increasing pressure to attract third-party funding. This might give them an incentive to engage in evaluation projects only if public authorities provide project finance — which might, in turn, run counter to the objectivity of the evaluation. Therefore, finding institutional arrangements to provide funding to independent research is crucial.

Box 3: Mandates for Policy Evaluation Across Countries

Several jurisdictions have mandates for policy evaluation covering broader policy areas than regulatory policies alone.

Since 2002, the European Commission has been conducting impact analyses of legislative initiatives. The goal is to "*evaluate … all EU spending and non-spending activities intended to have an impact on the society and the economy*". According to the Impact Assessment Guidelines, costs and benefits should be qualitatively and whenever possible quantitatively assessed.[14] For the latter, the Commission uses a broad range of models (such as DSGE models, bank balance sheet simulations, etc.).

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[14] In order to enhance transparency and comparability across evaluations, the Commission has published a toolbox (http://ec.europa.eu/smart-regulation/guidelines/toc_tool_en.htm) on how to conduct impact assessments.

In <u>Germany</u>, the National Regulatory Control Council (*Normenkontrollrat*) is tasked with quantifying the costs of regulatory initiatives. Only administrative expenses such as labor and IT costs for reporting (data) or compliance with a new legal situation are captured. Second round effects (such as effects on competition, employment or R&D) and hence total economic costs do not count towards the costs of regulation. The National Regulatory Control Council has, therefore, proposed that federal ministries should evaluate policy measures taking such effects into account, too (Normenkontrollrat 2015). More recently, the German Federal Ministry of Finance initiated a public tender for evaluating the effects of European financial regulation on the German banking system economy (BMF 2017).

In the <u>Netherlands</u>, the Bureau for Economic Policy Analysis (CPB) is an independent part of the ministry of economic affairs. Research at the CPB is carried out at the CPB's own initiative, or at the request of public bodies, members of parliament, national trade unions or employers' federations. Besides regular macroeconomic forecasts, it analyses parties' election manifestos and the societal costs and benefits of infrastructure plans.[15]

In the <u>United Kingdom</u>, a sunset clause ensures that pieces of legislation have an "expiry date". Such a provision ensures that Parliament is forced to review a law and decide on its merits after a pre-specified time period. Such clauses can help prepare a withdrawal of certain policy measures if these are deemed unnecessary or to conflict with new political goals. In the context of financial stability policies, one might argue that the withdrawal of a certain policy measure in and of itself might create financial stability risks. However, such an approach does not necessarily imply that a given measure is actually terminated. It may, instead, imply that measures are reviewed in a structured way. The result of such a review may well be that measures remain in place.

In the <u>United States</u>, the Office of Information and Regulatory Affairs (part of the Office of Management and Budget) is the central authority reviewing the costs and benefits of regulatory initiatives at the federal level with an expected impact of more than USD 100 million. For macroprudential policy, Dodd-Frank gives the Office of Financial Research the explicit mandate "*to conduct studies and provide advice on the impact of policies related to systemic risk*" (House of Representatives 2010).

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[15] See http://www.cpb.nl/en/what-does-cpb-do on the mandate and activities of the CPB.

3.3   Data for Policy Evaluation

Policy evaluation requires good data. The costs of acquiring such data can be minimized if data are collected early on. Data collected before and during the activation period of policy instruments can be used for *ex-ante* calibration of instruments as well as for *ex-post* evaluations.

Data which are needed for an evaluation of macroprudential policies cannot be collected once an acute stress situation emerges. It is common practice for microprudential regulators to demand additional data from financial institutions which are under acute stress and which require additional microprudential oversight. Asking a lot of financial institutions for additional information once an economy-wide stress scenario has materialized would be both too late and too costly. Furthermore, a single cross-section of data would not allow the evaluation of risks to be traced over time. Effective surveillance of the financial *system* requires information on all (or at least the most relevant) actors in the system. A time series perspective is needed, because observing a single metric for a cross section of one period of time is not sufficient to assess the resilience of the financial system and its evolution. In addition, an ad hoc data collection exercise might be interpreted as signaling an upcoming activation of instruments, causing a sudden change of activities and exacerbating the problem.

The earlier relevant data are collected and the more consistent data collection is with existing reporting mechanisms, the lower will be the costs. Several initiatives at the national and international level address the shortcomings of current datasets. At the international level, the G20 Data Gaps Initiative provides information on financial systems, including the evolution of financial intermediation outside the banking system ("shadow banking"). This initiative aims to improve the availability of data to monitor risk from the financial sector, vulnerabilities, interconnectedness, and spillovers.[16]

On the European level, the International Network of Exchanging Experiences on Statistical Handling of Granular Data (INEXDA)[17] established by the Banca d'Italia, the Banco de Portugal, the Bank of England, the Banque de France and the Deutsche Bundesbank is an international cooperative project exchanging experiences on the statistical handling of

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[16] See the first progress report and the update of the G-20 DGI-2 of the Inter-Agency Group on Economic and Financial Statistics (2016, 2017) for more detail.

[17] https://www.bundesbank.de/Navigation/EN/Bundesbank/Research/RDSC/INEXDA/inexda.html

granular data, such as issues of accessibility of confidential data, techniques for analysis of granular data, and methods of output control of granular data for research purposes.

The financial crisis has shown that an effective oversight of global financial stability risks requires sharing of micro-data. But micro-data, by their very nature, can be highly confidential. These data allow the behavior of individual households, financial intermediaries, or firms to be tracked, particularly if they are not anonymized. Legal rules for data confidentiality, which typically differ across countries, thus apply [18] One recommendation of the Data Gaps Initiative is specifically dedicated to removing obstacles to sharing granular data, reflecting a paradigm shift in (central bank) statistics: moving from the collection of aggregate statistics to the use of flexible micro-data.

At the European level, several initiatives aim to improve the granular data that are available across European economies. This includes the European credit register (*AnaCredit*), which will provide consistent information on bank-firm linkages across European countries. Other European projects are the Securities Holdings Statistics (SHS) and the Central Securities Database (CSDB). [19] Both databases collect granular information on a security-by-security basis for a number of securities and provide up-to-date information on relevant securities needed by the European System of Central Banks (ESCB). These datasets will provide the basis for improved analysis in many policy areas including monetary and macroprudential policy.

At the national level, the Deutsche Bundesbank has established a research data center (RDSC),[20] which aims at making better use of micro-data for in-house policy analysis as well as granting access to data to external users (under strict rules concerning data confidentiality). The RDSC advises researchers on data selection, data access as well as on legal requirements and grants access to the data during research visits.

In addition to data on banks' activities, information on relevant regulations is needed in order to assess policy effects. Data on regulations that apply across countries are typically not confidential as they do not apply to individual firms. At the same time, the costs of obtaining information on regulatory initiatives across countries, including information on the nature and timing of implementation can be prohibitive for the individual researcher. International

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[18] Data on individual banks are not confidential per se. In the US, for instance, Call Report data have been publicly available for a long time, and many Latin American countries publish data on banks' balance sheets.

[19] https://www.ecb.europa.eu/stats/financial_markets_and_interest_rates/securities_holdings/html/index.en.html

[20] For details, see https://www.bundesbank.de/Navigation/EN/Bundesbank/Research/RDSC/rdsc.html

organizations can provide such information as a public good, thereby also enhancing the transparency of the regulatory process. The International Monetary Fund (IMF) has, therefore, surveyed prudential regulations in its Global Macroprudential Policy Instruments Database. This database provides information on macroprudential policies by country and over time.[21] The IMF started an initiative to collect such data on a regular basis and now conducts regular surveys on regulations in parallel to the annual survey on capital controls, and the corresponding database is publicly available. At the European level, the MacroPrudential Policies Evaluation Database (Budnik and Kleibl 2018) provides details of macroprudential (or similar) policy actions taken in the European Union since 1995.[22]

3.4   International Coordination and Cooperation

The effects of macroprudential policies do not stop at borders. Recent work by the International Banking Research Network (IBRN)[23] shows that there are spillovers of national prudential policies that affect the international activities of banks (Buch, Bussière, Goldberg 2016). These cross-border spillovers differ across banks, countries, and policy measures, and they have the potential to mitigate or reinforce the effects of national policies.

Regulatory reforms have a global dimension and have been decided at an international level. Speaking a common language is thus important when looking at the effects of reform. Setting common standards, learning from good practices, and international coordination are vital. This requires finding mechanisms for international cooperation and coordination in terms of the design and evaluation of policies. Policy evaluation needs to take into account spillovers of regulatory policies which may or may not be intended. An unintended consequence of regulation may be that international financial institutions with activities in several countries engage in regulatory arbitrage. But spillovers may also be the result of the reallocation of market share from weaker to stronger financial institutions, which may be an intended outcome. These spillovers have to be monitored and assessed. If cross-border effects are expected to be material, policy evaluations should be coordinated globally in order to ensure that perspectives from a broad range of countries are brought into the discussions.

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[21] For an overview of macroprudential policies in the real estate market see Vandenbussche, Vogel, and Detragiache (2015).

[22] https://www.ecb.europa.eu/pub/research/working-papers/html/mapped.en.html

[23] See https://www.newyorkfed.org/ibrn for more details.

To this end, the Financial Stability Board has proposed a framework for the post-implementation evaluation of the effects of the G20 financial regulatory reforms (FSB 2017). The framework is intended to guide and coordinate *ex-post* evaluation work by the FSB member countries and other international standard-setting bodies. Its focus is to verify whether the G20 financial regulatory reforms are achieving their intended outcomes, and it will help identify any material unintended consequences that may have to be addressed, without compromising on the objectives of the reforms. The framework identifies methods for policy evaluations and generates a common understanding of which techniques are useful to answer which questions. The framework also clarifies roles and responsibilities in the evaluation process at the FSB. Coordination mechanisms are needed to reduce the costs of globally coordinated policy evaluations and to avoid duplication of potentially incoherent work at the national level. Such internationally agreed and coordinated evaluations can contribute to evidence-based and thus more credible regulatory policy making.

Generally, the institutional set-up of macroprudential policy in Europe is well suited to also apply this structured policy process to enhance both, the effectiveness and efficiency of policy making at the European and the national level. The macro-prudential supervisory architecture of the EU was established right after the financial crisis and the ESRB has been in place as an integrated financial supervisor for macro-prudential supervision since 2011. The ESRB's aim is to identify systemic risks in the financial system and to propose measures to eliminate them, employing warnings and recommendations, which are subject to a "comply or explain" mechanism.

At the same time, mandates for macro-prudential policies lie at the national level. With regard to specific macro-prudential measures, the ECB has asymmetric intervention powers and may – after consultation with the national supervisory authorities – tighten macro-prudential measures enshrined in the CRD IV but not ease them. With some exceptions, the regulation governing most parts of the European macroprudential policy toolkit has been harmonized at the European level. Against this background, the ESRB is well suited to play a stronger (coordinating) role in the *ex-post* policy evaluation process at the European level.

3.5   Repositories of Evaluation Studies

Policy evaluation is a continuous process, building on previous work, extending this work, and ultimately leading to more informed policy decisions. In order to be effective and efficient, knowledge on previous evaluations thus needs to be available at relatively low cost. Generally, there is a vast amount of information available inside and outside of policy

institutions. Organizing this information in a repository of studies can be a useful part of the infrastructure for policymakers and academia. At the current juncture, there is, however, no consistent overview of what is available, and there is no consistent classification of studies.

Evaluation of regulatory reforms has similarities with evidence-based guidelines in medicine. These guidelines start with formulating the question based on which the relevant literature is searched and synthesized. Existing evidence on the evaluation of financial regulations, however, is not yet available in a synthesized format. A simple search in a frequently used database for research in economies (EconBiz[24]) for key elements of the G20 financial regulatory reforms returns a large number of results. There are 2967 entries[25] for the term "macroprudential policy", 211 entries for "counter cyclical risk buffer", 206 entries for "systemic risk buffer", 19 on total loss absorbing capacity "TLAC", 89 for the European Bank Recovery and Resolution Directive "BRRD", 721 for central counterparties "CCPs", and 461 for European Market Infrastructure Regulation "EMIR".

Additionally, policy institutions run their own analyses, which are published in outlets such as monthly and quarterly bulletins or financial stability reviews which are not covered by this database. International institutions and regulatory bodies often organize "Calls for evidence". For instance, the EU Commission requested feedback, backed by empirical evidence, on rules affecting finance and growth, unnecessary, incoherent and inconsistent rules as well as on regulations causing unintended consequences.[26] The Financial Stability Board requests input from its member jurisdictions and summarizes them in the annual reports to the G20 (FSB 2016). Such calls are relatively costly and are typically not harmonized across institutions.

A repository can contribute to an evaluation process by reducing the costs of collecting information, including the costs of calls for evidence. It would, thereby, promote transparency and make the regulatory process more democratic. A focused source of information on the effects of financial regulation can be a central information platform for policymakers and researchers alike. For policymakers and regulators, a repository can be an efficient way to exchange experiences and facilitate the flow of information. It can also help avoid a duplication of work. For researchers, a repository can help identify new and relevant research fields and topics – information usually scattered around in official publications.

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[24] http://www.zbw.eu/de/

[25] The numbers refer to a search at the beginning of June 2017.

[26] http://ec.europa.eu/finance/consultations/2015/financial-regulatory-framework-review/index_en.htm

Repositories are common in other disciplines such as development economics or medicine. For instance, the Cochrane Library[27] or the McMaster Health Forum[28] provide evidence on health issues. The repository run by the International Initiative for Impact Evaluation (3ie),[29] an international grant-making non-governmental organization, promotes evidence-informed development policies and programs; the J-PAL[30] initiative collects evidence on projects on poverty reduction.

4 Summing Up and Outlook

4.1 General implications for policy evaluation

Macroprudential policy is a new policy field. Its goal is to preserve financial stability and to prevent the build-up of systemic risk that may have adverse effects for the functioning of the financial system and for the real economy. New institutions have been tasked with the implementation of macroprudential policies, and new policy instruments have been introduced. Nonetheless, uncertainty about the state of the financial system and the effects and effectiveness of these policy instruments is still high. This uncertainty entails risks: the risk of a risk of acting too late and the risk of choosing an inappropriate instrument or inadequate calibration.

In this paper, we argue that these risks can be mitigated if macroprudential policy is embedded in a structured policy process. Such a policy process involves four steps: defining policy objectives for macroprudential policies, choosing intermediate objectives and appropriate indicators as targets, linking instruments to these targets through *ex-ante* evaluation studies, and analyzing the effects of these policies through *ex-post* evaluations. We argue that the infrastructure for this policy process can be further improved by providing data for policy evaluation, further developing methodological tools, strengthening legal mandates, establishing mechanisms for international cooperation, and building up repositories for evaluation studies.

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[27] http://www.cochranelibrary.com/

[28] https://www.mcmasterhealthforum.org/

[29] http://www.3ieimpact.org/

[30] https://www.povertyactionlab.org/

Both researchers and policymakers have important roles to play. Researchers' most important task is to push the research frontier. Many important and challenging methodological issues have to be addressed such as modeling network effects, spillovers, micro-macro linkages and non-linearities, addressing heterogeneity, and enriching macro-financial models by including elements that capture externalities. Learning from other sciences and exploring interdisciplinary modeling approaches can be another fruitful avenue going forward. Also, incentives in academia need to be set such that independent evaluation studies, including replication studies, are sufficiently rewarded.

Policymakers' to-do-list is equally challenging. Policy evaluation allows for more informed decisions to be taken and, crucially, contributes to the transparency and accountability of the policy process. In order to ensure the credibility of policy evaluation, embedding it in a legislative framework specifying responsibilities, data access and availability, and the involvement of external, independent, expertise is important. This means that policy evaluation, including the relevant data, should be planned in the early stages of the policy process. Transparency also means that data, and in particular micro-data, are made available. Availability includes making data available to a range of interested parties: central banks, macroprudential authorities, and independent researchers. The prerequisite for this is that data can be collected early on in the policy process, preferably when measures are planned or when instruments are designed.

Finally, a structured policy evaluation process is needed in order to provide better information for policy decisions. Ultimately, the difficult policy choices that are linked to financial sector reforms will remain, and different policy goals will have to be balanced. For example, do policymakers want to impose macroprudential measures targeted at the real estate market if these measures might have negative distributional consequences because they are more binding for younger families with little financial wealth? Answering questions of this type will remain difficult – but good policy evaluation *ex-ante* can provide inputs into decision-making and quantitative assessments of the involved trade-offs. *Ex-post*, after policy measures have been taken, their effects and potential side effects can be assessed. This may lead to a recalibration of the measures originally taken. Hence, policy evaluation should neither lead to inefficient fine-tuning of reforms, nor should it compromise the ultimate objective of reforms to enhance the stability of the financial system.

4.2   Implications for the ESRB

Synergies from international coordination and cooperation should be further fostered. In light of the structured policy process sketched in the paper, the ESRB can play a crucial role in improving efficiency and effectiveness of macroprudential policy making: First, the ESRB has a comparative advantage in analyzing and addressing macro-prudential issues that involve the **cross-border and cross-sectoral dimension**. Therefore, one might strengthen the ESRB's capabilities to focus on these issues. To this end, cooperation with the European Supervisory Authorities[31] (ESAs) should be intensified in order to enhance its cross-sectorial analytical capacities. Second, the ESRB needs **access to relevant data** and information, and data sharing among members has to be facilitated. Third, and most importantly, the ESRB provides a valuable platform for the exchange of experiences in macro-prudential policy making. In order to enhance this role, the ESRB could act as a hub for the **ex-post evaluation of macro-prudential policies** by coordinating and facilitating analytical work. With harmonized rules but extensive cross-country heterogeneity Europe seems well suited to broadly evaluate macroprudential measures and thereby improve both national and European macroprudential policy making. It could set up dedicated working groups and ensure high-quality output by coordinating peer-reviews of the evaluation.

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[31] The respective ESAs are the European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority (EIPOA) and the European Securities and Markets Authority (ESMA).

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Figure 1: Objectives, Indicators, and Instruments of Macroprudential Policy
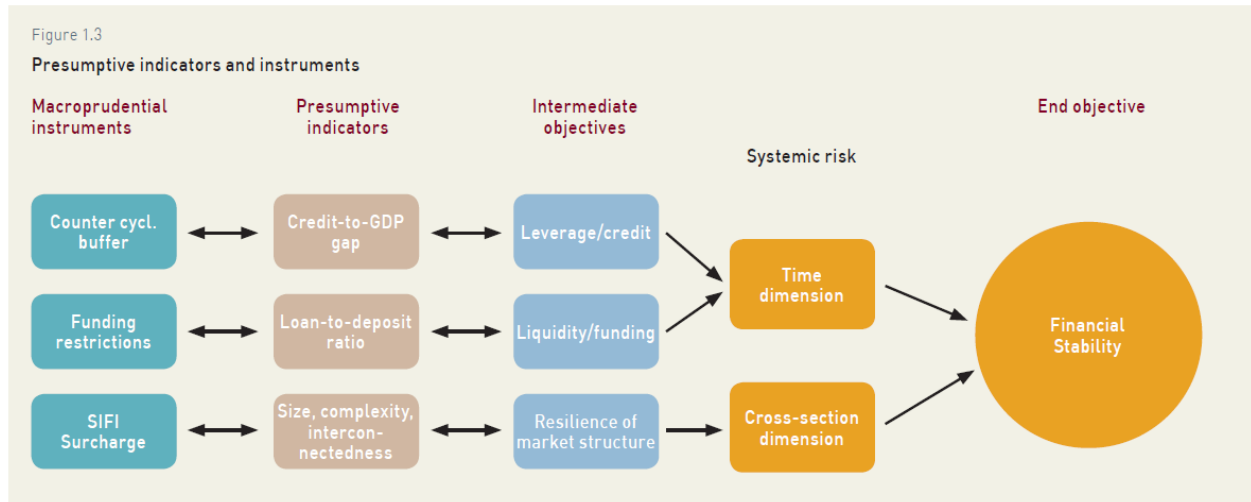
Source: Houben, van der Molen, Wierts (2012)

Figure 2: Stylized representation of a macroprudential policy process
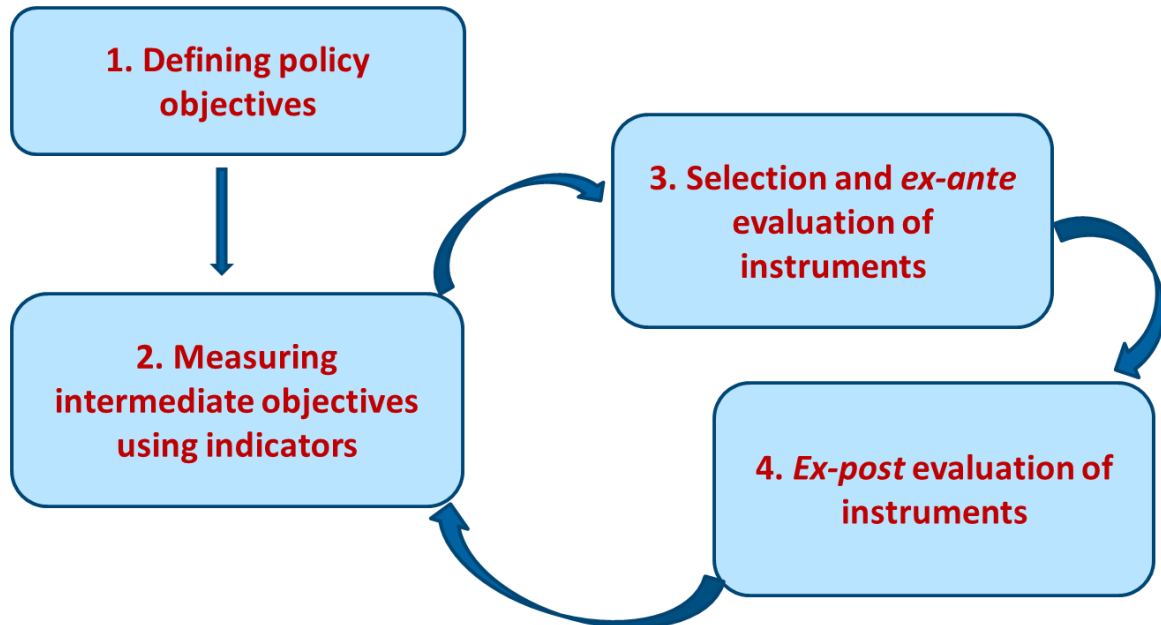
Figure 3: Terms Related to Monetary Policy and Financial Stability

This graph plots the results of an NGram search for terms related to monetary policy, financial stability, and fiscal policy.
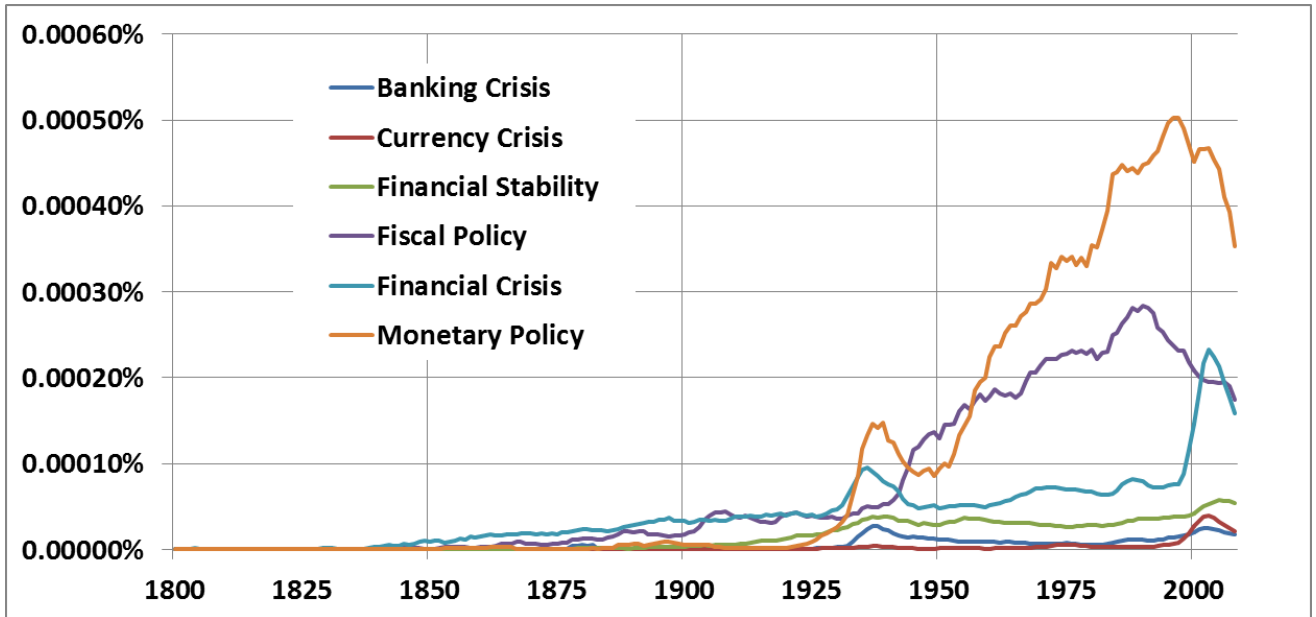
Source: Google Books NGram viewer, accessed on June 9, 2018.

Table 1: Intermediate Objectives and Instruments

Intermediate Targets	Instrument
Excessive credit growth and leverage	CCB, LTV and LTI/DSTI caps, sectoral capital requirements, SRB, capital conservation buffer, leverage ratio
Excessive maturity mismatch and market illiquidity	NSFR or LTD, LCR, liquidity surcharges and other liquidity buffers
Direct and indirect exposure concentrations	Sectoral capital requirement, SRB, large exposure restrictions, own funds conservation buffer
Misaligned incentives with a view to reducing moral hazard	G-SII and O-SII buffers, SRV, own funds conservation buffer, additional liquidity requirements for SIIs
Strengthen the resilience of financial infrastructures	Margin and haircut requirements on CCP clearing, increased disclosure, structural systemic risk buffer

Source: ESRB (2013, 2014).

Table 2: Structure of Macroprudential Surveillance in Europe

	European Systemic Risk Board (ESRB)	European Central Bank (ECB) Financial Stability Committee (FSC)	German Financial Stability Committee (AFS)
Regional level	EU	Euro Area	Germany
Markets	Banks Insurance sector Market infrastructures	Banks	Banks Insurance sector Market infrastructures
Instruments	Warnings and recommendations to national and European institutions	Tightening of national macroprudential instruments according to CRD IV / CRR	Warnings and recommendations to national institutions
Role of the Deutsche Bundesbank	Member with voting right	Member with voting right	3 voting members (Bundesbank, Ministry of Finance, BaFin) and one observer (Federal Agency for Financial Market Stabilisation). Bundesbank provides analysis and has veto power

Source: ECB (2014), Deutsche Bundesbank (2013).

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Claudia M. Buch
Deutsche Bundesbank, Frankfurt am Main, Germany

Edgar Vogel
Deutsche Bundesbank, Frankfurt am Main, Germany

Benjamin Weigert (corresponding author)
Deutsche Bundesbank, Frankfurt am Main, Germany; email: **benjamin.weigert@bundesbank.de**