EUROPEAN CENTRAL BANK

EUROSYSTEM

Financial Stability Committee

Framework to assess cross-border spillover effects of macroprudential policies

April 2020

Contents

Executive summary

Macroprudential measures implemented by national authorities may have cross-border repercussions. Macroprudential policy measures within the European Union (EU) are generally designed to address specific, systemic, financial stability risks in national jurisdictions, including those stemming from specific sectors or even individual financial institutions. At the same time, it is well known that macroprudential policy can generate unintended cross-border spillovers, both owing to regulatory arbitrage and risk management decisions by financial institutions as well as to broader trade and economic activities triggered by the activated measures. Policy instruments should therefore be designed to reap the benefits of positive spillovers in terms of enhanced financial stability, while also seeking to limit potential negative spillovers.

The analysis of cross-border spillover effects is therefore highly relevant for assessing the overall impact of specific instruments. Ensuring the effectiveness and consistency of macroprudential policy in the EU requires that policymakers give due consideration to the cross-border effects of macroprudential policy measures adopted by national authorities and take into account other countries' macroprudential settings when adopting their own macroprudential policies, or when warranted, that they adopt suitable reciprocating macroprudential policy measures.

A "best practice" framework for assessing cross-border spillover effects of macroprudential measures has been established. In order to ensure that such considerations are based on consistent analytical approaches across the EU countries, the Task Force on Cross-border Spillover Effects of Macroprudential Measures (TFSE) of the Financial Stability Committee (FSC) of the European System of Central Banks (ESCB) has devised a best practice framework for the analysis and assessment of cross-border spillover effects from the activation of national macroprudential measures. The framework is meant to serve as a starting point for national designated authorities (NDAs) and national competent authorities (NCAs) when assessing the need for reciprocity in the context of activations of macroprudential measures. Finally, the proposed framework should help inform deliberations on cross-border spillover effects and reciprocity agreements at the EU level under the umbrella of the European Systemic Risk Board (ESRB).

This report presents the FSC's analytical framework for assessing cross-border spillover effects of planned or enacted macroprudential measures. The description of the framework presented in this report is accompanied by an ECB occasional paper, which provides a more detailed study of the existing literature on cross-border spillovers, a survey of current national approaches and the conceptual underpinnings of the FSC framework presented in this report.[1]

[1] See ECB (2020), "Cross-border spillover effects of macroprudential policies: A conceptual framework", Kok, C. and Reinhardt, D. (eds.), *Occasional Paper Series* (forthcoming).

Importantly, the framework focuses on the cross-border spillover effects arising due to activated macroprudential measures. Accordingly, it does not explicitly consider systemic risk spillover effects from domestic financial systems to other countries due to macroprudential policy inaction by domestic authorities. The Financial Stability Committee notes that this is an important dimension warranting further consideration.

Overall, to support the assessments of cross-border spillover effects related to macroprudential policy decisions in the EU, the FSC recommends the following:

1. **Harmonised FSC indicator list:** the list of indicators presented in this report should be the starting point, providing macroprudential authorities within the EU with "guided discretion" for assessments of cross-border spillover effects of planned macroprudential measures, as well as for ex post monitoring of these measures. Authorities are encouraged to complement these with other indicators depending on the circumstances in their jurisdiction.

2. **FSC empirical benchmark tool:** this tool offers a basis for deeper spillover analysis. It provides authorities with a user-friendly tool, to be used at their discretion, to gauge the range of potential spillover effects from considered macroprudential measures. It should be noted that the output needs to be interpreted with necessary caution (as described in more detail in this report).

3. **Closing of data gaps:** the FSC has identified a number of data gaps that hamper a precise monitoring and assessment of cross-border spillover effects (most notably limited information on foreign branches and direct cross-border lending of foreign banks). Accordingly, the FSC recommends that further work be initiated to help close these gaps, also taking into account related initiatives at the ESRB level.

4. **Threshold values:** indicator-based approaches require well-calibrated thresholds to assess when an indicator signals material cross-border spillover effects. For the time being, the FSC recommends adopting a simplified, pragmatic, percentile-based approach. However, it also recommends conducting further work on developing a fully fledged signalling approach over the medium term.

5. **Reciprocity:** the report includes a few suggestions that could feed into subsequent discussions within the FSC and ESRB. The tools and indicators provided by the FSC can inform future discussions on the appropriate intensity of reciprocity by identifying the macroprudential instruments, for which spillovers may be most material. Furthermore, indicator-based analysis reinforces and complements the ESRB guidelines on the design and required flexibility in the use of materiality thresholds.

Introduction

1 Mapping the transmission channels of cross-border spillover effects

This introductory chapter outlines the main transmission channels of cross-border spillover effects of macroprudential measures. It also provides some evidence on the potential importance of cross-border linkages within the euro area and the EU, which may give rise to cross-border spillover effects. Finally, it briefly summarises existing national practices for monitoring and assessing cross-border spillovers of macroprudential actions.

Macroprudential policy cross-border spillovers are often positive given that they increase the resilience of the financial sector, thus reducing the impact of systemic crises. Macroprudential policy targets the resilience of the financial sector and contributes to macroeconomic stability by containing credit booms and by reducing the impact of shocks on the provision of credit to the economy. By reducing vulnerabilities and building resilience, macroprudential policy reduces the probability of the emergence of systemic crises in the domestic economy which – if they were to materialise – could also have negative implications for foreign countries.

But domestic macroprudential policies may also have unintended cross-border effects. Due to substantial cross-border financial intermediation activities within the EU financial system and beyond, a macroprudential policy that targets the activity of domestic financial institutions will often entail reactions of foreign financial institutions and/or domestic institutions operating abroad. Some of these responses may give rise to unintended consequences through undue reductions in financial intermediation and/or the circumvention of the policy measures via institutions not targeted by the policy. The latter aspect provides an argument for introducing reciprocity frameworks and strengthening cooperation on macroprudential policy measures more generally.[2]

Macroprudential measures may induce cross-border spillover effects through a variety of transmission channels. The starting point of the conceptual framework presented in this report is Chapter 11 of the ESRB handbook on operationalising macroprudential policy in the banking sector (hereafter referred to as the "ESRB Handbook").[3] Accordingly, the FSC proposes to retain the same definitions of cross-border spillover effects. A country activating a macroprudential policy is referred to as the domestic economy (country d), and other countries which are potentially affected by the policy as foreign economies (country f).

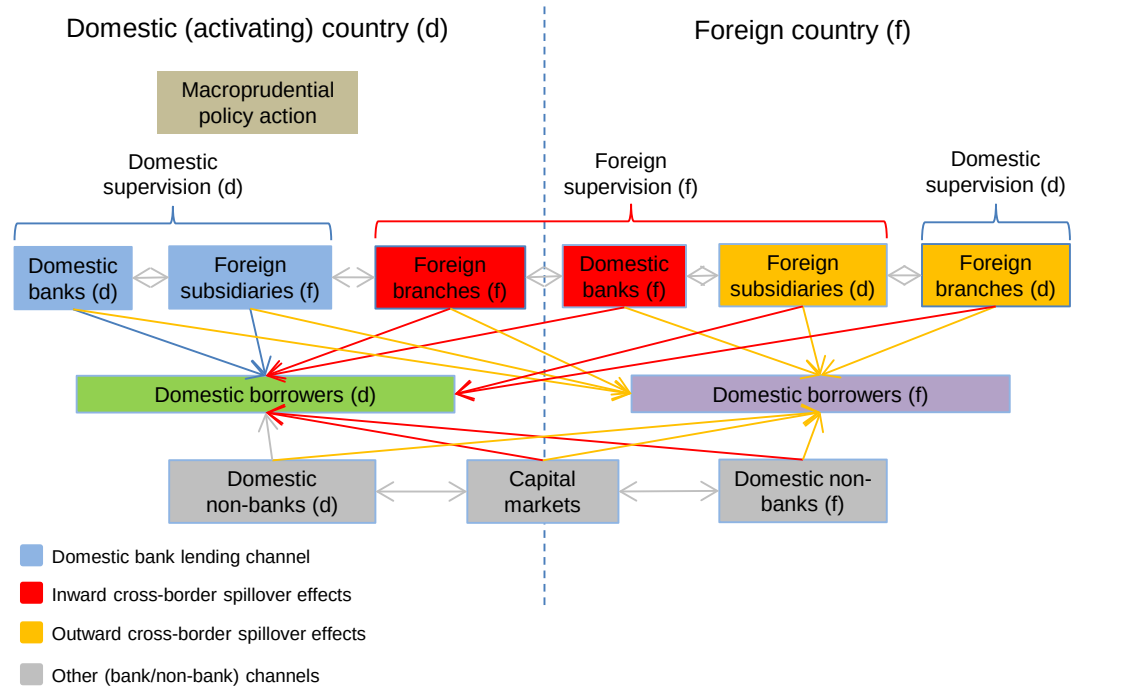
2 As stipulated in Recommendation ESRB/2015/2.

3 ESRB (2018), The ESRB handbook on operationalising macroprudential policy in the banking sector, January.

Cross-border spillover effects can be channelled through (i) an "inward" transmission channel and (ii) an "outward" transmission channel. Inward and outward cross-border spillover effects refer to the direction in which domestic macroprudential policies interact with foreign economies and institutions. Figure 1 provides a highly stylised picture of the different transmission channels and the main types of institutions involved.

Figure 1

The main transmission channels of cross-border spillover effects



Source: FSC.

Inward transmission of cross-border spillover effects refers to the effects of domestic macroprudential policies on the domestic economy (d) related to the actions of entities headquartered in foreign economies (f). The inward transmission of domestic macroprudential policy describes how domestic regulation affects foreign affiliates (bank branches or subsidiaries) located in the domestic country, e.g. through "leakages" or "waterbed" effects whereby activities migrate to entities not covered by the macroprudential measure. It also describes how domestic regulation affects the direct cross-border activity of foreign institutions in the domestic market. Thus, the inward transmission of cross-border spillovers may occasionally reflect the circumvention of the targeted national macroprudential measure and may render it less effective.

Outward transmission of cross-border spillover effects refers to the effects of domestic policies (d) on other, foreign (f), economies and also, from the opposite perspective, the effect of foreign policies (f) on the domestic economy (d). The outward transmission of domestic macroprudential policy is related, but not restricted, to international activities of domestic banking groups. Unintended outward effects of a policy may be channelled via subsidiaries and

branches of domestic banking groups operating in a foreign country or direct cross-border lending, or more indirectly via the impact on real activity and involving international trade channels.

While focusing on bank lending transmission channels, the FSC framework also considers other potential activity channels and institutions. In addition to traditional bank lending channels, the FSC also considers it to be important that authorities keep an eye on the cross-border transmission of macroprudential measures through bank non-lending channels, as well as through non-bank lending and market financing channels. A comprehensive analysis of cross-border spillovers should thus include both an institutional perspective and a market or activity-based analysis.

2 Cross-border activities in the EU financial system

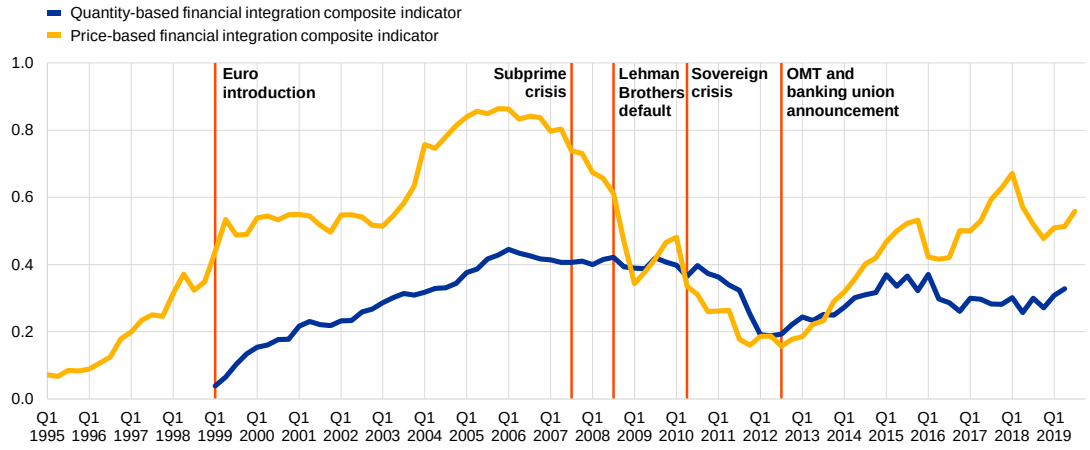
For cross-border spillovers of macroprudential measures to be meaningful, a certain level of cross-border financial activity within the EU is required. The report therefore also reviews intra-EU cross-border financial activity from various angles relevant for this report, including volumes of and changes in cross-border loans to non-MFIs, the relevance of subsidiaries and branches, the prevalence of regional interbank hubs, as well as the core-periphery structure of the euro area interbank network.[4]

Financial integration is significant enough to warrant the assessment of potential cross-border spillovers of macroprudential measures. Chart 1 offers a broad-based view of the scope for cross-border spillovers that can be extracted from indicators of financial integration (within the euro area). It displays two composite indicators based on prices and quantities, respectively. It can be observed that while financial integration contracted in the aftermath of the global financial crisis, in recent years there has been some rebound in cross-border interactions.

[4] For a more detailed analysis of cross-border financial activity in the euro area, see ECB (2018), *Financial Integration Report, May*.

Chart 1

Price-based and quantity-based composite indicators of financial integration



Sources: ECB and ECB calculations.
Notes: The price-based composite indicator aggregates ten indicators covering the period from the first quarter of 1995 to the third quarter of 2019, while the quantity-based composite indicator aggregates five indicators available from the first quarter of 1999 to the second quarter of 2019. The indicators are bounded between zero (full fragmentation) and one (full integration). Increases in the indicators signal greater financial integration. For a detailed description of the indicators and their input data, see the 2018 ECB Financial Integration Report.

Focusing on retail lending activity, material cross-border activity tends to be concentrated in specific areas of the EU. Concerning retail lending by banks, most EU countries' banking sectors tend to have a strong home bias. Nevertheless, in certain EU regions strong cross-border activity either through bank ownership or through exposures can be observed, e.g. among the Baltic and Nordic states, among France and the Benelux countries, between Greece and Cyprus, between Spain and Portugal, between the United Kingdom and Ireland, and between Austria and many central and eastern European (CEE) countries (see Table 1).

Table 1

Matrix of cross-border credit provision among EU countries

(share of total credit in country column of banks in the sample from country row)

From\To	AT	BE	CY	DE	EE	ES	FI	FR	GR	IE	IT	LT	LU	LV	MT	NL	PT	SI	SK	GB	SE	PL
AT	74.6	0.2	1.8	0.8	0.0	0.2	0.3	0.2	0.1	0.7	0.2	0.4	0.6	0.4	1.1	0.4	0.1	14.8	37.6	0.3	0.2	1.2
BE	0.4	45.4	0.1	0.8	0.0	0.8	0.4	1.2	0.1	4.2	1.3	0.1	2.0	0.5	0.5	1.8	1.5	0.7	12.6	1.4	0.1	0.4
CY	0.0	0.0	66.3	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DE	6.5	3.1	4.1	85.2	1.1	2.9	3.8	3.0	0.9	7.3	3.5	0.6	15.0	2.6	4.3	4.5	2.7	2.4	3.0	4.7	2.7	8.0
EE	0.0	0.0	0.0	0.0	81.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
ES	0.6	0.7	0.0	1.0	0.1	86.7	1.0	1.4	0.2	1.6	1.9	0.1	2.3	0.0	4.9	0.9	30.9	0.0	0.2	10.8	0.3	7.2
FI	0.1	0.3	1.2	0.2	14.2	0.0	69.8	0.1	0.0	0.2	0.0	17.7	1.0	17.1	0.7	0.2	0.0	0.0	0.0	0.2	11.5	0.0
FR	1.5	28.2	2.1	3.2	0.5	3.5	1.9	90.3	1.1	6.7	13.2	0.1	42.5	0.1	4.5	3.9	4.5	10.5	2.3	4.7	1.5	7.4
GR	0.0	0.0	13.8	0.0	0.0	0.0	0.0	0.0	96.0	0.0	0.0	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0
IE	0.2	0.4	0.2	0.3	0.0	0.3	0.2	0.4	0.2	58.9	0.1	0.1	0.5	0.0	0.2	0.7	0.2	1.4	0.5	2.0	0.3	0.1
IT	13.0	0.9	3.0	3.2	0.4	2.3	0.4	0.8	0.6	1.0	77.9	1.3	3.3	2.3	2.2	0.9	0.6	15.3	24.2	1.0	0.1	0.7
LT	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	72.5	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
LU	0.2	0.5	0.2	0.1	0.1	0.1	0.2	0.2	0.0	0.3	0.1	0.4	18.6	0.1	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.2
LV	0.0	0.0	0.2	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	71.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MT	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	71.6	0.0	0.0	0.1	0.0	0.1	0.0	0.0
NL	1.6	19.2	3.5	3.1	0.1	1.9	2.1	1.2	0.3	2.3	1.2	0.1	6.2	0.6	2.9	84.4	0.8	0.2	1.3	1.8	0.7	5.5
PT	0.0	0.1	0.0	0.0	0.0	0.6	0.0	0.1	0.1	0.1	0.2	0.0	0.2	0.1	0.2	0.1	57.9	0.0	0.0	0.1	0.0	2.9
SI	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.0	49.1	0.1	0.0	0.0	0.0
SK	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	12.5	0.0	0.0	0.0
GB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	11.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	70.8	0.0	0.0
SE	0.1	0.1	0.2	0.4	0.8	0.0	13.4	0.1	0.0	0.2	0.0	1.5	1.2	1.6	2.3	0.5	0.0	0.0	0.0	1.2	81.8	0.1
PL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.8
Other	0.9	0.6	2.7	1.4	0.1	0.5	6.3	0.4	0.3	5.4	0.3	0.3	6.1	1.0	3.5	1.3	0.4	5.2	5.2	0.5	0.3	0.4
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Sources: ECB and ECB calculations based on COREP reporting.
Notes: The data in the chart refer to the fourth quarter of 2018. The values were calculated using supervisory data at the highest level of consolidation for about 430 banks supervised by the Single Supervisory Mechanism (SSM) including significant institutions (SIs) and less significant institutions (LSIs). This implies that credit provided to country "X" by a subsidiary of a bank resident in country "Y" is accounted for as cross-border credit. The total credit of each country is calculated as the sum of the credit from the individual countries, meaning that the total credit does not include credit from banks in non-EU countries, unless these banks have a subsidiary under SSM supervision (in this case, the credit is included under "Other").

The potential for cross-border spillovers may be greater in banking sectors with a strong presence of foreign subsidiaries and in particular foreign branches. The empirical literature has provided some evidence that macroprudential leakages may arise due to the presence of foreign branches, in particular, which are not subject to measures targeting the domestic banking sector.[5] As shown in Charts 2 and 3, foreign branches are relatively important in a few EU banking sectors such as Luxembourg, Finland and Ireland (as well as Malta[6], which is not shown for confidentiality reasons). At the same time, the presence of foreign subsidiaries is important in a number of countries, most notably the Baltics, Belgium and Slovakia.[7]

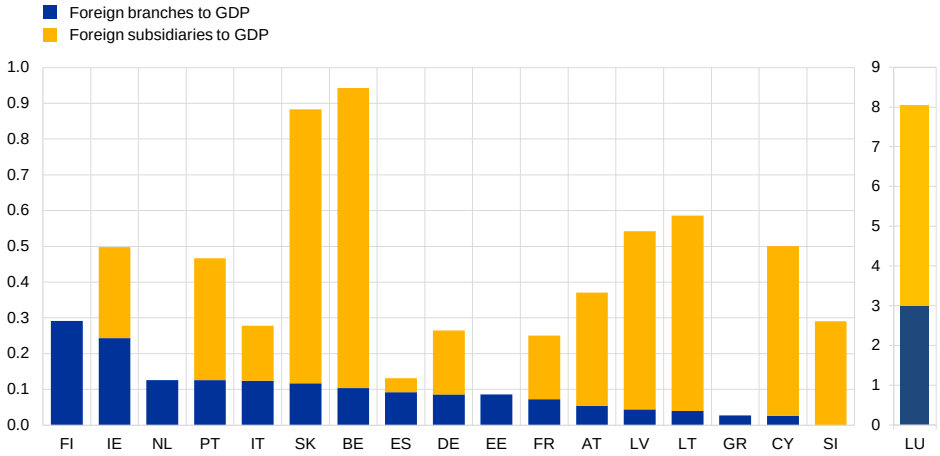
5 For a detailed review of the literature, see the ECB Occasional Paper accompanying this report.

6 Notwithstanding the relatively high total assets-to-domestic GDP ratio for foreign branches in Malta, from a risk-based perspective, these entities exhibit no links with the Maltese domestic economy and thus the potential risk of inward spillover effects is negligible.

7 For a country-by-country matrix of cross-border lending through foreign branches and direct cross-border lending, see also the article by Cantone, D., Jahn, N. and Rancoita, E. (2019), "Thinking beyond borders: how important are reciprocity arrangements for the use of sectoral capital buffers", *Macroprudential Bulletin*, No 8, ECB, September.

Chart 2

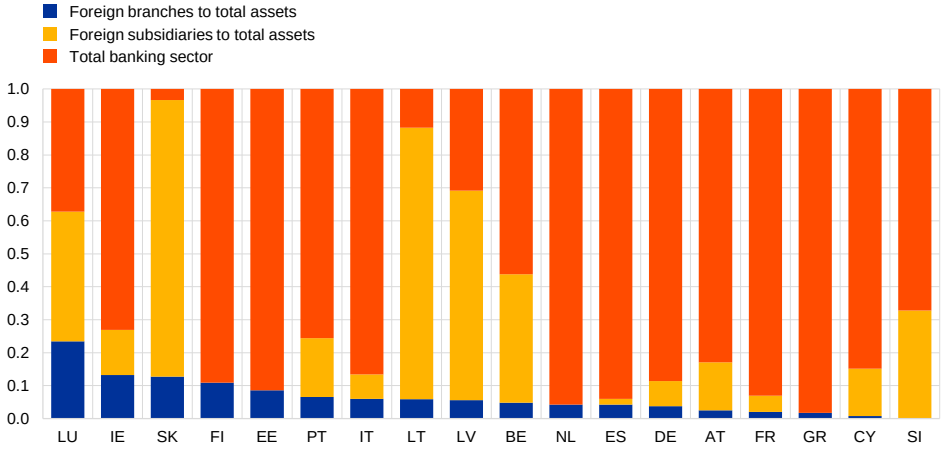
Ratio of total assets of foreign branches and subsidiaries to domestic GDP



Sources: ECB, Eurostat and FSC calculations.
Notes: Reference date is Q4 2019. Based on the ECB's banking structural financial indicators (SSI) and Eurostat data. Malta is not shown for confidentiality reasons. Data refer to the fourth quarter of 2019.

Chart 3

Ratio of total assets of foreign branches and subsidiaries to total banking sector assets



Sources: ECB and FSC calculations.
Notes: Reference date is Q4 2019. Based on the ECB's SSI and balance sheet item (BSI) statistics. Malta is not shown for confidentiality reasons. Data refer to the fourth quarter of 2019.

Indicators for inward and outward lending-based spillovers have overall remained broadly stable in recent years. Employing some of the indicators of the FSC framework (described in more detail in Chapter 1) to gauge the importance and development of inward and outward spillover potential, Chart 4 displays one inward spillover indicator and two outward spillover indicators. It can be seen that at the aggregate (euro area) level the spillover potential – at least according to these indicators – has remained broadly stable with only limited quarter-by-quarter movement.

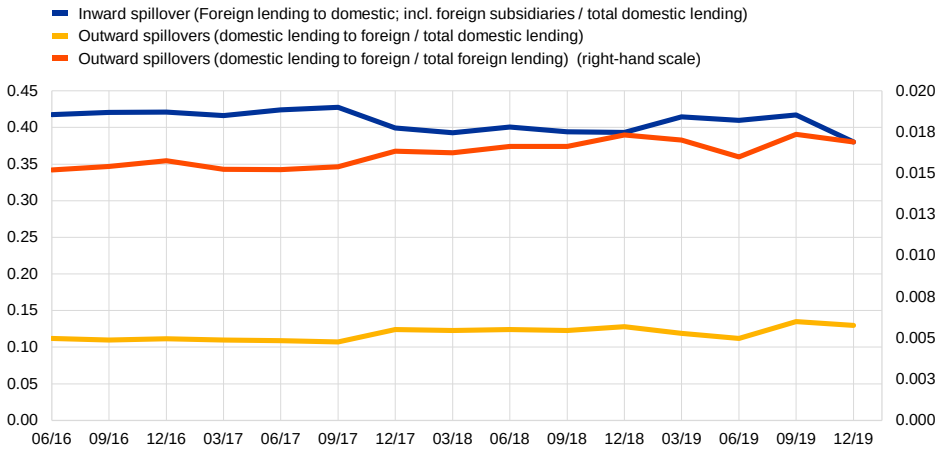
Cross-border interbank activity within the EU is material. While direct cross-border retail lending and the importance of foreign branches/subsidiaries overall

remain limited and centred on some regional areas, substantial cross-border transactions take place in the interbank market (see Chart 5). This is corroborated by a network chart displaying the domestic and cross-border linkages between a large set of euro area significant institutions and less significant institutions (see Chart 6).

Chart 4

Inward and outward spillover indicators: retail and corporate lending

(ratio; Q2 2016-Q4 2019)

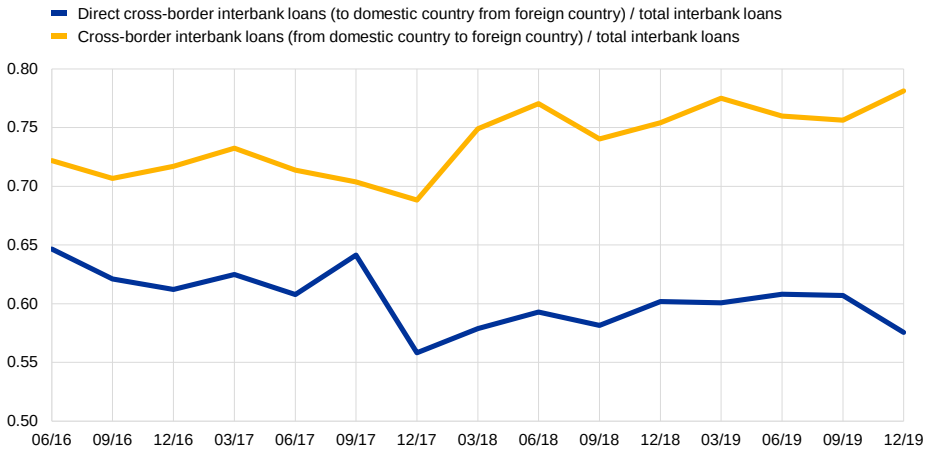


Sources: ECB and FSC calculations.
Note: Based on FINREP and COREP reporting.

Chart 5

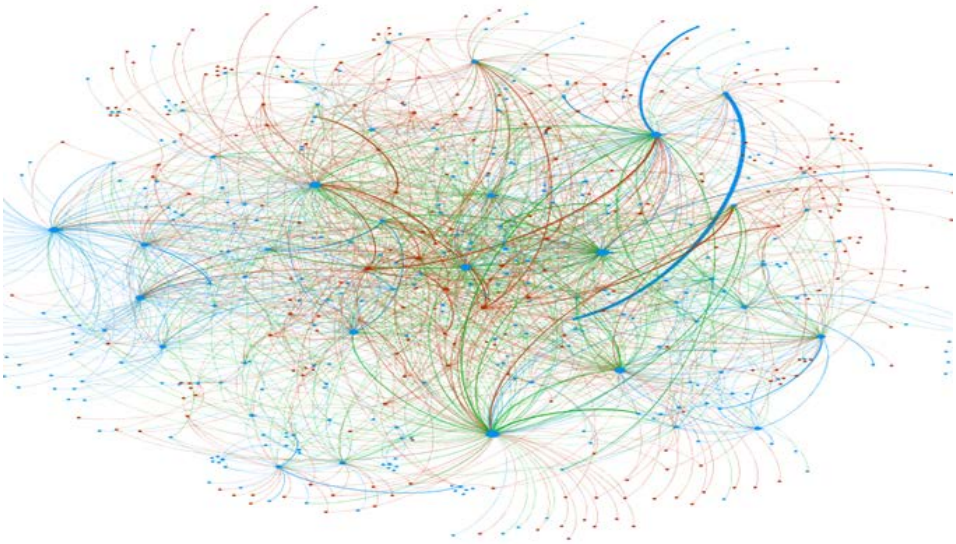
Inward and outward spillover indicators: interbank lending

(ratio; Q2 2016-Q4 2019)



Sources: ECB and FSC calculations.
Note: Based on FINREP and COREP reporting.

Chart 6
EU banking sector interbank network



Sources: ECB and ECB calculations.
Notes: The network is based on large exposure reporting (COREP 27-29). Large exposures encompass all debt contracts, equity, derivatives (on a net basis) and off-balance-sheet exposures beyond a certain threshold. The sample covers the largest euro area banks including SSM significant institutions and a large number of less significant institutions, other EU banks, as well as a large number of large non-EU banks. Blue nodes indicate EU institutions, while red nodes indicate non-EU institutions. The size of the node is proportional to its number of connections. The edges' thickness is proportional to the amount the source node is exposed to and they are coloured as follows: blue links: within the same EU country; green links: between two EU countries; red links: between EU banks and non-EU banks. Data refer to the fourth quarter of 2017.

3 What does the literature say?

The accompanying occasional paper provides a rich summary of the literature on cross-border spillover effects, with a particular focus on the impact of macroprudential measures via bank lending channels. The review is divided according to different analytical approaches ranging from structural and theoretical simulation-based models (such as stress-test and contagion models) to various empirical specifications.

While the analytical approaches differ considerably, the key takeaway from the empirical literature is that cross-border spillover effects can be meaningful. The nature, direction and magnitude of the spillover effects vary across both modelling approaches and model specifications. The overall finding of the empirical literature is that cross-border spillover effects matter. Although the evidence is somewhat mixed, in general it suggests that both inward and outward spillovers can be material (see Chart 7).

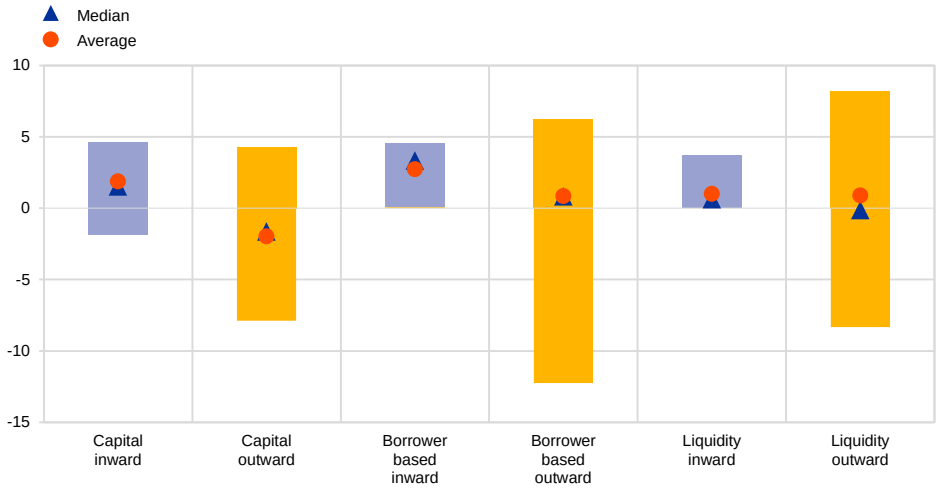
The magnitude and direction of the effects are found to depend on the specific circumstances. In terms of inward spillovers, there is relatively solid evidence of the presence of leakages of domestic macroprudential measures, in particular via foreign branches not captured by domestic policy activation. This provides a solid case for setting up policy reciprocity frameworks among highly integrated economies

and financial systems, such as within the EU. Outward spillover effects are also found to be present in most studies, with the effects (on lending) varying across instruments, bank balance sheet characteristics and the nature of banks' relationship abroad (e.g. whether the entity is a core part of the business or more like an ancillary business line).

Chart 7

Cross-border spillover effects according to the empirical literature, across different transmission channels and macroprudential instruments

(loan growth in percentage points following a policy action or 1 pp increase in the policy instrument)



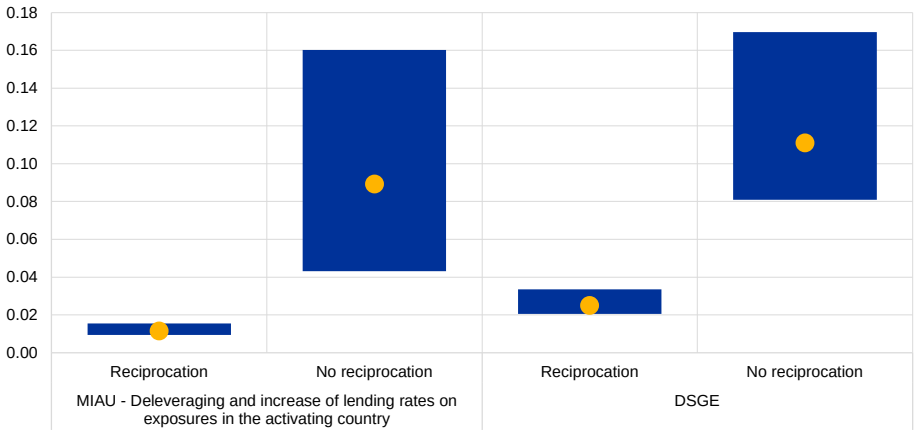
Sources: FSC and FSC calculations based on the empirical benchmark tool (see Chapter 2).

Simulation-based models likewise suggest that macroprudential policies can induce cross-border spillover effects. Another key takeaway from the literature is that structural and theoretical models can complement empirical approaches in that they can be useful for conducting simulation exercises to gauge how the financial sector (and the broader economy) would respond to the activation of specific macroprudential measures. If well calibrated, these types of tools may be highly valuable for ex ante assessments of macroprudential policies. Chart 8 provides an illustration of such a model-based ex ante policy simulation. It compares the needed increase in capital buffer requirements to achieve the same impact on credit growth – with and without policy reciprocation. It is shown that reciprocation, by shifting the burden of the macroprudential intervention to more banks in the domestic banking sector, allows for a notably lower average increase in requirements.

Chart 8

Increase in the sectoral capital requirement needed to obtain the same amount of sectoral deleveraging across models

(percentages)



Source: Cantone, Rancoita and Wildman (2019).
Notes: MIAU is a granular bank-level mechanical accounting tool (see Cantone et al. (2019) for a description). The DSGE model is based on Darracq Pariès, M., Kok, C. and Rancoita, E. (2019), "Macroprudential policy in a monetary union with cross-border banking", Working Paper Series, No 2260, ECB, March. The analysis is based on supervisory data for the third quarter of 2018. The bars illustrate the minimum and maximum increase in sectoral capital requirements across countries; the yellow points indicate the average increase in capital requirements.

Cross-border spillover effects may also propagate through non-bank lending channels. While most existing studies focusing on macroprudential transmission via non-bank financial activities do not explicitly consider cross-border spillover effects, the fact that "shadow banking" entities and their operations are typically international in nature suggests that any unintended spillover effects are likely to also have cross-border implications. All in all, although the topic of cross-border spillover effects of macroprudential policies involving bank/non-bank interactions is still only at a nascent stage, there is some evidence that macroprudential measures targeting the banking sector can have meaningful spillover effects on the non-bank financial sector which, in turn, may also act as a conduit for regulatory arbitrage.

4 What are the prevailing national approaches?

The FSC also took stock of current practices and analytical approaches employed by the relevant authorities in the EU.[8] The stocktake relied on information from multiple sources. As a starting point, the information provided by Member States' relevant authorities in response to the ESRB follow-up questionnaire on compliance with Recommendation ESRB/2015/2 was analysed. To ensure a comprehensive and up-to-date stocktake, the information was complemented by responses to a more granular questionnaire designed particularly for the purpose of describing in further detail the national frameworks in place.[9]

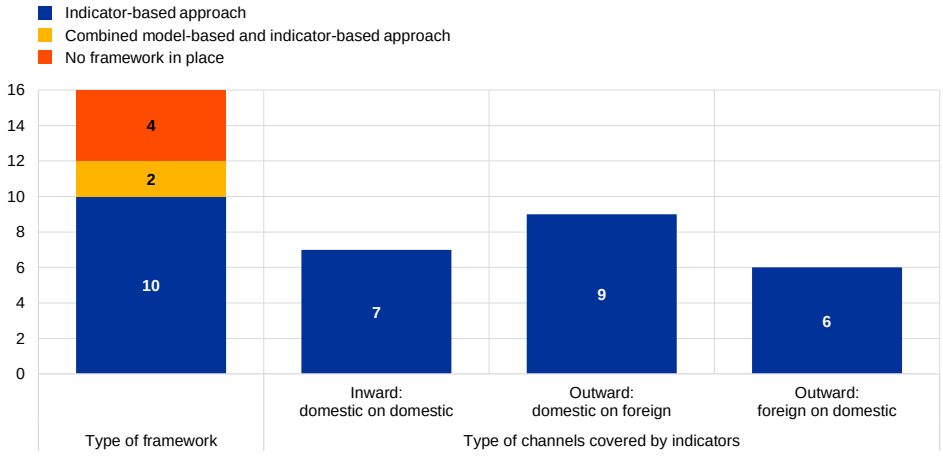
8 That is, national central banks, national supervisory authorities and the ECB, for assessing potential cross-border spillovers from macroprudential policy instruments.

9 The accompanying occasional paper expands in Chapter 4 on the short summary given in this section.

Most of the relevant national authorities in the EU have a framework to assess and monitor cross-border spillovers from the macroprudential policies in place. Existing frameworks are primarily indicator-based, relying heavily on the guidance provided in the ESRB Handbook. Besides the guidance provided by the ESRB Handbook, a few authorities have used additional inputs to inform their assessment, such as findings obtained from empirical models and complementary indicators not mentioned in the ESRB Handbook. There are also countries which have not mentioned standardised methods to assess cross-border spillover effects either due to no/few enacted macroprudential measures or due to having a primarily domestically oriented financial sector (see Chart 9).

Chart 9

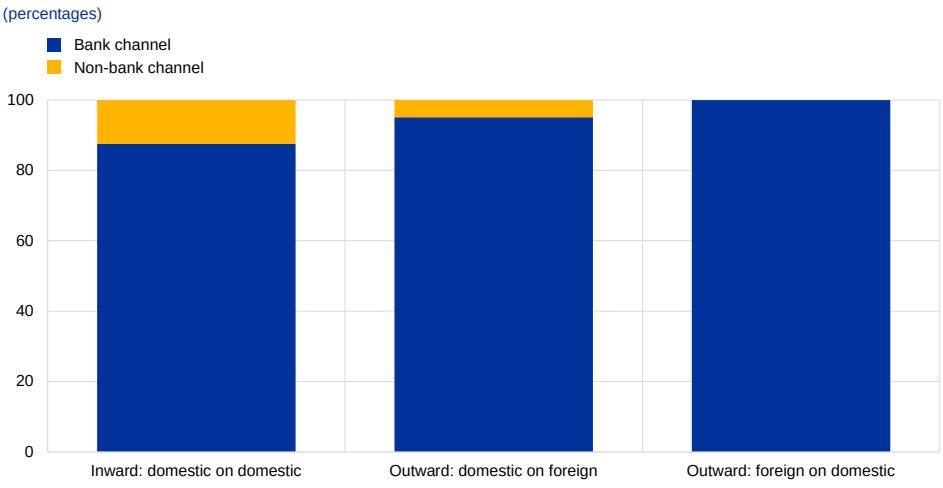
Number of reporting authorities



Source: ECB (TFSE stocktaking survey, March 2018).
Note: * Three countries did not provide details on the indicators used.

Chart 10

Share of reported indicators



Source: ECB (TFSE stocktaking survey, March 2018).

The indicators in use vary substantially across countries and tend to cover both inward and outward spillover channels (see Chart 9, columns 2-4). There

is primarily a focus on “bank channels” comprising “bank lending channels” and, to a lesser extent, “other bank channels”, whereas only little attention is currently paid to “non-bank channels” (see Chart 10).

Many indicators are calculated both at the individual bank level as well as the banking system level. The indicators are either updated on a regular basis (quarterly or annually) or with the activation or review of a macroprudential instrument. A few countries reported attempts to implement visualisation tools, such as heat maps or chart dashboards, to inform their judgement, and plan to make greater use of tentative thresholds going forward.

Many authorities view their current frameworks as being still under development. Authorities mostly plan to enhance the current frameworks, although concrete objectives and timelines are rarely defined.

The majority of authorities see merit in extending the existing guidance for the assessment of cross-border spillovers. Responses to the questionnaire indicated that enhancements to the current operational guidance should address a number of essential gaps: (i) the lack of guidance on suitable models; (ii) the absence of explanation regarding indicators (including indicative data sources for each indicator); (iii) the difficulties in gathering data to compute some of the indicators; and (iv) the difficulties in mapping the indicators to the channels and the direction of cross-border effects.

In general, there is an expectation that FSC recommendations will help to enhance current frameworks. In particular, authorities underscored: (i) the build-up of a common set of indicators and possible thresholds to assess the materiality of the spillovers; and (ii) the development of structural models (empirical or theoretical) to conduct ex ante assessments and the design of a comprehensive framework, including both indicators and models, which could represent guidance on best practices.

5 Structure of the report

The rest of this report presents a set of operational tools (model estimates and indicators) to monitor and assess cross-border spillovers from macroprudential policies that the FSC recommends to be used for practical policy purposes in the EU Member States and by the ECB. In Chapter 1, the various indicator-based tools recommended by the FSC are presented. In Chapter 2, the empirical benchmark tool is presented. Chapter 3, in turn, presents some reflections on existing reciprocity frameworks within the EU, while Chapter 4 concludes. Finally, more detailed information and guidance regarding the operational tools are presented in the appendices.

Chapter 1: FSC indicator list for assessing cross-border spillover effects

This chapter presents a recommended indicator set to be used by national authorities and by the ECB for monitoring and assessing potential cross-border spillover effects. The FSC recommends that the starting point for the analysis of the existence of cross-border spillover effects in the context of macroprudential policy activations is a set of indicators, which would serve the purpose of signalling potential for spillovers along the various dimensions laid out in the FSC conceptual framework (see the introduction and the accompanying occasional paper).

The FSC list of indicators enhances the indicator set laid out in the ESRB Handbook. Chapter 11 of the ESRB Handbook contains a minimum set of indicators that authorities should consider looking at when assessing the potential for cross-border spillover effects. In line with its mandate, the FSC recommended list of indicators is consistent with but goes beyond the ESRB Handbook indicators.

The FSC also expands on the ESRB Handbook indicator set by making it more operational for practical purposes, providing a detailed description of how to calculate the relevant indicators. The majority of authorities see merit in extending the existing guidance. With respect to the indicators, authorities underscored that additional practical guidance from the FSC on the build-up of a common set of indicators and possible thresholds to assess the materiality of the spillovers would be most useful. Authorities also mentioned the absence of explanation regarding the indicators (including indicative data sources for each indicator), difficulties in gathering data to compute some of the indicators and difficulties in mapping the indicators to the channels and the direction of cross-border effects.

The indicator list is accompanied by guidance on how to compute and use the indicators. In this regard, the FSC indicator approach contains a short list of indicators that should be the starting point of an assessment, complemented with a supplementary set of indicators that may or may not be useful depending on the specific situation (as well as data availability). The more detailed guidance on the operational steps needed for calculating and using the indicators is provided in Appendix 1 and in the accompanying Excel file entitled “FSC indicator list”.

The FSC has also reflected on how to derive relevant threshold values to determine when an indicator would signal material cross-border spillover potential. Apart from pure expert judgement, the FSC has considered two approaches to determine relevant threshold values: (i) a “percentile” approach based on the historical distribution of the indicator; and (ii) a “signalling” approach based on the indicator’s ability to predict material cross-border spillovers. While the latter is more conceptually appealing, at this point in time the former was deemed the more operational approach in the light of current empirical evidence and data availability. Going forward, however, over the medium term once the information set improves, a

signalling approach is worth pursuing and national authorities together with the ECB should be encouraged to explore this option alongside the more simplistic percentile approach.

In its work on the indicators, the FSC has also identified a number of data gaps that to some extent hinder an effective and comprehensive assessment of cross-border spillover effects across the EU. This chapter will also point to some identified data gaps (at national and/or ECB level), along with some recommendations on how to fill them.

This chapter provides the comprehensive list of cross-border indicators recommended by the FSC. Section 1.1 presents the FSC indicator list. In Section 1.2, approaches to calculate relevant indicator thresholds are discussed, while Section 1.3 highlights some pertinent data gaps. Appendix 1 at the end of this report contains additional guidance on the construction of the FSC indicators and the accompanying Excel tool provides the full list of recommended indicators.

1 FSC indicator list

Building upon the accompanying occasional paper and also the ESRB Handbook, a list of indicators for measuring cross-border spillovers has been developed. A general advantage of an indicator-based approach for measuring cross-border spillovers is its relative simplicity and hence operationality compared with other approaches, facilitating the communication of the impact of activated policies and reciprocity decisions. However, this comes with the limitation that an indicator-based approach does not allow for controlling for other variables. Therefore, while an indicator-based approach provides a good sense of potential cross-border spillover effects, a causal relationship between the activation of a macroprudential measure and changes in indicators cannot be directly established.

The set of indicators takes the perspective of the domestic country (d). From this perspective, indicators for measuring both inward and outward spillovers have been selected. As mentioned in the introduction, the starting point of the conceptual framework presented in this report is Chapter 11 of the ESRB Handbook. According to that, a country activating a macroprudential policy is referred to as the domestic economy (d), and other countries which are potentially affected by the policy, foreign economies (f). Inward transmission refers to the effects of domestic macroprudential policies (d) on the domestic economy (d) related to the actions of entities headquartered in foreign economies (f). Instead, outward transmission of cross-border spillover effects refers to the effects of domestic policies (d) on other, foreign (f), economies. The effects of foreign macroprudential policies (f) on the domestic economy (d) can be characterised both as outward spillovers from the perspective of the foreign activating countries (f) and as inward spillovers from the perspective of a passive domestic policymaker (i.e. a policymaker which is confronted with the activation or tightening of a macroprudential measure in another country).

For operational reasons, the indicator list follows a decision-tree structure. In order to facilitate the operationalisation of the assessment, the table of indicators is structured as follows: after deciding whether one is interested in the bank or non-bank channel, the analysis starts with the selection of the policy instrument applied, whether an ex ante or ex post assessment is to be done, then whether the assessment is done by the country activating the measure or not and, finally, what kind of spillover to assess (inward or outward). Conditional on this, policymakers are provided with a range of indicators. Table 1.1 illustrates this structure for the bank channel. In this vein, it is worth mentioning that some indicators might appear more than once as they might be applicable for ex ante and ex post assessments, and/or for more than one policy instrument. The table below provides an overview of this structure.

Table 1.1

A decision-tree structure to determine the relevant indicators

Instrument category	Instrument	Assessment	Activating/Passive country	Spillover direction	Indicator
Capital, Liquidity or Borrower-Based	Instrument A	Ex-ante	Activating country	Inward spillover	BAI1. Indicator
					BAI2. Indicator
				Outward spillover	BAO1. Indicator
					BAO2. Indicator
			Passive country	Inward spillover	BAI1. Indicator
					BAI2. Indicator
		Ex-post	Activating country	Inward spillover	BPI1. Indicator
					BPI 2. Indicator
				Outward spillover	BPO 1. Indicator
					BPO 2. Indicator
			Passive country	Inward spillover	BPI1. Indicator
					BPI2. Indicator
	Instrument B	…		…	…
	Instrument C	…		…	…

Source: FSC.

The indicators have been differentiated per category of instrument, distinguishing between capital-based, liquidity-based and borrower-based instruments. This first step in the categorisation allows for a differentiation between spillover channels for each category of instruments. Also within a category, further differentiation for a specific instrument helps to select appropriate indicators. For instance, the scope of an instrument may differ. While some capital-based instruments do not (automatically) apply to branches of foreign banks (e.g. those based on Article 458 of the Capital Requirements Regulation (CRR)), some capital-based measures do apply to foreign bank branches (e.g. the countercyclical capital buffer (CCyB), up to 2.5%).

Both ex ante and ex post indicators have been developed. Ex ante indicators provide an insight into the potential for cross-border spillovers by measuring cross-border interlinkages. These indicators are especially relevant before an instrument is activated. Usually, ex ante indicators are measured in levels. Ex post indicators are especially relevant for gaining an insight into the development of potential cross-border spillovers after an instrument has been activated. These indicators measure the percentage changes of the ex ante indicators between periods t and t-1.

The emphasis of the FSC indicator list is primarily on banks. This is due to: (i) the fact that most macroprudential instruments are only available for the banking sector; (ii) the high relative importance of the banking sector in most EU financial systems; and (iii) the scarcity of data for the non-banking sector. However, indicators to account for potential cross-border spillovers via non-banks are also suggested.

To evaluate whether a set of indicators can be used as a monitoring tool for measuring cross-border spillovers, a number of evaluation criteria have been applied:

- **Balance:** given a predefined net benefit of activating/recalibrating the instrument, is the set of indicators sufficiently flexible to encompass both benefits and costs (including cross-border spillovers when relevant)?
- **Robustness/flexibility:** are the results sufficiently robust to data breaks? Is it possible to change the indicators easily to capture structural changes in the economy and financial sector?
- **Parsimony:** are the indicators the simplest across a class of indicators that capture the relevant cross-border spillovers? Is the implementation and maintenance of the set of indicators feasible within a reasonable time frame, also considering issues like the frequency of updates, operational documentation and staff turnover?
- **Communication to policymakers:** are the indicators easy to interpret and communicate to policymakers? This consideration is key because the final policy decision inevitably looks at a complex set of factors.
- **Saturation:** Does the indicator provide new information compared with other available indicators? Are there other indicators capturing the same spillover channel/segment? Does the indicator provide complementary information or is it redundant?
- **Data availability:** Are the data required for computing the indicator available to the domestic policymaker? The use of EU harmonised financial data should be preferred to ensure the consistency and transparency of the framework. In this vein, the timeliness of the indicators should also be considered.

The FSC indicators can be used for regular monitoring of the importance of cross-border activities and as input to ex ante and ex post assessments. The FSC has developed a list of indicators that activating and reciprocating Member

States could use when a measure is being considered for activation. The list of indicators is long and comprehensive: more than 200 indicators are included.[10]

In order to guide national authorities in the implementation of an indicator-based framework, the FSC has selected a short list of indicators that it recommends as a starting point for authorities to detect (potential) cross-border spillovers of macroprudential measures. The short list of indicators was selected by using the selection criteria and the authorities' experience with constructing the indicators.[11] Using other indicators from the full list may, however, be necessary to have a more detailed understanding of the (potential) spillovers. It is recommended that authorities go beyond the short list of indicators, whenever reasonable or necessary given either the characteristics of the national financial market or the nature of the macroprudential measure considered.

The FSC indicators are also divided into the different transmission channels identified as being important for cross-border spillovers. The division of indicators into transmission channels follows the conceptual framework described in the introduction (Figure 1) as well as, in more detail, in the accompanying occasional paper. The key distinctions include: bank lending channels versus non-bank channels and bank non-lending channels; inward versus outward spillover channels; and capital-based measures, borrower-based measures and liquidity-based measures. For ex post assessment, the changes in FSC indicators should be monitored. The short list of indicators is shown in Table 1.2. The full list, including the supplementary indicators' descriptions and data sources, is available in Appendix 1 and in the accompanying Excel file entitled "FSC indicator list". National authorities can also combine indicators, depending on the instrument analysed; for instance, an indicator about loans to the domestic private non-financial sector granted by foreign banks could be combined with an indicator about non-financial corporation (NFC) securities held by foreign banks.

[10] However, this number is somewhat inflated due to the fact that the list includes similar indicators expressed in levels (ex ante) and in changes (ex post), respectively.

[11] The FSC ranked the indicators by attributing a score from 0 to 3 for each selection criterion. The indicators obtaining the highest scores for each type of macroprudential measure and transmission channel were selected for inclusion in the short list.

Table 1.2

FSC indicator list: short list of indicators

Capital-based indicators

Description	Ex ante (levels)	Ex post (changes)	Inward	Outward
Loans to domestic private non-financial sector granted by foreign banks/ loans to private non-financial sector	BCAI1	BCPI1	x	
Loans to domestic private non-financial sector granted directly or through branches of foreign banks/ loans to private non-financial sector	BCAI2	BCPI2	x	
Foreign banks´ branches assets / assets	BCAI9	BCPI9	x	
Cross-border loans granted to foreign private non-financial sector/ Total loans of banks operating in domestic country to private non-financial sector	BCAO1	BCPO1		x
Cross-border loans from domestic to foreign country / Total loans of foreign country	BCAO3	BCPO3		x
Cross-border loans granted directly or through branches / Total loans of foreign country	BCAO4	BCPO4		x
Cross-Border assets / assets	BCAO10	BCPO10		x
Exposures in foreign countries potentially subject to a CCyB / All exposures subject potentially subject to a CCyB	BCAO14	BCAO14		x

Liquidity-based indicators

Description	Ex ante (levels)	Ex post (changes)	Inward	Outward
Securities issued by domestic banks held by foreign banks /Total securities issued by domestic banks by activating country	BLAI3	BLPI3	x	
Share of foreign banks in illiquid assets in domestic country / Share of foreign banks in total assets domestic country (could be further specified per jurisdiction)	BLAI7	BLPI7	x	
Liquid assets held by foreign (EU and non-EU) controlled subsidiaries and foreign (EU and non-EU) controlled branches	BLAO1	BLPO1		x
Institution-specific relevant (measure-related)cross-border funding/Total funding of domestic banking group	BLAO3	BLPO3		x
Cross-border illiquid loans from domestic banks to foreign counterparties / total loans to foreign counterparties (could be further specified per jurisdiction)	BLAO8	BLPO8		x

Borrower-based indicators

Description	Ex ante (levels)	Ex post (changes)	Inward	Outward
Real estate loans to domestic private NFCs or HHs granted directly or through branches of foreign banks / real estate loans to private NFCs or HHs	BBAI1	BBPI1	x	
Cross-border real estate loans granted directly or through branches to NFCs or HHs / Real estate loans to private NFCs or HHs	BBAO1	BBPO1		x

Source: FSC.
Notes. For liquidity-based instruments, outward spillovers are often deemed more likely to occur than inward spillovers, from the perspective of the activating country. Concerning "illiquid assets", the FSC does not predefine what kind of assets are assessed as liquid or illiquid, as this status is highly dependent on the market conditions in the activating country and the underlying systemic liquidity risk of each measure. FINREP 20.04 provides a list of more than 20 different asset groups, which – according to the financial structure of the activating country – can be classified as liquid or illiquid.

2 Thresholds

Predefined thresholds for indicator values that indicate potentially material spillovers could greatly ease the interpretation of the indicators and inform policy design. The FSC indicators are monotonous in spillover materiality so a higher value of the indicator tends to signal increased materiality of possible spillovers. However, the values themselves cannot be interpreted easily. Inference could be eased by information on whether the indicator for a particular macroprudential measure is in its "critical territory" or not. The ability to convey information to the policymaker in a clear way was required in the "communication to policymakers" criterion and, therefore, thresholds positively contribute to the appeal of the indicator scoreboard. Besides expert judgement, the FSC has considered two methods for deriving thresholds: (i) a percentile approach; and (ii) a signalling approach.

In the percentile approach, the value of the indicator is compared with the realised "historical" distribution of the indicator. The historical distribution of past realised indicator values can be confined to the national jurisdiction or also incorporate a cross-country perspective. The attraction of this approach lies in its simplicity and operationality as it neither requires any modelling assumption nor any data on top of the indicator values in the reference sample. At the same time, it may not be clear a priori which percentile should indicate the potential for material spillovers and hence the threshold choice will typically have to rely on expert judgement. The fact that indicators are high in the cross-sectoral dimension (among reference countries) or in the time dimension (relative to historical values) does not in itself imply that the spillover potential is high. In fact, it could also signal that in other countries or in the past the potential for spillovers was fundamentally low.

The signalling approach identifies indicator values that were connected with material spillovers in the past. The approach optimises the threshold value so that it can optimally split "safe territory" of the indicator values from "critical territory" by maximising the trade-off between missed signals and false alarms.[12] Threshold values derived by the signalling approach are therefore directly related to the phenomena that they are meant to identify and thus are easy to interpret. The method also greatly reduces the need for additional expert judgement. Nevertheless, this approach is very demanding with respect to its inputs. It requires not just past values of the indicator in a panel of countries, but also a database of material spillovers realised in the past. Measurement of realised spillovers is a difficult discipline in itself. As with any statistical technique, the signalling approach is only as good as the underlying data are. Consequently, the FSC concluded that for the time being, until more data on realised cross-border spillovers become available, in most cases the signalling approach is a promising but not yet viable solution.

[12] Besides the signalling approach, other statistical techniques such as logistic regression or decision trees could be utilised. However, the signalling technique is easiest, free of behavioural and distributional assumptions and effective even when only limited data are available. This makes it the first-choice technique in the realm of macroprudential policy spillovers. At the same time, the result does not say anything about the exact intensity of the expected spillover effect, only whether it is expected to be material or not.

Given the complexity of the signalling approach, in the short to medium term the percentile approach was favoured by the FSC as being the most operational. Although the percentile approach does not "prove" the existence of spillovers and cannot be interpreted as providing true critical values, the breach of the percentile-based thresholds would indicate that the propensity for spillovers is high for the cross-sectional and/or time dimension. This propensity should help to focus the policymaker's attention on cross-border spillovers in the analysis of potential impacts of macroprudential policy tools and, if the resulting spillovers were indeed expected to be large and negative, amending the design of the macroprudential instrument could be considered.[13] In order to strengthen the explanatory power of the derived thresholds, it is recommended, whenever data are available, to derive percentile thresholds with respect to a panel of countries, as experience derived just from one country's past data might obscure the real propensity for spillovers. Also, where data and expertise are available, it is recommended to consider a panel of countries with similar financial sector characteristics to the country under investigation.

Given the tentative status of the percentile approach and the associated caveats, the FSC does not put forward predefined threshold values to be applied by national authorities. As more experience will still need to be gained on the performance of individual FSC indicators, the FSC does not at this point provide concrete recommendations on specific threshold values across the FSC indicator list. Hence, as a starting point, it will be up to the national authority to make an assessment. Over time, it might then make sense to aim at some harmonisation of indicator values to facilitate discussions across jurisdictions.

At the same time, exploring the signalling approach might be a fruitful avenue for future research. When a database of material spillovers is assembled by researchers, comparing it with the values of indicators identified by the FSC might be highly informative and can be used to establish truly evidence-driven thresholds. Such results could then be used to test the viability of the thresholds set by the toolkit developed by the FSC.

3 Data gaps

One of the main challenges when using an indicator-based approach to measure cross-border spillover effects of macroprudential instruments is the issue of data gaps.[14] The work of the FSC on developing a set of indicators confirmed this issue. This section discusses the main data gaps identified in order to inform relevant authorities about identified limitations of the indicator-based approach resulting from data gaps. Potential solutions or already launched initiatives

[13] Taking cross-border spillover effects of national macroprudential measures on other Member States into account is an essential part of Recommendation ESRB/2015/2.

[14] For an overview of data sources used for assessing cross-border spillover effects by national authorities, see Chapter 4.2 of the accompanying occasional paper.

to curtail or close these data gaps will also be described, wherever available or foreseeable.

For indicators on the bank lending channel, the common European supervisory reporting framework provides a full, granular and comparable set of data on financial institutions in Europe. However, direct access to the data is limited to authorities that are directly in charge of supervising financial institutions. Generally, these are the ECB and/or the NCA(s) in the country where the financial institution is officially registered.

There are however non-negligible obstacles for national supervisors when it comes to monitoring cross-border spillover effects, especially where a significant share of the domestic market relies on foreign branches and lending from foreign banks abroad. Even NCAs with access to granular supervisory reporting generally do not have access to data on direct cross-border lending of foreign banks to their country. In addition, reporting on foreign branches to host authorities is often very limited. While some information on foreign branches is exchanged between home and host competent authorities, it is often not sufficient to monitor all inward spillover effects.

To improve the cross-border spillover monitoring capacity within the EU, further efforts to exchange and potentially centralise relevant information should be encouraged. For NCAs, there would be virtue in having more supervisory data on significant branches to better assess prospective spillovers. Consistently with the need-to-know and the proportionality principles, the exchange of necessary information about relevant branches should be facilitated. A couple of already launched supranational initiatives try to overcome some of these data gaps. To have a complete web of exposure relationships, there would be benefits in centralising such data collections. The ESRB within the EU context and the ECB in its SSM capacity would be well placed to access data for a multitude of countries and to benefit from economies of scale in the indicator calculation. Obviously, the benefits of collecting and exchanging new data should be weighed against the costs, and it has to be fully justified by the importance for the monitoring of financial stability.

Using aggregated data on cross-border activity to overcome the data gaps provides only an incomplete picture of relevant cross-border spillover effects. While granular supervisory reporting has limitations relating especially to the sample coverage, statistical reporting and more aggregated data on cross-border activity in principle allow for a more comprehensive view of banking sector activities. This however typically comes with the cost of not being able to for example distinguish between regulated (e.g. foreign subsidiaries) and unregulated (e.g. foreign branches) entities, which is crucial for the proper identification of macroprudential leakages and regulatory arbitrage.

Data gaps are even bigger for non-bank transmission channels. Cross-border data for non-bank financial institutions is generally scarce and mostly available only at aggregate levels. Hence, for the time being cross-border spillover effects through non-bank channels can at best be measured and monitored in approximate ways.

Chapter 2: An empirical benchmark tool to assess cross-border spillover effects

By now there is a rather extensive literature on cross-border spillovers from macroprudential policies which provides a valuable benchmark against which to assess future macroprudential actions. While noting that each macroprudential action is specific to prevailing circumstances, the FSC is of the view that there is nevertheless value added in "learning from past experiences". Against this background, the main goal of this chapter is to retrieve quantitative estimates of cross-border spillovers from existing studies and summarise them in an intuitive way.

The FSC has created a user-friendly Excel-based tool to provide ballpark numbers for likely spillover effects. The quantitative estimates derived from the empirical literature have been integrated into a user-friendly tool (the "empirical benchmark tool"). In this chapter, its main features and usage are described at a high level. A more detailed and technical description of the tool and how to use it is provided in Appendix 2 of this report (as well as in the tool itself).

1 The empirical benchmark tool: approach

The set of empirical studies assessing cross-border spillovers has increased substantially since the first publication of Chapter 11 of the ESRB Handbook in 2014. Within the more general literature, a homogeneous set of papers use a specification similar in spirit to the following equation:

$$Bank\ flow_{r,s,t} = \alpha + \boldsymbol{\beta Regulation}_{r(s),t-n} + \boldsymbol{\varphi Controls}_{r(s),t-n} + \boldsymbol{\phi Interactions}_{r(s),t-n} + \boldsymbol{\delta}_{r(s)} + \theta_t + \varepsilon_{r,s,t}$$

where $Bank\ flow_{r,s,t}$ stands for the bank flow (level or growth) to (recipient) country ***r*** from (source) country ***s*** at time ***t***. *Regulation* is a vector representing prudential policy actions in "source" or "recipient" countries. *Controls* is a vector of variables controlling for features of country ***r*** or country ***s***, or the gap between the two, such as the demand for and supply of credit in ***r*** and ***s***, the relative position of the domestic financial and business cycles, banking sector characteristics (e.g. size, liquidity and capitalisation) or more structural factors. The latter may also be introduced as country fixed effects, $\boldsymbol{\delta}_{r(s)}$. Global push factors in international bank flows, such as monetary policies in core economies, can be included as control variables or "packaged" as time fixed effects, θ_t. Finally, some specifications include an *Interactions* vector encompassing the product of each *Regulation* index and some of the control variables. Interaction terms help to determine if the regulation has a differential impact conditional on specific characteristics, such as bank characteristics or the economic cycle of country ***r***.

The tool shows information from relevant papers by organising and standardising estimates for the coefficient of interest β. The criterion for inclusion in the database is 10% statistical significance, a standard level in the literature.[15] For each study, the range of elasticities presented includes every specification that produces a significant outcome. The tool is organised in a flexible way, including a number of toggles that allow the user to switch on and off specific features in order to get as close as possible to the country-specific case the user is trying to assess. The main categories embedded in the tool are described in Box 1.

Papers with non-significant results (at least at the level of 10% significance) are not formally shown in the tool. On the one hand, the exclusion of non-significant results might lead to bias in the form of omitting papers that show that cross-border spillovers from macroprudential measures are zero or negligible, which would be a relevant result. On the other hand, the inclusion of point estimates from such studies would add noise to the range of significant results as the point estimates are often large due to the fact that most studies finding insignificant effects are employing dummy variables to measure macroprudential policies. More precise studies which employ bank-specific intensity-based measures typically find significant results. Moreover, the tool makes it possible to single out the estimated ranges of studies using intensity-based measures which would hence provide an unbiased range of benchmark estimates (as it does not include studies with non-significant results). For the sake of clarity, the FSC thus decided that it is better to exclude non-significant results. It is however worth noting that Buch and Goldberg (2016), in their meta-analysis of International Banking Research Network results, find that "the majority of specifications do not exhibit statistically significant international spillovers of prudential instruments". In the case of capital requirements, 92% of the specifications across country teams did not find any significant outward spillovers. For the other prudential instruments, the range of non-significant results is between 66% and 76%. However, there is no clear pattern with respect to the sign of effects across significant results: in many cases, more countries found positive outward spillovers than negative ones, indicating that a tightening of a prudential measure in one location is associated with an increase in lending growth in another location. This outcome is reflected in the general literature and reinforces the need for caution in making generalisations about country-specific studies. Taking into account the number of non-significant studies, it follows that spillovers might in general be weaker than shown by the tool's output.

There are several caveats related to the application of the literature's empirical findings as guidance for the presumed effects of new policy actions:

- **Risk of generalising country-specific studies to other jurisdictions with different financial structures.** As is implicit in the equation above, structural and other factors in recipient and/or source countries attenuate or enhance the average effect of prudential policies.

[15] Some studies use lags of policy variables to study the gradual effects of policies. Others include interaction terms between the policy variable and other variables. Whenever results were available in papers, the 10% criterion was applied to the summed effect on lending growth over linear combinations of all regression terms that include policy instruments. See Appendix 2 for more details.

- **Challenge of mapping literature to granular macroprudential instruments.** Most of the studies use more general measures of macroprudential measures not readily translatable into specific instruments available to policymakers. One particular example is the use of dummy variables to capture the activation of macroprudential measures, which will be further discussed below.
- **Limited comparability across different dependent and explanatory variables.** Variables used in empirical studies are restricted by data availability, but also by differences in domestic regulations.
- **Studies can often not account for how binding changes in regulation are for different entities, but usually refer to changes in minimum requirements.** This would improve the accuracy of estimates and help to assess the effect of specific measures. Non-binding changes are expected to lead to non-significant results.
- **Going forward, spillovers might be different than suggested by the tool, which is based on the empirical literature to date.** For example, one important consideration is that generally capital buffers have increased with recent Basel III implementation and it is subject to further study whether the extent to which banks will protect their external lending by relying on (now larger) buffers will change.
- **Assessing potential welfare effects is beyond the scope of the tool.** For example, the state of the credit cycle in the receiving country (f) will matter when thinking about the welfare effects of lending spillovers.
- **The estimates in the tool aggregate the effect on measures of bank flows/lending over different time horizons.** Often though the literature specifies *Regulation* in such a way that β measures the transmission of *Regulation* to growth in bank flows/lending over a one-year period.
- **The relatively wide ranges around the median/average lending responses (see below) imply that due caution is warranted when interpreting outcomes of the tool.** The user should in particular be cautious about taking the upper and lower bounds of the ranges at face value, as they rather serve to indicate the uncertainty around the average estimates across the surveyed studies.

Given the caveats, the tool can only give a first pass at the possible size and direction of spillover effects. Ex post monitoring of changes of specific measures would – once enough data become available – involve setting up a well-identified empirical study along the lines described above.

Box 1

Categories in the empirical benchmark tool

The empirical benchmark tool organises the information into ten categories, represented by "switches". These switches allow users to plot the distributions of elasticities according to specific needs. This box presents the options available.

Instrument: capital, borrower-based, liquidity. This refers to the main regulations analysed in the studies, according to broad categories. More granular instruments were mapped to these broad categories, following standard practice in the literature and the classification used in Chapter 1.

Direction: inward, outward. This convention follows Figure 1. Outward spillovers refer to a change in the financial flows from the banking sector of a domestic source country (d, s), which activates the policy, to foreign recipient countries (f, r). Studies using an inverse convention, most notably those of the International Banking Research Network (IBRN), were translated to the convention adopted in this report (which is also consistent with the approach taken in the ESRB Handbook). Inward spillovers are flows from a foreign source country or foreign affiliates based in the recipient economy (f, s) to a recipient economy, which activates a policy (d, r).

Macroprudential measure: this is a dummy. Because of the great heterogeneity of policies across countries, a large set of studies focus on tightening or easing episodes of macroprudential instruments without taking into consideration the magnitude of the changes to the instruments. They measure changes in policies with dummy variables that take a value of 1 for quarters and countries when a tightening of a macroprudential measure has taken place, -1 for a loosening, and 0 otherwise. Some studies also use the sum of all changes in that variable recorded prior to the quarter/year of interest. These are proxies for the overall change in the tightness of an instrument at a given point in time. With the availability of more granular data, papers departed from dummy variables to use intensity measures (i.e. whether capital requirements relative to risk-weighted assets are tightened for example by 50 or 100 basis points (bps) or whether they are tightened as a percentage of banks' capital). While intensity measures allow for an assessment of macroprudential measures beyond tightening or loosening, papers using dummy variables make up the vastest body of the literature. Dummy variables are also useful to capture complex measures not easily reproduced by intensity measures, such as those concerning loan amortisation depending on loan-to-value ratios. A dummy variable is able to capture the direct activation of the measure. For sources using intensity measures, a tightening of 100bps of the macroprudential measure is the convention adopted in the tool. This assumption should be kept in mind (and potentially adjusted to the specific case) when aggregating results across studies based on dummy variables and intensity measures.

Data type: macro, micro. Papers using macro data usually draw on open sources such as the Bank for International Settlements (BIS), International Monetary Fund (IMF) International Financial Statistics (IFS) or ECB monetary financial institution (MFI) datasets. While these databases are easily updatable and allow for consistent comparison across countries, they also limit the scope for disentangling supply and demand effects. Micro data, based usually on supervisory bank-level reporting, allow for higher precision with regard to the identification of supply effects and of countries' banking structure (such as local affiliates of foreign banks and the split between branches and subsidiaries). However, available micro data banking series are usually shorter than country-level series, confidential and harder to compare across countries.

Receiver: bank, non-bank, total. Papers on cross-border effects of macroprudential measures have increasingly found differential effects for interbank lending and lending to non-banks (e.g. households and non-financial corporations). The two market segments are usually different, with non-bank lending more relationship-based and more profitable, while interbank lending is more competitive and of shorter maturity. If the entry from a given paper just presents results for total lending, its entry is included under "total".

Geographical coverage: Europe, advanced, all. In the case of outward spillovers, the geographical dimension represents the receiving dimension (f, r). Once country (d, s) activates a macroprudential measure, the paper might be able to assess the impact on different areas, such as the European continent, advanced economies or all. For inward spillovers, it is usually the case that papers analyse the impact on country (d, r), which means that the geographical dimension of which specific countries are the source of inward spillovers is less relevant. The split between Europe and advanced refers to the distribution of foreign headquarters of banks (foreign affiliates) operating in country (d, r). The switch is incremental: "advanced" represents Europe plus other advanced countries, while "all" represents Europe, other advanced countries and other countries (emerging markets and low-income developing countries).

Time coverage: the time coverage entry has two switches: "time start" and "time end". By activating the "time start" switch, the tool excludes all studies covering years prior to the one entered in the cell. By activating the "time end" switch, the tool excludes all studies covering years after the one in the cell. The main objective is to allow the user to analyse specific periods, for example before and after the global financial crisis. Results might vary from period to period even in the presence of time fixed effects.

Dependent variable: bank loans, credit, other. Loans refer to balances and funds lent to banks and non-banks by banks, while credit more generally includes bills, certificates of deposit (CDs) and portfolio investments. Few papers use a precise terminology, and most interchange terms freely (e.g. "credit" and "claims"). "Other" is a residual category to encompass other exposures not included in credit.

Peer-reviewed: whether the study is published in a peer-reviewed publication. Publication in a peer-reviewed journal indicates that the study survived scrutiny from specialists in the field. But in most cases journal publications have become an archive rather than a tool of communication among researchers. Since publication times for studies with relevant results might be long, the inclusion of non-peer-reviewed studies (with the appropriate classification) ensures a timely tool for policymakers.

2 A practical illustration of the tool

The tool presently contains 51 entries from 21 studies. As seen in Table 2.1, most studies focus on capital requirements and liquidity requirements. The high number for liquidity requirements is due to the inclusion of reserve requirements, while studies analysing the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) are still rare. It should also be noted that there are significantly more studies on emerging markets than on European and other advanced countries.

Table 2.1

Number of studies included in the tool

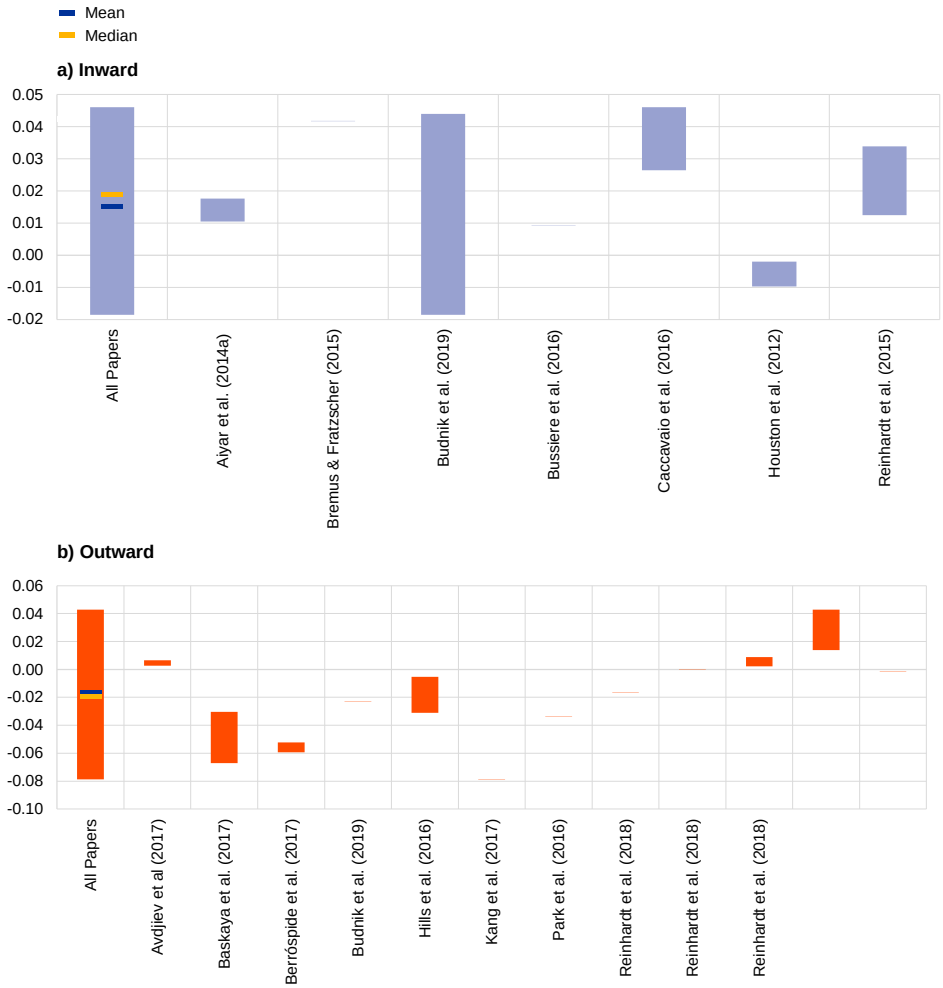
Instrument		Inward			Outward			Total
		Europe	Advanced countries	Whole world	Europe	Advanced countries	Whole world	
		Direction/Geographical Coverage						
Instrument	Capital	1	0	6	2	0	10	19
	Borrower based	2	1	2	2	0	7	14
	Liquidity	1	0	7	2	0	8	18

Source: FSC.

Chart 2.1 shows the entries for inward and outward spillovers arising from capital requirements. Most of the studies for inward spillovers find positive coefficients, with a net tightening in capital requirements increasing growth in lending to the domestic economy from foreign sources by 2 percentage points (pp) for the mean and median (green and blue diamonds, respectively), while outward spillovers mostly have a negative sign (average and median of -2pp), meaning that a tightening of capital requirements in one country has a decreasing impact on lending growth in other countries. The chart also shows that there is a high dispersion in the ranges, reflecting different specifications and samples. For inward spillovers from capital measures, the range goes from -2pp to +5pp and for outward spillovers it goes from -8pp to +4pp. Interpreting results is more straightforward by splitting between studies that use dummies as a proxy for the activation of macroprudential measures and those that use intensity measures. In the case of studies using dummies, the activation of capital requirements implies inward spillovers between -2pp and +5pp. The number of studies analysing inward spillovers based on intensity measures of macroprudential actions is limited (just three), but they provide a narrower range, i.e. a 100bp increase in capital requirements increases lending by foreign banks by 1pp to 4pp. For outward spillovers, the range for studies that do not use dummy variables is likewise somewhat narrower: -7pp to +1pp.

Chart 2.1

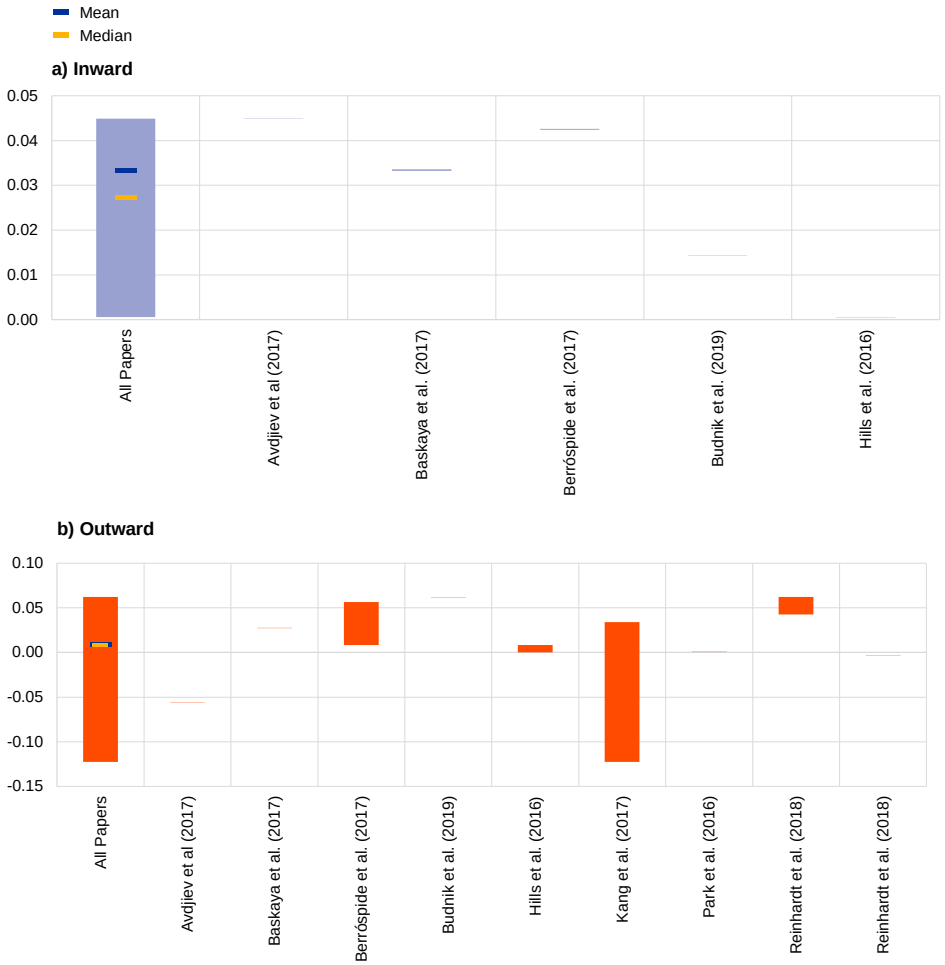
Empirical benchmarks: impact of capital-based measures on lending



Source: FSC.

Chart 2.2

Empirical benchmarks: impact of borrower-based measures on lending



Source: FSC.

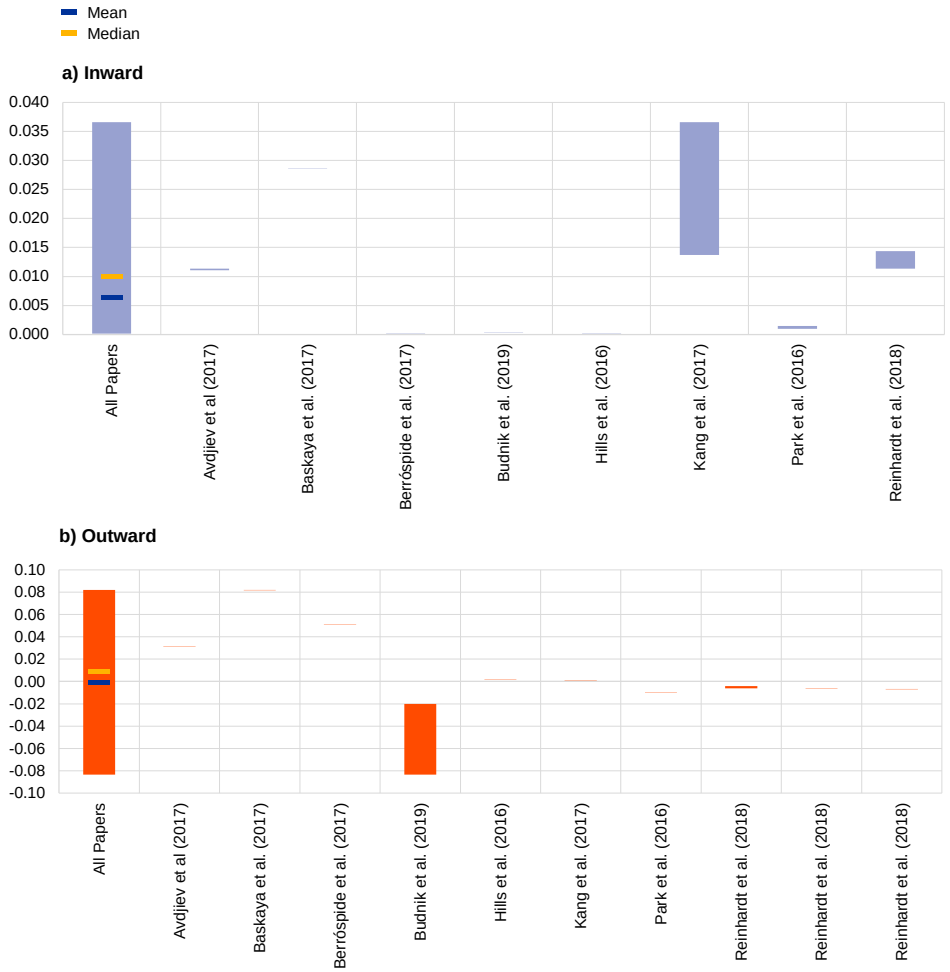
Chart 2.2 contains the results for borrower-based measures. For this specific category, no studies using intensity measures are available. One reason for this is that borrower-based measures depend on specific conditions related to the borrower, which means that the calculation of an intensity measure is difficult. Inward spillovers following the activation of a borrower-based measure range between zero and 4pp, i.e. growth in lending from foreign sources to banks or non-banks in the activating country increases by up to 4pp. For outward spillovers, estimations are more dispersed (ranging from -12pp to +6pp) and the average and the median are actually slightly positive. This would mean that the activation of a borrower-based macroprudential measure in a country would increase external lending from that country on average by 1pp. The range goes from 1pp to 6pp if the selection is only for European countries.

Finally, Chart 2.3 shows the results for liquidity requirements, which include changes in reserve requirements. For inward spillovers, the range goes from zero to 4pp, while for outward spillovers it goes from -8pp to +8pp (with the average and median being close to zero). There is only one study that takes into account how

intense changes in requirements were and which focuses specifically on liquidity regulation (Reinhardt et al., 2018). This study finds that following an increase of domestic liquidity requirements by 100bps of total bank assets, external lending growth falls by between 0.4pp and 0.6pp.

Chart 2.3

Empirical benchmarks: impact of liquidity-based measures on lending



Source: FSC.

Box 2

Using the tool to evaluate cross-border spillovers from the countercyclical capital buffer

The tool shows that the range of estimates in the literature for outward spillovers based on intensity measures of macroprudential actions is between -7pp and +1pp. This means that a 100bp increase in capital requirements has an impact on external lending growth that goes from -7pp to +1pp. However, when policymakers introduce the countercyclical capital buffer (CCyB) they might have to adjust this range, given that most findings in the literature relate to the effect of total capital requirements relative to risk-weighted assets taking into account total exposures rather than only domestic exposures as is the case for the CCyB. The estimates presented by the tool need

therefore to be multiplied by the country-specific share of claims on domestic non-bank private sectors in total (domestic plus foreign) claims on non-bank private sectors.

For example, for the United Kingdom's CCyB, the latest academic study based on UK data (included in the tool) posits that a 100bp increase in the requirement is associated with a reduction in the growth rate of cross-border credit of around 3pp over a one-year period. A portfolio share of claims against the UK non-bank private sector in total claims of around 60% would then imply that a 1pp rise in the CCyB might lead to an average fall in cross-border lending growth of around 1.8pp. This estimate would fall further when taking into account relative price effects, given that domestic exposures are now relatively capital intensive compared with foreign exposures.

This example makes clear that estimates provided by the tool for general capital requirements may need to be adjusted for the specific measure to be examined in order to provide a first pass on possible effects based on the empirical literature.

Chapter 3: Some considerations on reciprocity

In order to minimise the risk of macroprudential policy leakages arising due to inward spillover effects, various reciprocity arrangements – both mandatory and voluntary – have been put in place within the EU.[16] Reciprocity of macroprudential measures taken at the domestic level is therefore aimed at ensuring that the measures are effective in achieving their stated objectives by reducing potential cross-border spillover effects.

Against this background, in this chapter, on the basis of the FSC framework for assessing cross-border spillover effects related to macroprudential policy measures, the potential implications for the current arrangements on voluntary reciprocation in the EU are discussed. It is of high importance that, for measures for which material spillovers have been observed or could reasonably be expected, an effective and efficient reciprocity framework exists. The chapter is structured in the following manner. First, a brief description of the motivation for reciprocity and the current reciprocity framework in the EU is provided. Second, the sufficiency of and the need to potentially fine-tune current reciprocity agreements are considered in the light of the FSC findings.

1 Cross-border spillovers of macroprudential policies and reciprocity arrangements in the EU

The cross-border spillover framework presented in this report can be used to inform policymakers about the scope for material and relevant spillover effects, which may warrant a strengthening of existing reciprocity arrangements. The quantitative and qualitative findings on the importance of cross-border spillovers of different macroprudential tools based on the broad set of indicators and the empirical and model-based estimates reflect the most up-to-date research and provide a good starting point for feeding into reciprocity assessments. They may also help answer the question on whether existing reciprocity arrangements are appropriate or could be fine-tuned further.

[16] Reciprocity, as defined by the ESRB, is an "*arrangement whereby the relevant authority in one jurisdiction applies the same, or equivalent, macroprudential policy measure, as is set by the activating relevant authority in another jurisdiction, to any financial institutions under its jurisdiction, when they are exposed to the same risk in the latter jurisdiction*" (Section 2, paragraph 1(f), of Recommendation ESRB/2015/2).

Motivation for introducing reciprocity arrangements

An integrated financial system brings economic and financial benefits. But because this is accompanied by still heterogeneous national economic and financial cycles as well as economic policies, causing systemic risks to originate at the national level, this may also generate significant and undesired cross-border effects. Leakages and regulatory arbitrage may reduce the effectiveness of national macroprudential action depending on its stated policy goals. Furthermore, while arguably not the main argument in favour of reciprocity, competition in domestic financial markets can be distorted due to the fact that foreign banks might, either through their branches or by way of direct provision of services, use their competitive advantage to increase their market share. In addition, as foreign banks might redirect their activities to branches and foreign direct service provision, they will not create a sufficient buffer against the risks in the host country. The reciprocation of macroprudential measures might enhance the effectiveness and consistency of macroprudential policy. As a positive side effect, reciprocation also contributes to a level playing field in the Single Market. Therefore, policymakers should, when they or partner countries adopt macroprudential policy measures, analyse in detail the cross-border effects. Based on this analysis and to ensure the effectiveness of the overall impact of specific instruments, policymakers should request reciprocity or, when warranted, adopt suitable reciprocating macroprudential policy measures.

While the results from different empirical and analytical approaches differ considerably, the key takeaway is that cross-border spillover effects can be material. The nature, direction and magnitude of the spillover effects vary across both modelling approaches and model specifications. In terms of inward spillovers, there is relatively solid evidence of the presence of leakages of domestic macroprudential measures, in particular via foreign branches not captured by domestic policy activation. Outward spillover effects are also found to be present in most studies, although the effects (on lending) vary across instruments, bank balance sheet characteristics and the nature of banks' relationship abroad (e.g. whether the entity is a core part of the business or more like an ancillary business line). In addition, there is also some evidence that macroprudential measures targeting the banking sector can have significant spillover effects on the non-bank financial sector, which in turn may also act as a conduit for regulatory arbitrage. This, together with the experience of various Member States (see Chapter 4 of the accompanying occasional paper), demonstrates the importance of incorporating considerations on international spillovers prior to activating macroprudential policy and having an operational reciprocity framework in place.

Current reciprocity frameworks in the EU

In the EU, various degrees of cross-border recognition of national macroprudential measures are embodied in EU legislation (see Table 3.1). In principle, reciprocity arrangements exist for exposure-based measures enshrined in

EU legislation, while no arrangements exist for institution-based measures[17]. There are also no explicit reciprocity arrangements for measures not having a legal basis in EU legislation (e.g. borrower-based measures). Recommendation ESRB/2015/2 encourages the reciprocation of measures for which mandatory reciprocity is not provided for in EU law. Thus, in theory it should be possible to reciprocate borrowed-based measures if, for example, it is demonstrated that the growth in household debt is also caused by borrowing from foreign institutions domiciled outside the relevant Member State activating the measure. Recognition of the measures with respect to real estate exposures (Articles 124 and 164 of the CRR) and reciprocation of the CCyB up to 2.5% is mandatory for all Member States. In addition, the ESRB also recommends recognition of CCyB rates set in other Member States even when these rates are higher than the 2.5% threshold (Recommendation ESRB/2014/1).[18] For systemic risk buffers and national flexibility measures under Article 458 of the CRR, the legislation provides for voluntary reciprocity, with the potential involvement of the ESRB (individual recommendations B-D of Recommendation ESRB/2015/2). The revised CRR II and CRD V did not result in any material changes to the framework.[19]

Table 3.1

Recognition provisions in EU law

Macroprudential measure	Legal basis	Reciprocity
Countercyclical capital buffer	Art. 130, 135-140 CRD V	Mandatory up to 2.5% / voluntary above 2.5%
Higher risk weights for SA banks	Art. 124 CRR II	Mandatory
Higher loss given default parameters for IRB banks	Art. 164 CRR II	Mandatory
National flexibility measures	Art. 458 CRR II	Voluntary
Systemic risk buffer	Art. 133-134 CRD V	Voluntary
Pillar II measures*	Art. 104-104a CRD V	Not mentioned
Liquidity requirements	Art. 105 CRD V	Not mentioned
G-SII and O-SII buffers	Art. 131 CRD V	Not mentioned
Borrower-based measures (LTV, L/DTI, L/DSTI, limits)	National law	Not mentioned
LTD rules	National law	Not mentioned

Source: ESRB Handbook (March 2014).

The guidance for national macroprudential authorities for a voluntary reciprocity approach aimed at all exposure-targeted measures (except CCyB rates above 2.5%) is described, as mentioned, in Recommendation ESRB/2015/2.[20] Supplementary guidance to Member States is also provided in the

17 For example, buffers for global systemically important institutions (G-SIIs) and other systemically important institutions (O-SIIs) and Pillar II measures.

18 Recommendation ESRB/2014/1 provides specific guidance on how to implement the CCyB following the mandate given by the Capital Requirements Directive (CRD). In contrast to Recommendation ESRB/2015/2, which allows for the possibility to apply the de minimis principle, Recommendation ESRB/2014/1 recommends voluntary reciprocation without an exemption clause. The application of the de minimis principle would pose challenges when applied to the CCyB, considering its dual nature (mandatory reciprocity up to 2.5% and voluntary reciprocity above 2.5%).

19 One change brought by the CRR II is the possibility to reciprocate Article 458 also for direct cross-border exposures. This will reduce leakages and contribute to higher effectiveness of macroprudential policy in the EU. In addition, the CRR II has removed the macroprudential use of Pillar II.

20 Recommendation ESRB/2015/2.

ESRB Handbook (Chapter 11 on cross-border effects of macroprudential policy and reciprocity).[21] Furthermore, the obligations and timelines for the ESRB in the voluntary reciprocity process are laid down in Article 5 of Decision ESRB/2015/4.[22] In addition, the ESRB regularly devotes in its annual Review of Macroprudential Policy in the EU[23] a section to cross-border lending and reciprocity in the EU, describing in detail the reciprocity actions taken by Member States.

In 2017 the ESRB amended its reciprocity framework (under Recommendation ESRB/2017/4[24]) with the aim of promoting further convergence in the use of exemptions under the de minimis principle.[25] In addition, the mandate of the ESRB was broadened to include the task of assessing the materiality threshold proposed by the national authority and potentially recommending a different threshold. The new framework foresees that the activating Member State proposes an institution-level materiality threshold when requesting reciprocation of its measure. A materiality threshold of 1% of the total targeted exposure in the activating jurisdiction is considered appropriate as an initial orientation value.[26] The proposed materiality threshold is then assessed by the ESRB and included in the amendment of Recommendation ESRB/2015/2 supporting the reciprocation of the measure. The materiality threshold should be considered as a maximum threshold, and the reciprocating authorities may always set a lower threshold or no threshold at all in order to acknowledge reciprocity as a matter of principle. The use of a higher threshold by reciprocating authorities is considered as potential non-compliance with the Recommendation and authorities would have to carefully explain their deviation.

Furthermore, additional regional consultations or coordination examples can also be found in Europe, established to more fully account for the specificities of regional financial market characteristics. In 2016 and 2017 the ECB and countries from the Nordic and Baltic region signed the Memorandum of Understanding on prudential supervision of significant branches, where they also acknowledged the general principle of full reciprocity of macroprudential measures (see Box 3 for more details).

21 ESRB Handbook.

22 Decision ESRB/2015/4.

23 ESRB (2019), A Review of Macroprudential Policy in the EU in 2018, April.

24 Recommendation ESRB/2017/4.

25 Authorities of the reciprocating jurisdiction have discretion to apply the de minimis principle to an individual financial service provider with non-material exposures to the identified risk in the activating jurisdiction and waive the application of the reciprocated measure for it.

26 The high-level guiding principles laid out in the ESRB Handbook stipulate that the framework for voluntary reciprocity should be (i) well-founded (i.e. based on the due consideration of cross-border spillover effects); (ii) effective (i.e. address the expected leakages); (iii) efficient; (iv) transparent; and (v) flexible. Referring to the guiding principles on materiality thresholds, requesting Member States are encouraged to deviate from this orientation value in the case that another – usually lower – value is more appropriate to safeguard the activating Member State's domestic financial stability.

Box 3

Memorandum of Understanding in the Nordic-Baltic region

One of the examples of international coordination within the EU is the Memorandum of Understanding (MoU) between Finansinspektionen (Sweden), Finanstilsynet (Norway), Finanstilsynet (Denmark), Finanssivalvonta (Finland) and the European Central Bank on prudential supervision of significant branches.[27] The MoU aims to facilitate cooperation between home and host supervisors. In June 2017 the competent authorities of Estonia (Finantsinspektsioon; Eesti Pank), Iceland (Icelandic Financial Supervisory Authority), Latvia (Financial and Capital Market Commission) and Lithuania (Lietuvos bankas) also signed and acceded to the MoU.[28]

The MoU contains various elements and principles for the supervision of significant branches and crisis management with respect to cross-border groups containing one or more significant branches from microprudential and macroprudential perspectives. Furthermore, for large branches, which are assessed to be systemically important according to the national O-SII methodology but due to their legal status as a branch cannot be designated as systemically important by the competent authority of the host Member State, the MoU advocates stricter principles for supervision and a higher degree of coordination among competent authorities.

In the MoU, participating countries also establish mutual understanding on reciprocity in order to mitigate systemic risk and regulatory arbitrage. The participants acknowledge Recommendation ESRB/2015/2 as the minimum standard for reciprocity in macroprudential matters. The competent authorities of the home and host countries will communicate with each other in respect of planned measures in order to facilitate reciprocity and the consistent implementation of regulatory frameworks. The general principle shall be full reciprocity, with recognition that the participants must respect applicable national and EU law. Specifically, examples of macroprudential measures mentioned in the MoU that should, in principle, be subject to reciprocation are combined buffer requirements[29] as defined in Article 128 of the CRD, asset class-specific risk-weight floors, the requirements laid down in Article 458 of the CRR, and regulations and supervisory standards on mortgage lending (e.g. mandatory amortisation, loan-to-income limits, loan-to-value limits).

There is a well-established tradition of cooperation and facilitation of implemented measures in the Nordic countries, dating back to before the MoU. For instance, a 2014 Norwegian tightening of internal ratings-based model requirements and a loss-given-default floor for mortgage lending were reciprocated by Sweden and Denmark without any recourse to the ESRB. Likewise, the Swedish risk-weight floor for mortgages introduced in 2013 and tightened in 2014 was also reciprocated accordingly by Denmark. The MoU has reinforced and reaffirmed this tradition of cooperation and extended it also to the Baltics, thereby contributing to increased policy coordination among authorities.

27 Memorandum of Understanding between Finansinspektionen (Sweden), Finanstilsynet (Norway), Finanstilsynet (Denmark), Finanssivalvonta (Finland) and the European Central Bank on prudential supervision of significant branches in Sweden, Norway, Denmark and Finland, 2 December 2016.

28 Accession to Memorandum of Understanding on prudential supervision of significant branches in Sweden, Norway, Denmark and Finland, June 2017.

29 Combined buffer requirements refer to the capital conversation buffer, the countercyclical capital buffer, the G-SII and O-SII buffers, and the systemic risk buffer. The MoU does not envisage reciprocating institution-based G-SII and O-SII buffers.

2 Implications for reciprocity arrangements

The quantitative estimates of cross-border spillovers of macroprudential policies from existing studies differ considerably, but they show that cross-border spillover effects might be material. The FSC analytical framework, presented in the previous chapters of this report and in the accompanying occasional paper, provides the most up-to-date and comprehensive assessment so far of the relevance and magnitude of cross-border spillover effects broken down by macroprudential instrument and transmission channel and by jurisdiction. This provides valuable information about the appropriateness of existing reciprocity arrangements in the EU.

The reciprocity discussion focuses on three main questions. First, whether the use of the tool going forward can address the questions about: whether the current intensity of reciprocity applied is appropriate (Section 3.2.1); whether country experiences and indicators may also suggest the need to reinforce or complement the guidance provided by the ESRB on the use and design of materiality thresholds (Section 3.2.2);[30] and, if indicator realisations are suggestive of potentially large spillovers from countries outside the EU, whether further consideration could be given to extending some part of the (voluntary) reciprocity arrangement beyond the EU (Section 3.2.3). As more reciprocity entails costs for the supervised institutions, the desirability of the aforementioned policy initiatives depends chiefly on the assessment of the level of the expected benefits regarding financial stability, which in turn depend on the potential severity of spillover effects that reciprocation aims to mitigate.

2.1 Implications of TFSE findings regarding the appropriateness of the voluntary reciprocity framework

Standardised measures with high potential for spillover effects as demonstrated in the indicator scoreboard are often requested to be reciprocated. Member States which sought reciprocation for their measures through the ESRB (including Belgium, Estonia, Finland, France and Sweden) exhibit high percentiles for inward spillovers, which indicate that the potential for spillover effects can be high. The French case is an exception, but this could be given the French measure's very specific focus on large companies which might not be described entirely by the definition of the broad indicators. Other Member States that adopted a systemic risk buffer (SyRB) or Article 458 measure, whose design allows for easy reciprocity under EU law, have not requested reciprocity given their specific application. For example, these SyRB measures were intended to support the resilience of systemic domestic institutions and reciprocity was not needed.

The current voluntary reciprocity regime is assessed to accommodate and facilitate the reciprocation of measures with high spillover potential. The

[30] See ESRB Handbook, January 2018, Chapter 11.

evidence from the reciprocation of measures recommended by the ESRB so far shows that countries with material exposures in the activating country tended to reciprocate the measures. The reason for non-reciprocation was almost exclusively the immateriality of exposures, and in one case, the absence of legal powers to deploy the relevant macroprudential instruments on domestic institutions. The recommended measures were reciprocated on average by nine Member States. Reciprocity may come at a cost in terms of banks' administrative burden and compliance costs and the available evidence suggests that Member States with negligible exposures tend not to reciprocate, although some countries reciprocate as a matter of principle.

The experience with the current voluntary reciprocity regime is still limited. As at end-2019, there were only six measures requested and endorsed for reciprocation via the ESRB. As more experience is gathered, there can be merit in reviewing and assessing whether a mandatory reciprocity framework would be beneficial, in particular for more "standardised" measures such as the SyRB. Standardisation in terms of (i) having a clear basis in EU law and thus being available in all EU Member States, (ii) being designed for use only on easily identifiable exposure types and (iii) having a straightforward design, entails lower implementation costs.[31]

2.2 Implications of TFSE findings regarding the design of materiality thresholds for voluntary reciprocity

Institution-level materiality thresholds were introduced by Recommendation ESRB/2017/4. Their objective is to guide and harmonise the application of the de minimis threshold according to which authorities of the reciprocating jurisdiction have discretion to waive the application of the reciprocated measure for an individual financial service provider with non-material exposures to the identified risk in the activating jurisdiction. This section elaborates on two issues highlighted by the quantitative results in previous chapters which could be taken into consideration when calibrating the institution-level materiality thresholds.

Currently, there is insufficient evidence for the TFSE to have a strong view on the appropriateness of using the 1% threshold as a starting value. Comparing the typical intensity of inward spillovers depending on the materiality of a given institution's exposures could be used to establish whether the 1% de minimis level envisaged by the ESRB as a practical compromise is warranted. However, two limitations prevent the TFSE from elaborating on the question. First, the percentile approach for the threshold calibration chosen so far does not provide information about past material spillovers. Second, the indicators are evaluated by the TFSE on

[31] Some arguments for and against making reciprocity more mandatory are available in the European Commission's consultation document on the review of the EU macroprudential framework and the related feedback statement.

A document entitled "Introducing materiality thresholds: a policy proposal", circulated to the ESRB's Advisory Technical Committee for its August 2017 meeting, included a discussion of harmonising materiality thresholds, also covering why more reciprocity is desirable (e.g. in terms of financial stability, level playing field and implementation cost considerations).

a country-by-country basis and not on an institution basis. As a consequence, this question is left for future scrutiny when more experience is gained.

Nevertheless, the framework and indicators developed by the TFSE are highly useful for investigating issues related to materiality thresholds. To highlight its usefulness, two specific issues related to the reciprocity framework which could be taken into consideration when calibrating the institution-specific materiality threshold are investigated. First, the possibility that individual banks have exposures under the 1% threshold, but they are jointly material for the activating country, is explored. Second, the desirability of considering materiality also on a consolidated basis is illustrated.

a) Aggregated exposure of banks with non-material exposures

When requesting reciprocity, activating Member States are interested in ensuring the effectiveness and reducing the leakage potential of their national macroprudential measure. Therefore, for the activating Member State it does not matter whether material cross-border exposures, falling outside the scope of the national regulation, result from (i) the activity of a single (large) foreign bank or (ii) from the aggregated activity of many (small) foreign banks from one or more countries. As institution-level materiality thresholds are only capable of addressing materiality in case (i), there is the risk that financial stability concerns related to (ii) remain unattended.

In this regard, the ESRB defined guiding principles on threshold calibration and published them in its Handbook.[32] According to these principles, thresholds should be calibrated such that they account for situations where the material exposures stem from many banks with small individual exposures. The implication is that activating countries requesting reciprocity, given the situation described in (ii), are encouraged to deviate from the orientation value of 1% and to propose to the ESRB assessment team another – usually lower – value that is deemed more appropriate to safeguard domestic financial stability. The ESRB, in turn, also takes such considerations into account when recommending a materiality threshold by either confirming or changing the proposed value of the activating Member State.

Results from the previous chapters show that for macroprudential instruments the potential for cross-border spillover effects in the form of leakages can be substantial. Given the experience so far with reciprocated measures, it appears that the issue of many small but on aggregate material bank exposures has not arisen yet, as no country requesting reciprocity has mentioned this specific concern when motivating their reciprocation request.

Nevertheless, there might be situations in which institution-specific thresholds are not capable of determining all cases of cross-border materiality from the perspective of the activating Member State. The TFSE conducted a hypothetical

[32] See ESRB Handbook, January 2018, Chapter 11.

scenario with real-life data, which demonstrated (using indicator BCAIW2 or BCAOW2[33] from the FSC indicator list) that not all information is available to home and host authorities alike and international coordination is needed to obtain the necessary information. The activating authority should evaluate indicator BCAIW2. However, host authorities typically do not have information on direct cross-border exposures to their jurisdictions. On the other hand, home authorities possess information on exposures of their banks to the activating country by both branch and direct cross-border lending and can evaluate their total exposure better through the numerator of BCAOW2. However, they do not possess the information on the total size of the relevant market in the activating country. The sharing of information or its centralisation at the ECB or ESRB might allow national authorities to see all the pieces of the puzzle.

With this in mind, it is important to adhere to the ESRB's guiding principles on the calibration of materiality thresholds and to recall the flexible and "anything but fixed" nature of the 1% orientation value. An excessive focus on the 1% value might come at the risk of adopting an insufficient policy response when the risk stems from the presence of a multitude of small entities. Therefore, the guiding principle in the Handbook that the activating country should "be aware of situations where the material exposure stems from many banks with small exposures" could be extended by explicitly stating that the threshold should be set lower in such cases. The Handbook could also be complemented with hypothetical examples of alternative threshold calibrations.

b) The possibility to apply the materiality threshold also at a consolidated level

Recommendation ESRB/2015/2 stipulates that the materiality threshold can be used to exempt an individual financial service provider from applying a particular reciprocating macroprudential policy measure. This means that a reciprocating authority uses the recommended materiality threshold to assess whether each individual bank under its supervision has either branch exposures or direct cross-border exposures in the activating country that exceed the materiality threshold. Experience has shown that this view of exposures covered by reciprocity may pose a problem in some cases depending on the organisational structure of the banks concerned.

Some banks have established in the host country a structure which comprises both a branch and a subsidiary, enabling the bank to book exposures in either of these entities. A measure implemented by the host country will automatically cover the exposures in the subsidiary but not the exposures in the branch, unless the latter exceed the materiality threshold and the measure is reciprocated by the home

[33] Indicator BCAIW2 is defined as "Loans to domestic private non-financial sector granted directly or through branches of foreign banks/Loans to private non-financial sector (levels)". BCAOW2 is defined as "Cross- border loans granted (directly or through branches) to private non-financial sector/Total loans of banks operating in domestic country to private non-financial sector (levels)".

authority. Thus, depending on the level of the materiality threshold, there may be incentives for a bank to shift large parts of its relevant exposure portfolio from the subsidiary to the branch, thereby exempting those exposures from the measure. These incentives are amplified, the tighter the introduced measure is. A situation where a large foreign bank has both a branch and a subsidiary in the host country creates arbitrage possibilities, whereby exposures can be easily moved to the branch in order to avoid the higher requirements. Although on a risk basis it might be considered that 1% of the relevant exposures is immaterial, for a banking group it could mean that a material part of its portfolio is exempted from the measure. Thus, if different requirements are assigned to the same exposures accounted for by subsidiaries on the one hand, and branches and direct cross-border lending of the same institution on the other, then this would create strong incentives for foreign banks to change their distribution channels and where they book the exposures.

Reciprocity is all about ensuring the effectiveness of macroprudential measures, making sure that measures are not circumvented and leakages and regulatory arbitrage are avoided. One way of avoiding the incentives above is to set a lower materiality threshold than the starting value of 1% indicated in the ESRB Recommendation. At times this would require setting too low a threshold, constituting a significant departure from the starting value of 1% of the relevant exposures. Therefore, another plausible alternative would be to apply the materiality threshold at a consolidated level rather than at an individual entity level. This approach would imply that foreign banks, with exposures in the activating host country through both a subsidiary and a branch, which at the consolidated level exceed the materiality threshold, would fall within the scope of reciprocity. This, in turn, implies that the measure of the activating country is also applied to the branch with lower exposures than the materiality threshold, thereby removing any incentives to shift exposures from the subsidiary to the branch and stopping the possibility of leakages and circumvention of the measure. The approach ensures at the same time that other foreign institutions with small exposures are still exempted.

In view of the above, there might be a case for the activating authority to suggest, and for the ESRB assessment team to review, whether the materiality threshold should be applied at the individual, sub-consolidated or consolidated level. The issue of applying the materiality threshold at the consolidated level in order to decide whether an institution falls within the scope of reciprocity is not new. The issue has been raised earlier with the ESRB assessment team in two cases where Member States requested that the ESRB issue a reciprocity recommendation for the macroprudential measures taken. To illustrate, the issue was, for instance, raised in the context of the request for reciprocity of a French measure under Article 458 of the CRR. As an exception to the reciprocity framework, the materiality threshold is applied in the French case at the highest consolidated level for G-SIIs and O-SIIs in the reciprocating Member States. The original measure applies at the highest level of consolidation in France. Applying the materiality threshold at an individual level could lead to the exemption of institutions which, at a consolidated level, have concentrated large exposures to highly indebted non-financial corporations having their registered office in France. In a written consultation of the ESRB General Board, it was proposed that the authority

activating a macroprudential measure should specify whether the materiality threshold should apply at an individual, a sub-consolidated or a consolidated level. The ESRB assessment team would then assess the appropriate level of consolidation that should apply to the materiality threshold. However, it was decided to return to this issue at a later stage, possibly when conducting a review of Recommendation ESRB/2015/2.

An alternative solution might be setting up two materiality thresholds: (i) the standard threshold applied to exposures across borders and through branches; and (ii) a threshold applied at the consolidated level to banks operating through both branches and subsidiaries. This latter option acknowledges that groups with a subsidiary in the activating country can more easily engage in regulatory arbitrage. As argued above, a consolidated group-level threshold for groups operating through both branches and subsidiaries would limit the potential for leakages. This option attempts to deal with the concern that setting thresholds at the consolidated level independent of the number and type of entities in the host country could result in imposing an additional administrative burden on banks (e.g. compliance costs resulting from the need to detect and evaluate relevant cross-border exposures and the need to coordinate group policy in order not to breach the threshold) and home supervisors (e.g. administrative costs resulting from identifying a legally enforceable way to reciprocate and informing host supervisors who are in charge of supervising the behaviour of other entities in the group under their jurisdiction). One drawback of this alternative approach is that it brings additional layers of complexity to the already comprehensive process of determining materiality thresholds and, in doing so, causes additional administrative costs. These costs would result as countries asking for reciprocity and the ESRB would have to identify two materiality thresholds instead of only one.

The optimal regulatory response to the issue of a group having subsidiary and branch presence in one market is yet to be explored. In general, the potential benefits of applying materiality thresholds at the consolidated level should be weighed against the possibility that applying thresholds on a consolidated basis might be more costly for banks and supervisors. In other words, it will be important to ensure that costs and benefits are carefully balanced.

c) Concluding remarks

The two issues raised in this section emphasise the importance of flexibility when it comes to setting the materiality threshold to be applied for determining which foreign institutions fall within the reciprocity scope of a macroprudential measure. The orientation value of a 1% materiality threshold has been introduced to balance the costs and benefits of reciprocation and to set a starting point to be considered when requesting reciprocity. However, this orientation value may not work in specific cases. In those cases, the possibility to diverge from the 1% rule should be opened up to the activating country in order to ensure the effectiveness of the measure in addressing the identified risks and safeguarding financial stability in the country. The FSC cross-border spillover framework provides

a good quantitative basis indicating the need for reciprocity. Complemented with the expert judgement of the activating authority, this makes for a well-grounded decision on the materiality threshold, with the ESRB assessment team acting as a final checkpoint on the appropriateness of the threshold level.

It should also be kept in mind that the starting value of 1% for the materiality threshold is based on the share of the relevant exposures held by the individual foreign institutions in the activating country. The FSC framework has identified and presented a number of different indicators that can be calculated in order to assess the materiality of the spillover effects, which in turn give an indication of the need for reciprocity of a certain measure. The institution-specific share of relevant exposures is one among many such identified indicators in the proposed framework. The extended information provided by the FSC framework would suggest that sticking firmly to the 1% materiality threshold as the only decisive factor on whether an institution falls within the scope of reciprocity can be problematic and may weaken the benefits of the existing voluntary reciprocity framework.

2.3 Potential spillovers between the EU and other countries

The risk of negative inward spillovers can give rise to the need for strengthened international cooperation with third countries. The third-country subsidiaries and branches in, and direct cross-border exposures to, a Member State might cause an inward spillover. A Member State could be interested in making macroprudential policy arrangements with third countries whose banks have material exposures in that Member State, e.g. if there is a branch with significant exposures to the domestic market. So far, the third-country branches for which the potential risk of inward spillovers is higher than the risk for subsidiaries have a limited footprint in most EU countries. On the other hand, subsidiaries of third-country parents are active in many EU countries.[34] In addition, inward spillovers may also arise due to direct cross-border lending.

Member States can also be subjected to spillover effects from policy inaction in a third country. Member States are, for instance, required to monitor their banks' exposures to third countries and take action if the CCyB rates adopted by the third country are too low to tackle the cyclical risk identified.[35] A Member State should monitor risks in third countries where a significant amount of exposures of the domestic banking sector is located.

By the same token, Member States can induce outward spillovers to third countries where their banks have subsidiaries, branches and direct cross-border exposures. Chart 3.1 uses indicator BCA01 from Chapter 2 to demonstrate the importance of exposures to the EU versus exposures to the rest of the world for

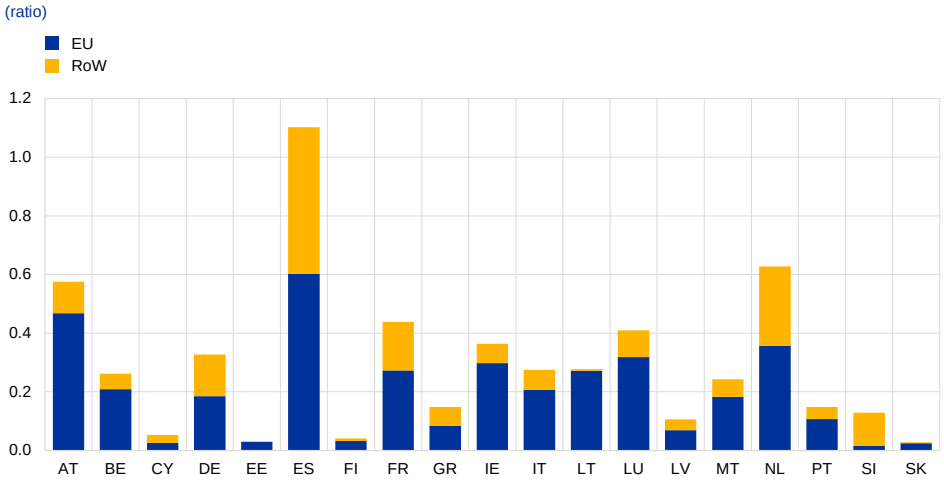
[34] See ESRB (2018), A Review of Macroprudential Policy in the EU in 2017, April, Special Feature A.

[35] See Decision ESRB/2015/3 on the assessment of materiality of third countries for the Union's banking system in relation to the recognition and setting of countercyclical buffer rates; Recommendation ESRB/2015/1 on recognising and setting countercyclical buffer rates for exposures to third countries; and Articles 138 and 139 of the CRD.

the full range of euro area countries: in most cases, the potential for outward spillovers seems non-negligible. These third countries, which are often countries in close geographical proximity to the EU (e.g. non-EU countries in south-east Europe and Turkey or Switzerland) or countries with historically strong ties to some EU Member States (e.g. some of those in Latin America), as well as major financial centres (e.g. the United States, Japan, Hong Kong, Singapore and the Cayman Islands), might be interested in forming cooperation arrangements with the EU or its Member States. Memoranda of understanding, such as those between the Nordic and Baltic countries, might be beneficial. More broadly, further discussions could focus on whether strengthening global arrangements on macroprudential policy reciprocity might be beneficial, for example in the context of the Financial Stability Board or another Basel-based forum.

Chart 3.1

Outward spillover lending-based indicators (BCAO1): divided into intra-EU and extra-EU contribution



Sources: ECB and ECB calculations.
Note: Reference date is Q3 2018. BCAO1 defined as "Cross-border loans from domestic country to foreign households and non-financial corporations/Total loans to domestic households and non-financial corporations.

The spillover effects to and from non-EU countries have not, however, been the focus of the quantitative assessment by the FSC. Neither have the importance of third countries' banks in the EU or the importance of EU banks in third-country markets been the focus of the FSC's work on indicators or model-based spillover analysis. Nevertheless, with the exit of the United Kingdom from the European Union in mind, next to generally increasing financial linkages with other regions in the world, the potential for inward and outward spillovers resulting from cross-border exposures of EU banks to third countries will rise. The framework developed by the FSC can be extended to shed light on these matters.

3 Summary

The FSC has primarily focused on setting up an analytical framework for monitoring and assessing potential cross-border spillover effects related to

macroprudential policies. Its findings, including on the size of spillovers, can also support the debate on the sufficiency of existing reciprocity frameworks from both the tentative evidence and methodological perspectives.

The necessity for an effective and efficient framework for international policy coordination has been confirmed by the FSC. The work conducted has provided evidence of the existence of material spillovers in the past and their potential to arise in the future when other macroprudential policy measures are potentially adopted. Given the increasing interconnectedness of financial markets and the increased use of macroprudential policy tools, the potential for spillovers will likely grow further.

The work undertaken by the FSC serves as a starting point for the assessment of the appropriateness of current reciprocity arrangements. The evidence collected so far does not point to material deficiencies in the current reciprocity framework. However, its sufficiency and effectiveness should be re-evaluated at periodical intervals, using – inter alia – the toolkit and methodology developed by the FSC.

Conclusion

Macroprudential measures implemented by national authorities may have cross-border repercussions. Macroprudential policy measures within the EU are generally designed to address specific, systemic, financial stability risks in national jurisdictions, including those stemming from specific sectors or even individual financial institutions. At the same time, it is well known that macroprudential policy can generate unintended cross-border spillovers, both owing to regulatory arbitrage and risk management decisions by financial institutions as well as to broader trade and economic activities triggered by the activated measures. Policy instruments should therefore be designed to reap the benefits of positive spillovers in terms of enhanced financial stability, while also seeking to limit potential negative spillovers.

The analysis of cross-border spillover effects is therefore highly relevant for assessing the overall impact of specific instruments. Ensuring the effectiveness and consistency of macroprudential policy in the EU requires that policymakers give due consideration to the cross-border effects of macroprudential policy measures adopted by national authorities and take into account other countries' macroprudential settings when adopting their own macroprudential policies, or when warranted, that they adopt suitable reciprocating macroprudential policy measures.

This report presents a best practice framework for assessing cross-border spillover effects of macroprudential measures. In order to ensure that such considerations are based on consistent analytical approaches across the EU countries, the ESCB Financial Stability Committee has devised a best practice framework for the analysis and assessment of cross-border spillover effects from the activation of national macroprudential measures. The framework is meant to serve as a starting point for national designated authorities and national competent authorities when assessing the need for reciprocity in the context of activations of macroprudential measures. Finally, the proposed framework should help inform deliberations on cross-border spillover effects and reciprocity agreements at the EU level under the umbrella of the ESRB.

The FSC will revisit the framework once more practical experience has been gathered. While the framework has been designed to be highly operational and useful for policymaking in practice, whether all indicators and tools work as intended from a practical perspective remains to be seen. The FSC therefore commits to gather experience with the framework and revisit it in due time.

Appendices

Appendix 1: Guidance on the FSC indicator list

The objective of this appendix is to provide guidance on how to use the indicators identified by the FSC to the macroprudential authorities, which conduct analyses of spillover effects of their policies. This guidance should help in indicator selection, computation and interpretation. It also points out some of the data and coverage limitations of the indicators. In the first part of this appendix, general guidelines regarding indicator selection are provided. In the second part, detailed information about the construction of individual indicators is provided.

Calculation of the indicators requires access to locational data on exposures of financial institutions. There are two kinds of data that were used by the FSC: publicly available data compiled by the ECB in conjunction with the national authorities, accessible from the ECB's Statistical Data Warehouse (SDW), and supervisory data compiled by authorities in a given jurisdiction. In particular, data from the SDW used by the FSC come from the MFI BSI statistics, consolidated banking data and securities holdings statistics (SHS), while supervisory data used by the FSC come from the FINREP (financial reporting)/COREP (common reporting) framework. Public data offer easy access, but often lack the necessary granularity. On the other hand, supervisory data tend to be very granular, but the coverage is restricted to the reporting jurisdiction.

Publicly available data come on a country basis and do not contain information on individual banks. As the number of countries where the exposures are located is high, the country location of exposures is either summed to a wider aggregate (e.g. euro area, rest of the world) or only countries with the largest exposures are singled out. Also, the level of granularity of exposure classes tends to be lower, making it difficult to distinguish, for example, whether it is corporate or retail exposure. Finally, these aggregated data come to their users with limited transparency regarding the entities from which the exposures originate. For example, the consolidated banking data use the highest level of consolidation, and subsidiaries, branches and direct cross-border exposures in a host country receive the same treatment, which might obscure the assessment of potential spillovers.

Supervisory data are far more granular as they cover all entities active in a jurisdiction and the reporting framework requires entities to disclose data in a more detailed form. This allows a better identification of relevant exposures, and distinguishing subsidiaries, branches and direct cross-border exposures is possible. The harmonised EU reporting framework for banks (FINREP and COREP) makes reported figures comparable across countries. Supervisory reporting was not designed particularly to identify details of cross-border exposures to measure potential spillovers. As a consequence, it was not possible to evaluate some indicators under consideration by the FSC even with supervisory data (e.g. the indicators related to exposures in foreign currency). Nevertheless, regulatory

reporting in some jurisdictions goes beyond the harmonised European reporting, making these authorities potentially able to evaluate even those indicators. Compared with public data, processing supervisory data might be more challenging as values for multiple entities have to be aggregated and an appropriate IT solution is required. Additionally, supervisory data are primarily accessible to microprudential supervisors, thus a good liaison with the authorities responsible for applying macroprudential policy, i.e. macroprudential authorities, is key to perform this type of analysis. For the non-banking area, the degree of European harmonisation in reporting is lower and a consistent use of supervisory data is more challenging.

For most indicators, the FSC recommends using supervisory data as the primary source because of its higher granularity and transparency. Data from the ECB's SDW are a primary source for a minority of indicators. When more data sources are available, considering more of them can be recommended as a consistency check. Also, publicly available data which are typically easier to obtain can be used as a starting point in the analysis.

Data for non-banks are even scarcer. Given the dominant focus of macroprudential policy tools on the banking area, the indicators proposed by the FSC focus on the banking sector. The non-banking sector is more scattered so ensuring adequate coverage from supervisory data is far more challenging. Given the fact that many non-bank entities – such as insurance companies, pension funds and investment funds – tend to invest in securities, security-by-security data on securities holdings (such as the ECB's SHS) and issuance (such as the ECB's securities issues statistics) are a good starting point for calculating similar indicators for non-banks. Aggregates from the SHS are also publicly available from the SDW.

It is envisaged by the FSC that, at least in the short to medium term, the thresholds will be calculated using the percentile approach. This method is analytically easy and allows the derivation of the critical values even when there are data limitations (see also Section 2.3). According to the percentile approach, thresholds are calibrated on the basis of the historical distribution of the indicator. If cross-country data used for the same indicator are available to the national authority, applying the historical distribution also in the cross-section dimension could provide added robustness. At this point, the FSC does not provide any recommendation as to the relevant critical threshold values for materiality. The assessment of the FSC is that more experience will need to be gathered with respect to the performance and development over time of individual indicators before proper sensitivity analysis can be conducted in order to establish harmonised critical threshold values at the euro area/EU level. This is also due to the fact that there might be countries with specificities that warrant alternative threshold choices than those for the area as a whole. For the time being, it will thus be the sole responsibility of national authorities to identify such specificities and adjust the thresholds accordingly for their practice. The percentile method has not been linked to observed spillover effects at values beyond the threshold in the past and indicates only that the propensity for spillovers could be higher than in other reference countries or in the past. Nevertheless, the breach of the thresholds indicates that national authorities should give due consideration to the issue of possible spillover effects.

To ease orientation, indicators are clustered according to various dimensions. First, they are clustered by macroprudential instrument: capital, liquidity and borrower-based. Different macroprudential instruments warrant different approaches as the spillovers could operate through different channels. Second, they are grouped in terms of the timing of the spillover assessment exercise: ex ante analysis or ex post analysis. The indicators are expressed in levels for conducting an ex ante analysis and in growth rates for conducting an ex post analysis. In addition, the users can select the indicators according to the perspective of the activating country or of the passive country. Finally, indicators are clustered by the type of spillover channel: inward or outward. While inward spillovers depend on the role of foreign affiliates in the domestic market, outward spillovers depend on the importance of foreign markets for domestic institutions and their footprint in those foreign markets. As a consequence, different indicator designs are required to account for such specificities.

The indicators were assigned standardised codes for easy referencing. Their alphanumerical code consists of five segments. The first letter stands for the area of application: banking (B) or non-banking (N). The second letter stands for a type of macroprudential instrument: capital instrument (C), liquidity instrument (L) or borrower-based instrument (B). The third letter refers to the ex ante (A) or ex post (P) application of the indicator. The fourth and fifth letters distinguish indicators for detecting inward spillovers (IW) from those for detecting outward spillovers (OW). Finally, the number at the end ensures unique identification. The numerical ranking of the indicators does not entail any judgement by the FSC on their importance in the analysis.

The FSC indicator list mostly includes indicators for measuring cross-border spillovers when the domestic country activates a measure, but many of these indicators can also be used for a perspective where the foreign country activates a measure. Often, the indicators designed for measuring inward spillovers when a domestic country takes a measure can also be used for measuring outward spillovers when a foreign country takes a measure. However, most of the time when measuring inward spillovers from the perspective of a country activating a measure, it is especially relevant to look at the exposures of foreign branches and the loans of foreign banks which are directly provided across borders. Instead, for measuring outward spillovers when a foreign country takes a measure, exposures of subsidiaries may also be relevant, depending on the measure which the foreign authority takes. Similarly, indicators designed for measuring outward spillovers when a domestic country takes a measure can also be used for measuring inward spillovers when a foreign country takes a measure.

Appendix 2: Guidance on the empirical benchmark tool

1. How to use the empirical benchmark tool

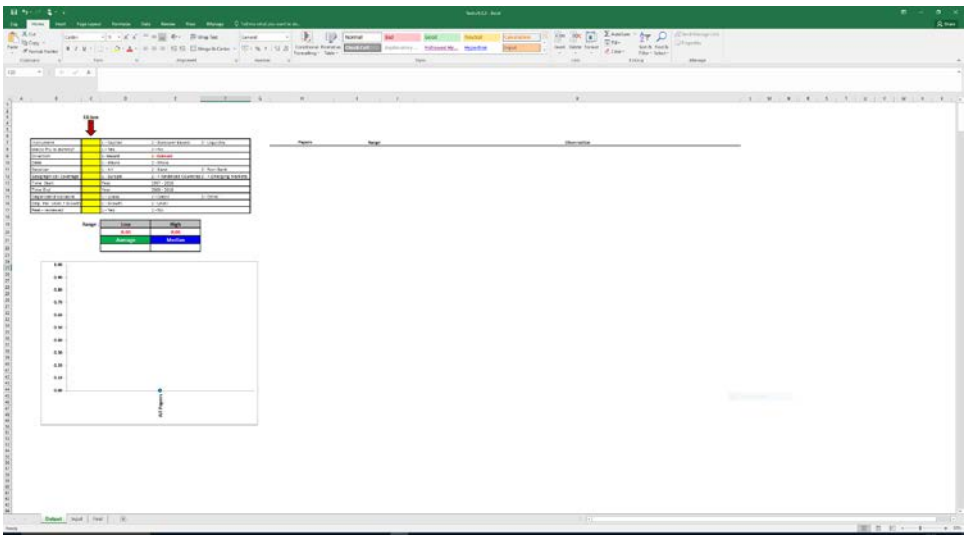
The tool comprises an Excel file. In the “Output” tab, users can activate switches according to ten categories, as explained in the main report. The options available for each one of these categories are located next to each switch (yellow cell). To start using the tool, users simply need to fill in the yellow cells with numbers. The cells also contain a drop-down menu from which users can select the desired options.

Figure A2.1
Switches of the empirical benchmark tool

Fill here

Instrument		1 - Capital	2 - Borrower based	3 - Liquidity
Macro Pru is dummy?		1 - Yes	2 - No	
Direction		1- Inward	2- Outward	
Data		1 - Macro	2 - Micro	
Receiver		1 - All	2 - Bank	3 - Non-Bank
Geographical Coverage		1 - Europe	2 - + Advanced Countries	3 - + Emerging Markets
Time Start		Year	1997 - 2018	
Time End		Year	2000 - 2018	
Dependend Variable		1 - Loans	2 - Credit	3 - Other
Dep. Var. Level / Growth		1 - Growth	2 - Level	
Peer - reviewed		1 - Yes	2 - No	

Figure A2.2
Empirical benchmark tool with no activated switches



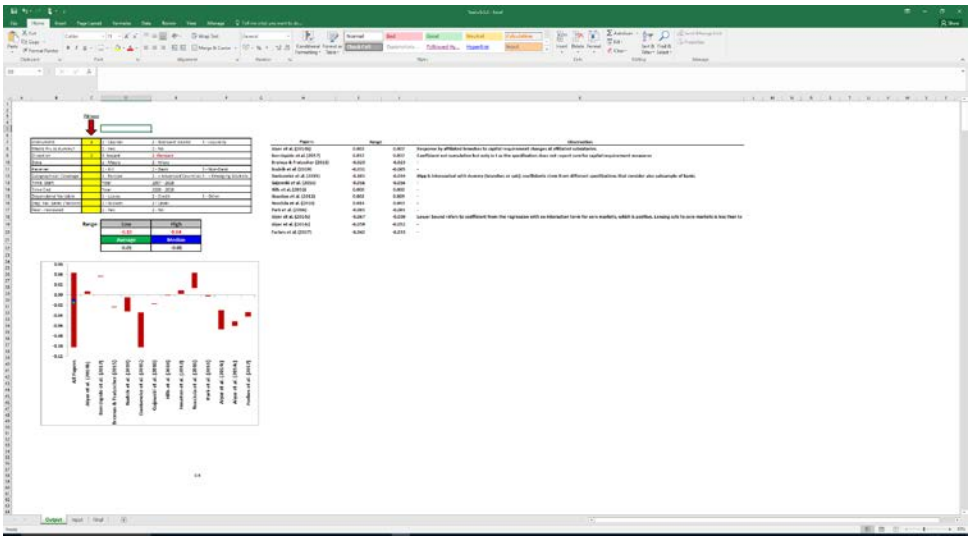
When switches are activated, the tool produces three outputs for the set of papers that conform to the chosen parameters:

1. A list with references of papers and the range of elasticities for each paper, as well as relevant observations regarding the elasticities.

2. A summary table with the total range (lowest and highest estimates for elasticities) for the set of papers, and the average and median for that group of papers. While the average and the median are useful information, and the median can be more accurate when the set contains more extreme values, the use of a range is more appropriate when analysing the uncertainties of real-world policymaking.

3. A chart with the range of each paper, as well as a bar representing the total range for the set of papers, a green diamond representing the median for the set of papers and a blue one representing the average. The bars for studies analysing inward spillovers are grey, while the bars for the ranges of studies analysing outward spillovers are red. The bar for the total range also becomes red/grey depending on the selection of the "direction" switch, but it remains red when no option is selected.

Figure A2.3
Empirical benchmark tool with activated switches

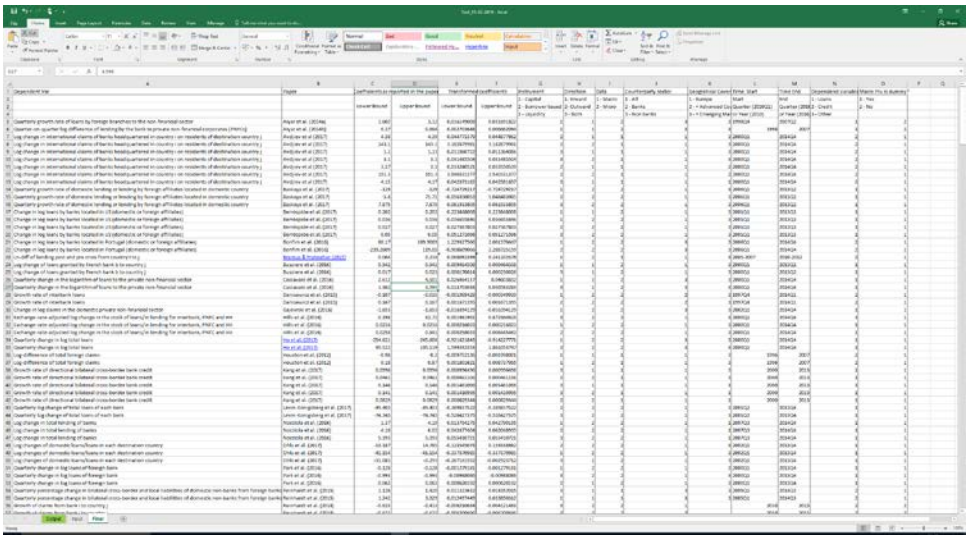


2. How to update the empirical benchmark tool

The tool has three tabs: "Output", "Calculation" and "Input". The main tab to update the tool is "Input", which should be updated by filling in new lines and appropriately designating each category based on the study. Detailed instructions on how to create individual entries for studies follow.

Figure A2.4

"Input" tab where new information can be added



One paper might appear in several entries according to the coding presented below. For example, a paper that contains estimates for outward and inward spillovers for capital, liquidity and borrower-based instruments will appear in six entries because of the interactions between these two categories. The categories for *instrument* and *direction* would be as follows: (1,1), (2,1), (3,1), (1,2), (2,2) and (3,2). The same is true for studies that contain regressions on spillovers from banks, non-banks and lending to the whole economy without a distinction between sectors (respectively category *counterparty sector*: 2, 3 and 1). And it is also true for studies that contain regressions for different time periods (for example one entry with *time start* 2000 and *time end* 2006 and another with *time start* 2010 and *time end* 2018).

Figure A2.5

Categories to be included with a new entry

1	Dependent variable (description)			
2	Reference Paper - Authors and year			
3	Coefficients as reported in the paper	Lower Bound		
4		Upper Bound		
5	Transformed coefficients	Lower Bound		
6		Upper Bound		
7	Instrument	1 - Capital	2 - Borrower based	3 - Liquidity
8	Direction	1- Inward	2- Outward	
9	Data	1 - Macro	2 - Micro	
10	Counterparty sector	1 - All	2 - Banks	3 - Non banks
11	Geographical Coverage	1 - Europe	2 - + Advanced Countries	3 - + Emerging Markets
12	Time Start	Start	Quarter (2010Q1) or Year (2010)	
13	Time End	End	Quarter (2016Q1) or Year (2016)	
14	Dependent Variable	1 - Loans	2 - Credit	3 - Other
15	Macro Pru is dummy?	1 - Yes	2 - No	
16	DV level or growth	1 - Growth	2 - Level	
17	Peer-reviewed?	1 - Yes	2 - No	
18	Comments			
19	Link to the paper			
20	Detailed Comments			

Column-by-column description of how to update the tool

In the "Input" tab.

1. Dependent variable (description)

The description of the dependent variable of the study.

2. Reference paper (authors and year)

The entry should follow the usual standard for academic papers in economics: the name of the author, followed by the year of publication in parenthesis. For non-peer-reviewed papers, the year of the first draft can be used. If the paper has two authors, both should be included using "and". In papers with more than two authors, the name of the first author should be followed by "et al.".

3. Lower bound - Coefficients as reported in the paper and
4. Upper bound - Coefficients as reported in the paper

As mentioned in the main text, the tool's variable of interest is the coefficient β representing the elasticity of cross-border flows to movements in macroprudential measures. While most transformations will be done in the columns for "transformed coefficients", the columns "coefficient as reported in the paper" already include some previous calculations. The main criterion for choosing the range to report from papers is how the specifications fit with all categories available in the tool. For example, if a study contains only one specification for outward spillovers from capital requirements, the range will only be a point: the lower and upper bounds are the same.[36] But most papers contain several specifications for the same case: with and without fixed effects; with and without additional controls. When choosing between the specifications, the updater should pick the ones that are significant at least at the 10% level. When the specification includes several lags of regulations, the updater should include the sum of the coefficients of all lags, when the sum is significant and information is available. One important case relates to specifications including interaction terms. When interaction terms are included, the coefficient for the policy without interaction changes drastically to become the intercept of an equation in which all the variables being interacted with the policy variable are zero. Some papers report the "marginal effect", which can be directly compared with the coefficient for a specification without interactions.[37] If not reported, the usual proxy is calculated by multiplying the coefficients for interaction terms by the average value of the variables used in the interaction (usually reported in the summary statistics), taking care to use significant

[36] As is clear from the text, the range reported refers to different specifications and not to the usual range of statistical significance calculated by using standard deviations of point estimates.

[37] In Stata (a popular statistical software package), the marginal effect is given by the post-estimation command `margins, dxdy(.)`.

coefficients. Given that it is not possible to check if coefficients are jointly significant, the procedure is less than ideal. The identification strategy for inward spillovers is usually more complex than for outward spillovers. In cases where complex calculations were needed, this should be included in the "detailed comments" field.

5. Lower bound - Transformed coefficients and 6. Upper bound - Transformed coefficients

In order to present comparable estimates among studies, the tool needs to provide values of β that are transformed from the original papers. For example, in the baseline specification adopted by the IBRN, the dependent variable is the log change in lending (in some cases multiplied by 100) in conjunction with a dummy variable (-1, 0, 1) representing changes in the macroprudential stance. The interpretation of the estimated coefficient β is that a one-unit increase in macroprudential policy produces an expected increase in the logarithm of the dependent variable of β units. This means that a tightening of a macroprudential measure by one unit results in a change of growth in the credit supply between periods t and t-1 of $exp(\beta)$ or $exp(\beta/100)$ on average. The exponential transformation was used for most studies presented in the tool which have growth as a dependent variable. The annualised rate is used whenever possible (for example by multiplying estimates for quarterly effects by four). The coefficient should be divided by 100 when the dependent variable is described as a percentage.

7. Instrument (1 – Capital, 2 – Borrower based, 3 – Liquidity)

This refers to the main regulations analysed in the studies, according to broad categories. More granular instruments should be mapped to these broad categories. Reserve requirements are included in number 3.

8. Direction (1 – Inward, 2 – Outward)

Outward spillovers refer to the change in the financial flows from the banking sector of a domestic source country *(d, s)*, which activates the policy, to foreign recipient countries *(f, r)*. Studies using an inverse convention, most notably those of the IBRN, should be translated to the convention adopted in this report. Inward spillovers are flows from a foreign source country *(f, s)* to a recipient economy, which activates a policy *(d, r).*

9. Data (1 – Macro, 2 – Micro)

Papers using macro data usually draw on open sources such BIS, IMF IFS or ECB MFI datasets. Micro data-based studies usually rely on supervisory bank-level returns.

10. Counterparty sector (1 – All, 2 – Banks, 3 – Non-banks)

Papers on cross-border effects of macroprudential measures may include different specifications for interbank and non-bank lending. If the study just presents results for total lending, its entry should be included under “all”.

11. Geographical coverage (1 – Europe, 2 – + Advanced countries, 3 – + Emerging markets)

In the case of outward spillovers, the geographical dimension represents the receiving dimension *(f, r)*. Once country *(d, s)* activates a macroprudential measure, the entry should indicate the geographical area affected by the measure (usually given by the availability from the database). For inward spillovers, it is usually the case that papers analyse the impact on country *(d, r)*, which means that the geographical dimension is less relevant. The split between Europe and advanced could refer to the distribution of foreign headquarters of banks (foreign affiliates) operating in country *(d, r)*, but this information is usually not available in the papers. It is suggested that updaters should use number 3 for those cases, adding a note in the “comments” field to indicate the name of country *(d, r)*. The category is incremental: “advanced” represents Europe plus other advanced countries, while “all” represents Europe, other advanced countries and other countries (emerging markets and low-income developing countries).

12. Time start (Quarter (YYYYQQ) or Year (YYYY))
13. Time end (Quarter (YYYYQQ) or Year (YYYY))

These indicate the year or quarter when the study’s sample starts and ends. Please note that the cells should be filled in using the specific format above.

14. Dependent variable (1 – Loans, 2 – Credit, 3 – Other)

Loans refer to balances and funds lent to banks and non-banks by banks, while credit more generally includes bills, CDs and portfolio investments. Few papers use a precise terminology, and most interchange terms freely (e.g. “credit” and “claims”). “Other” is a residual category to encompass other exposures not included in credit.

15. Macroprudential variable is a dummy? (1 – Yes, 2 – No)

This indicates if the variable for changes in policies is a dummy variable, e.g. a variable that takes a value of “1” for quarters and countries when a tightening of a macroprudential measure has taken place, “-1” for a loosening, and zero otherwise. The entry should also be “1” for papers that use the sum of all changes in that variable recorded prior to the quarter/year of interest. Papers that use intensity measures (i.e. whether capital requirements are tightened for example by 50 or 100 basis points or as a percentage of banks’ capital) should be assigned a “2” in this cell.

16. Dependent variable level / growth (1 – Growth, 2 – Level)

If the dependent variable is in levels (stocks such as foreign claims) or represents a growth rate (e.g. log change, growth rate of claims or loans).

17. Peer-reviewed? (1 – Yes, 2 – No)

This indicates whether the study was published in a peer-reviewed publication or whether it is at the working paper/draft stage.

18. Comments

Any comment that might be relevant for understanding the inputs of the table should be entered here. For example, if the range refers to different specifications, it might be useful to include observations to help the user to navigate between them. One example is papers that include specifications for different markets not included in the geographical coverage above, such as “core” and “periphery”. The entry could include an observation stating that values in the lower part of the range refer to “core” markets (banks reduce lending less to core markets). If no additional information is needed in this cell, the updater should fill this cell with “_”.

19. Link to the paper

The link to the published version of the paper, or the most recent working paper version, if available. To help users to find papers if the link is broken, the preferred format is to include the title of the paper as text and the link as a hyperlink for the text.

20. Detailed comments

Detailed comments are not included in the “Input” tab. They are an additional resource available to the user interested a specific entry. Ideally, the detailed comments should contain an explanation of the methods used to construct the range of estimates presented in the table, including the paper’s specific tables from which numbers were extracted. Any other information that might be relevant to users can also be included here.

In the “Calculation” tab

Once the above cells in the “Input” tab have been filled in, the updater should move to the “Calculation” tab and drag the last row with information to copy the calculations. For each new row inputted in the “Input” tab, a new row with calculations should be created in the “Calculation” tab (from columns A to BW).