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## European Macroprudential Database<sup>1</sup>

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## Abstract

This paper presents the Macroprudential Database (MPDB), as a part of the ECB's Statistical Data Warehouse, and encourages its use among external users. The paper explains the rationale for creating the MPDB and how it can contribute to fulfil the macroprudential data needs for the analysis conducted by the E(S)CB and by the ESRB, within the countries of the Single Supervisory Mechanism and also of the whole Europe Union. The structure of the database and a broad overview of indicators are also presented, dealing with data confidentiality issues and differences between the internal and the public version of the database. Examples illustrate how the MPDB is used for monitoring purposes and econometric modelling. Finally the paper discusses remaining data gaps and expected future enhancements of the MPDB.

Keywords: Macroprudential, statistics

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## 1. Introduction

The financial crisis and its aftermath confirmed the need for system-wide surveillance of systemic risk and led to the establishment of macroprudential policy as a new key policy area with the objective of an early detection of systemic risk and, in case of materialisation, promoting actions to limit its contagion effects. Systemic risk can be described as the risk that the provision of necessary financial products and services by the financial system will be impaired to a point where economic growth and welfare may be materially affected. Systemic risk can derive from three sources: an endogenous build-up of financial imbalances possibly associated with a booming financial cycle; large aggregate shocks hitting the economy or the financial system; or contagion effects across markets, intermediaries or infrastructures. Financial stability is a state whereby the build-up of systemic risk is prevented. Whatever their origin, a primary role of macroprudential authorities is to identify, measure and monitor these systemic risks as early as possible and to consider macroprudential policies to mitigate them. The overarching goal of macroprudential policy is to preserve financial stability by (1) preventing the excessive build-up of risk, resulting from external factors and market failures, in order to smoothen the financial cycle (time dimension); (2) by increasing the resilience of the financial sector and limit contagion effects (cross-sectional dimension) and (3) by encouraging a system-wide perspective in financial regulation to create the right set of incentives for market participants (structural dimension).

An input partially missing in the macroprudential field was the availability of a strong and comprehensive common statistical basis to support macroprudential analysis and to stimulate research, to be used as a basis for conducting macroprudential policy by the ECB and national authorities, with the European Systemic Risk Board (ESRB) being in charge of the macroprudential oversight of the EU financial system and the prevention and mitigation of systemic risk. Establishing a comprehensive and unique Macroprudential Database (MPDB) is therefore essential to underpin quantitative and policy oriented analyses for both internal and external publications, and for a consistent cross-country analysis of systemic risk (see Box 1 for a comparison with IMF Financial Soundness Indicators).

The MPDB became operational in October 2015 and it is accessible through the ECB's Statistical Data Warehouse (SDW)<sup>1</sup>. It currently comprises around 275 relevant country level public indicators (and around 370 in the internal version) grouped into seven domains related to the macro economy and financial markets, debt and credit, residential and commercial real estate, the banking sector, the non-banking sector and interconnectedness. In order to meet continuously evolving user needs, the MPDB is already subject to a regular review process, making it a live and easily adjustable product. The majority of indicators are also publicly available, allowing further research outside the ESCB/ESRB community.

This paper is structured as follows: section 2 explains the motivation for the set-up of the MPDB and increasing user needs that triggered the project; section 3 describes the structure and key features of the database; section 4 points out ideas

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<sup>1</sup> The MPDB can be accessed in the public SDW via this link: <http://sdw.ecb.europa.eu/browse.do?node=9689335>

for future enhancements of the database; and finally, section 5 includes key concluding remarks.

## 2. Motivation for the set-up of the MPDB and user needs

Macroprudential policies address the emergence of possible systemic risks in the financial system, and thus aim at preserving financial stability. Originally, macroprudential powers in the European Union were established primarily at the national level<sup>2</sup>, reflecting the need for a more tailored approach, due to the imperfect synchronisation of financial and business cycles in the European Union. Along with the harmonisation of microprudential supervision, the Single Supervisory Mechanism (SSM) Regulation also strengthens consistency of macroprudential policy. Hence, the Eurosystem is able to strengthen coordination and to address potential cross-country spill-overs of macroprudential policies at the national level<sup>3</sup>.

In particular, the SSM Regulation<sup>4</sup> confers specific powers and responsibilities in the field of macroprudential policy upon the ECB and National Competent Authorities or National Designated Authorities.

The role of the ECB in this area is twofold. First, the ECB is involved in the decision making process of macroprudential policy in SSM countries. National authorities are required to notify the ECB before implementing or changing a national measure foreseen in EU laws<sup>5</sup>. The ECB is then required to assess the envisaged macroprudential measure and, if necessary, raise objections, which must be considered by the national authorities.

Second, the ECB has the right to apply more stringent measures at the national level for the instruments included in the EU laws. For example, the ECB may apply higher capital buffer requirements<sup>6</sup> compared to the level set by national authorities.

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<sup>2</sup> This is for example reflected in the ESRB Recommendation ESRB/2011/3 on National Macroprudential Mandates:

[http://www.esrb.europa.eu/pub/pdf/ESRB\\_Recommendation\\_on\\_National\\_Macroprudential\\_Mandates.pdf?87d545ebc9fe76b76b6c545b6bad218c](http://www.esrb.europa.eu/pub/pdf/ESRB_Recommendation_on_National_Macroprudential_Mandates.pdf?87d545ebc9fe76b76b6c545b6bad218c)

<sup>3</sup> ECB Macroprudential Bulletin, Issue 1, 2016, <https://www.ecb.europa.eu/pub/pdf/other/ecbmpbu201603.en.pdf>

<sup>4</sup> Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions.

<sup>5</sup> Capital Requirements Directive (CRD) IV (Directive 2013/36/EU) and Capital Requirements Regulation (CRR) (Regulation No 575/2013)

<sup>6</sup> Countercyclical capital buffer, systemic risk buffer, capital buffers for Global Systemically Important Institutions (G-SII) and Other Systemically Important Institutions (O-SII).

The shared responsibilities regarding macroprudential policies between national authorities and the ECB triggered the need to establish a common ground for macroprudential analysis. A comprehensive and unique database was therefore considered as essential for analytical and policy oriented work flowing into internal and external reports, and for a consistent cross-country analysis of systemic risk. The establishment of a comprehensive and harmonised database for macroprudential analysis – the Macroprudential Database (MPDB) – was therefore considered as a key priority.

Due to the multifaceted nature of systemic risk, a wide range of indicators is needed to identify vulnerabilities, assess the resilience of the financial system and capture both cyclical and structural developments. Naturally, banking sector variables play a key role for macroprudential policy, together with debt and credit variables. In addition, the macroeconomic environments, as well as the developments of relevant financial markets need to be taken into account. In addition, indicators reflecting developments of the housing market as well as the commercial real estate market are essential inputs. However, poor data availability and quality in this field often hamper the analysis.

To ensure that the MPDB would not only support the ECB's macroprudential functions at the euro area level but have a wider application, the ESRB joined the MPDB development work. As responsible for the macroprudential oversight of the EU financial system and the prevention and mitigation of systemic risks,<sup>7</sup> the ESRB has a broad remit, covering banks, insurers, asset managers, non-banks intermediaries (the so-called shadow banking), financial market infrastructures and other financial institutions and markets. By extending the relevant indicators to cover non-bank financial intermediaries and encompassing the EU to the extent possible, the new database also suits the broader perspective of the ESRB.

In this regard, the MPDB constitutes the statistical basis for conducting macroprudential analyses in the context of the ECB's macroprudential function, while also addressing the ESRB's data needs. By considering synergies between different users' requirements, the MPDB establishes a consistent, unique and harmonised database supporting relevant and well-informed macroprudential analyses as well as the policy discussions.

The MPDB should also stimulate macroprudential analysis and research both within and outside the European System of Central Banks, and should prove relevant for market-participants and academics (see Box 2 for confidentiality issues).

### 3. Structure and key features of the database

The MPDB provides a comprehensive set of harmonised, relevant and fit-for-use indicators to analyse the build-up of both cyclical and structural systemic risks.

The development of the database started with the compilation of a list of potential indicators to be included in the database — casting the net relatively wide

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<sup>7</sup> See ESRB Regulation: Regulation (EU) No 1092/2010 of the European Parliament and of the Council of 24/11/2010

— based on relevant experience on macroprudential analyses and on the relevant academic literature. The list also included the indicators selected for the ESRB's quantitative risk analysis tools, such as the ESRB risk dashboard. Following the compilation of this list, the second and longest phase of the work consisted in an extensive inventory exercise. The desired indicators were to allow cross-country comparability (harmonisation), large cross-country availability and, to the extent possible, a long history. This inventory exercise showed that many of the "best available" time series for the desired indicators were already available in datasets included in the ECB's Statistical Data Warehouse (SDW), in databases of other international institutions (BIS, OECD, Eurostat, IMF) or in commercial data providers (Bloomberg, Thomson Reuters, Datastream, iBoxx, etc.).

A relatively large number of indicators were ultimately integrated in the MPDB, which is structured around the following seven domains<sup>8</sup>:

- Macroeconomic and financial market variables
- Debt and credit variables
- Residential real estate variables
- Commercial real estate variables
- Bank sector variables
- Non-bank variables
- Interconnectedness variables

The MPDB comprises around 275 relevant country level public variables and indicators (and around 370 in the internal version). A catalogue encompassing all indicators together with underlying SDW codes and indicators calculations is available in the SDW. In addition, the catalogues are also available at domain level. These catalogues also include references to few time series that cannot be shown in the SDW, but are available in the other data sources.

The following sections present a summary of the main features of the various MPDB domains.

### 3.1 Macroeconomic and financial market variables

This first domain covers a very wide range of macroeconomic and financial market variables that can be used to measure the build-up of cyclical and structural systemic risks in the financial system or in the real economy, both on a national and European level (i.e. euro area as well as the EU). The indicators included in this domain aim to cover financial stability risks stemming from macroeconomic developments (inflation, growth) and imbalances (current account,

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<sup>8</sup> See Annex 1 for an overview of the full MPDB structure.

competitiveness), from household, corporate and public sector debt or from financial markets (equity, bond, foreign exchange:), encompassing:

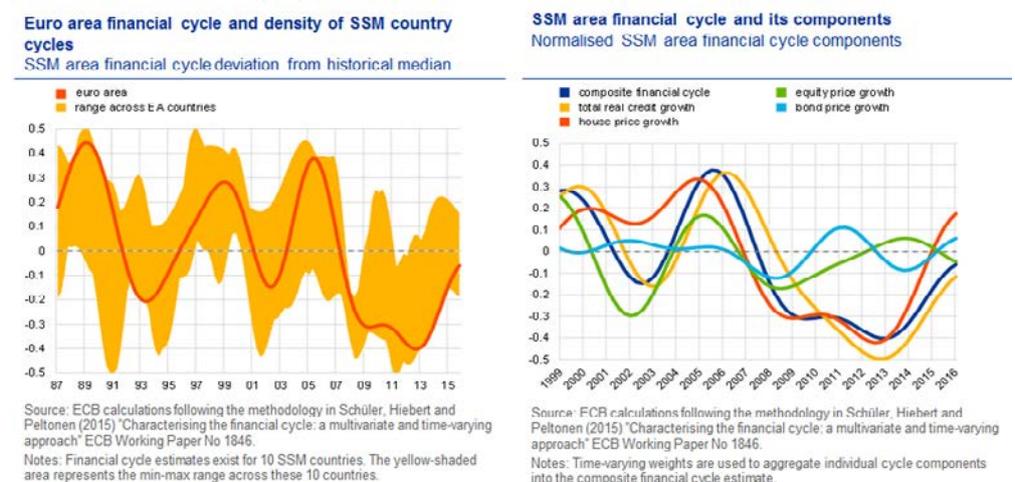
- Macroeconomic aggregates (monetary and real variables)
- Financial market variables
- Risk and uncertainty variables
- Financial condition indicators for the main economic sectors (government sector, households, non-financial corporations)
- Borrowing and lending conditions

These indicators can be used to characterise and estimate financial cycles for European countries and the euro area as a whole. Based on the methodology of Schuler, Hiebert and Peltonen<sup>9</sup>, the financial cycle is a widely used measure in financial stability analysis and macroprudential policy.

The financial cycle summarises the (co)-movements over time of a range of financial sector variables, covering quantities and prices. To identify financial cycles, attention is given to common cyclical fluctuations across total credit, residential property prices, equity prices and benchmark bond yields. The indicators used for estimating the financial cycle are included in MPDB (credit, house prices, equity prices, bond yields, real GDP, unemployment, inflation).

In order to estimate the financial cycle and the trend evolution, long time series are needed and the MPDB therefore contains several indicators with significant historical data. In addition, the full euro area country coverage of MPDB indicators allows for decomposition of the cycle, as well as of its components, also at the individual country level. Chart 1 illustrates the euro area financial cycle and the components, including also the min-max range across euro area countries. The cycles and its subcomponents are not stored in the MPDB, but can be calculated on the basis of the time series included in the MPDB.

Chart 1: Euro area financial cycle and its components, as well as density of euro area country cycles



11 See "Characterising the financial cycle: a multivariate and time-varying approach", Y. Schuler, P. Hiebert, T. Peltonen, ECB Working Paper Series, No. 1846 / September 2015

## 3.2 Debt and credit variables

According to the Basel Committee on Banking Supervision (BCBS, 2010) an important goal of macroprudential policy relates to the prevention of periods of excess aggregate credit growth that have often been associated with the build-up of leverage and system-wide risk. It is also well documented that variables related to the cyclical dimension of credit are among the best performing indicators in signalling (banking) crises in a broad set of countries (in particular during the upswing of the economic cycle<sup>10</sup>). Such indicators include, for example, (i) the credit-to-GDP gap<sup>11</sup> (e.g., Babecký et al., 2014; Drehmann and Juselius, 2014; Detken et al., 2014; Behn et al., 2016), (ii) the deviation of household credit to GDP from its long-run trend (e.g. Detken et al., 2014; Anundsen et al., 2016), (iii) the deviation of non-financial corporation credit to GDP from its long-run trend (e.g. Anundsen et al., 2016), (iv) total or bank credit growth (e.g., Schularick and Taylor, 2012; Anundsen et al., 2016; Behn et al., 2016), (v) household credit growth (e.g., Büyükkarabacak and Valev, 2010; Detken et al., 2014), (vi) non-financial corporations credit growth (e.g., Büyükkarabacak and Valev, 2010). While excessive cyclical credit developments might reflect growing optimism in economic boom periods, potentially leading to risk illusion and excessive risk-taking by financial actors, high indebtedness of the non-financial private sector increases vulnerability to economic shocks. The empirical literature has emphasised the ability of indicators such as the credit to GDP ratio (e.g., Behn et al., 2016) and the debt service ratio (e.g., Detken et al., 2014; Drehmann and Juselius, 2014) in signalling banking crises well in advance.

The debt and credit domain of the MPDB considers a wide range of variables aimed to timely detect the build-up of periods of excessive credit growth or the possible emergence of credit bubbles in the economy that might pose a threat to the resilience of the financial sector. Complementing the financial condition indicators of the first domain, this second domain provides time series covering various aggregates and breakdowns of:

- Total credit (loans plus debt securities) granted to households, non-financial corporations and (private) non-financial sector;
- Bank credit (loans) to various types of counterparties;
- Cross-border exposures;
- Information on credit exposures in banks' balance sheet (data from the consolidated prudential COREP and FINREP reports);
- Bank Lending Survey indicators related to the bank's practices and expectations regarding credit standards and lending conditions<sup>12</sup>.

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<sup>10</sup> For further details see Borio and Lowe (2002, 2004), Borio and Drehmann (2009), Behn et al (2013) and Drehmann and Juselius (2014), BCBS (2010) and Detken et al. (2014), Alessi and Detken (2014).

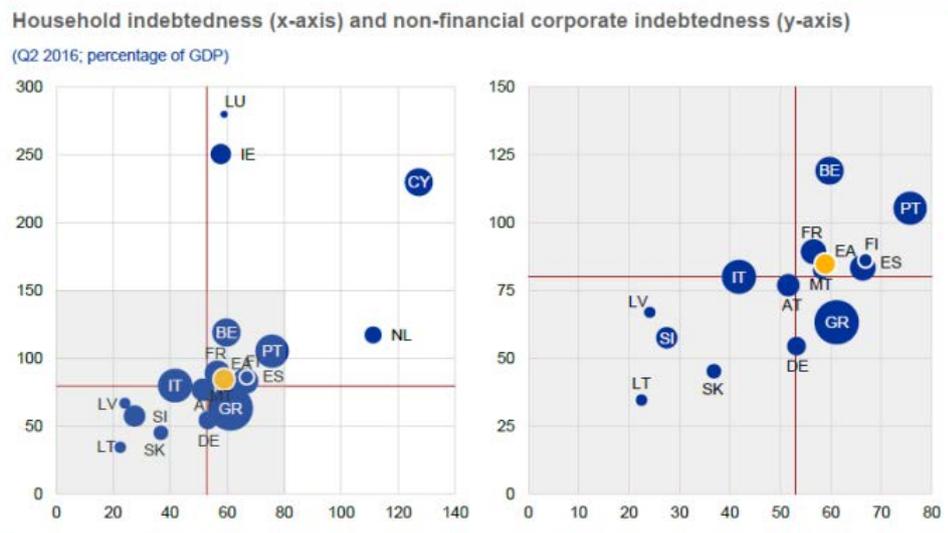
<sup>11</sup> The credit-to-GDP gap is defined as the deviation of credit to GDP from its long-run trend.

<sup>12</sup> See also <https://www.ecb.europa.eu/stats/money/surveys/lend/html/index.en.html>

Credit variables are particularly relevant in the context of the setting of the Countercyclical Capital Buffer (CCyB). This macroprudential instrument was introduced in the EU law by the Capital Requirement Directive IV (CRD IV) and needs to be assessed and set on a quarterly basis by the designated authority.

Among these variables, which aim at capturing cyclical systemic risk, the credit-to-GDP gap (as suggested by the Basel Committee of Banking Supervision) plays the most prominent role, although it is not supposed to lead to any automatic setting of the buffer. As its performance over time and in different countries can be heterogeneous, it is important to rely on a broader set of indicators, including qualitative information. The ESRB recommendation explicitly requires national authorities to monitor and consider a broader set of variables in addition to the credit-to-GDP gap, when setting the countercyclical capital buffer: real estate overvaluations, measures of credit developments, measures of external imbalances, measures of the strength of bank balance sheets, measures of private sector debt burden, measures of potential mispricing of risks, and measures derived from models which combines the credit-to-GDP gap<sup>13</sup>. Many of these indicators used at the national level can be found in the MPDB. Chart 2 illustrates indebtedness of households and non-financial corporates in euro area countries as an example. Apart from a comparison with historical value, the cross-country dimension of the database can also be used to compare developments in a cross-country and cross-time dimension.

Chart 2: Indebtedness across sectors



Sources: European Commission and ECB.  
Notes: The size of the bubble reflects the level of general government debt as a share of GDP. Non-financial corporate debt is consolidated. Consolidated non-financial corporate debt figures include cross-border inter-company loans, which tend to account for a significant part of debt in countries where a large number of foreign entities, often multinational groups, are located (e.g. Belgium, Cyprus, Ireland, Luxembourg and the Netherlands). The horizontal and vertical lines represent the estimated macroeconomic imbalance procedure (MIP) benchmarks of 80% of GDP for consolidated non-financial corporate debt and 53% of GDP for household debt. The 133% of GDP MIP limit for fully consolidated non-financial private sector debt is split between firms and households based on their average past shares in the stock of non-financial private sector debt.

<sup>13</sup> See ESRB/2014/1.

### 3.3 Residential real estate variables

Imbalances in residential real estate markets (RRE) have played a significant role in several past financial crises<sup>14</sup>. Often, housing booms coincided with (broad-based) credit booms and, as documented in Crowe, Dell’Ariccia, Igan and Rabanal (2013), almost all the countries that experienced a “twin boom” ended up suffering a financial crisis or a severe contraction of GDP. The severe impact on the real economy of financial and economic crises related to real estate stems from the central role of the real estate sector in the economy and the predominance of bank credit in financing this sector.

Several empirical studies confirmed the importance of indicators related to residential real estate as useful early-warning indicators of banking crises or vulnerabilities related to real estate markets (e.g., Barrell et al., 2010; Reinhart and Rogoff, 2013; Detken et al., 2014; Ferrari et al (2015); Anundsen et al., 2016; Behn et al., 2016, Ciocchetta et al. (2016)). Imbalances in real estate markets are therefore also used as input for the more general assessment of cyclical systemic risks (see Section 3.2).

The potentially important role of RRE markets in the build-up of financial vulnerabilities also helps to explain why several macroprudential instruments have been implemented to target risk stemming from RRE. These include instruments targeting banks (e.g. sectoral capital requirements) and borrowers (e.g. loan-to-value (LTV), loan-to-income (LTI) and debt-service-to-income (DSTI) caps). Indicators related to credit conditions (LTV, LTI and DSTI) could also be useful to signal the emergence of vulnerabilities in the real estate sector driven by too lax lending standard. In fact, Crowe et al (2013) find that LTV ratios are significantly associated with real estate price developments. However, the empirical testing of the signalling properties of such indicators was so far hampered by significant data gaps and a lack of harmonised definitions<sup>15</sup>.

The MPDB includes times series on variables that have been identified as potential leading indicators for RRE crises and/or that are the basis for the above-mentioned macroprudential instruments. Some of these areas are however still characterised by important gaps in the availability of comprehensive and comparable data for various countries (see Section 4)<sup>16</sup>.

Against this background, the MPDB has identified a broad set of indicators for the RRE domain:

- A first set of indicators looks at the domestic household sector's balance sheet and its mortgage liabilities.

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<sup>14</sup> See for example Crowe et al. (2013) and Hartmann (2015).

<sup>15</sup> The ESRB Recommendation on Closing Real Estate Data Gaps (ESRB/2016/14) lays the foundations for a more harmonised and widespread availability of lending standards indicators for residential real estate loans in the EU, thereby allowing to overcome this issue in the future.

<sup>16</sup> See for example ESRB (2015), Report on residential real estate and financial stability in the EU, December.

- The second set of indicators covers time series that provide information on mortgage loans' key features, such as the interest rate cost of these loans. In the future, these should be complemented with comprehensive and comparable data on mortgage loan maturities and LTV, DSTI or LTI ratios.
- A third group of indicators focuses on time series providing information on house prices and house price valuation.
- The fourth group of indicators relates to time series that provide information on the supply side of the residential real estate market.

The MPDB puts a strong emphasis on cross-country comparability and therefore provides a very good basis for the horizontal analysis of vulnerabilities across European countries. Examples of how the MPDB was used for such a horizontal and indicator-based assessment of vulnerabilities can be found in the ESRB report on "Vulnerabilities in the EU residential real estate sector" published in November 2016.<sup>17</sup>

Table 1 presents the residential real estate scoreboard for European countries for Q3 2016. The indicators are grouped in three different categories according to the type of vulnerability they aim to capture, namely a "collateral stretch" (reflecting house price developments and measures of potential overvaluation of prices), "lending conditions" (signalling availability and pricing of mortgages), and "household stretch" (capturing the households' financial situation and ability to service its debt). Moreover, in addition to the single indicators, also summary measures are constructed to facilitate a comparison and ranking across countries and arrive at composite vulnerability scores.

It should be noted that an indicator-based horizontal analysis of vulnerabilities can only serve as a starting point of a more detailed analysis, which takes into account country-specific structural and institutional factors as well as expert judgement.

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<sup>17</sup> The report is available on the ESRB website: [https://www.esrb.europa.eu/pub/pdf/reports/161128\\_vulnerabilities\\_eu\\_residential\\_real\\_estate\\_sector.en.pdf?d1a536823a87796fcc0d06428343fe11](https://www.esrb.europa.eu/pub/pdf/reports/161128_vulnerabilities_eu_residential_real_estate_sector.en.pdf?d1a536823a87796fcc0d06428343fe11)

Table 1: Residential real estate scoreboard for European countries

Vulnerabilities in RRE across the EU: results from the indicator-based horizontal analysis

Country	Indicators										Summary measures	
	Collateral Stretch				Lending Indicators			Household Stretch			Average rating across indicators	Composite indicator
	Residential real estate price index, 12m growth, %	Residential price index relative to peak prior to 2014	RRE valuation measure, house price to income	RRE valuation measure, econometric model	Loans to HH for house purchases, 12m growth, %	Loans to HH for HP relative to peak prior to 2014	HH Loan spread	HH debt, % of GDP	HH financial assets to debt, %	Debt service to income ratio for HH, %		
AT	8.1	1.1	26.0	14.0	4.9	1.1	2.1	51.2	350.8	10.2	1.4	0.3
BE	2.3	1.0	26.0	4.0	8.1	1.2	1.8	59.6	500.2	10.7	1.5	0.2
BG		0.8	-9.0	-11.0	0.6	1.0	5.6	23.8	552.6	8.1	0.0	-0.9
CY	-1.6	0.7	-16.0	-3.0	-1.8	0.9	3.2	127.3	206.0	28.8	0.9	0.3
CZ		1.0	8.0	2.0	8.7	1.1		30.3	360.4	8.2	0.8	-0.1
DE	4.7	1.1	4.7	-2.0	3.7	1.1	1.9	53.4	338.1	9.4	0.8	0.1
DK	3.5	0.9	19.0	4.0	1.2	1.0	1.4	122.8	248.5	20.4	1.5	0.6
EE	0.8	0.9	8.0	-7.0	4.6	1.0	2.3	40.6	270.4	7.6	0.4	-0.2
ES	6.3	0.7	-6.0	6.0	-3.5	0.8	1.9	66.4	275.8	12.9	0.5	-0.1
FI	-0.1	1.0	10.0	3.0	2.6	1.0	1.4	66.7	210.9	11.4	1.4	0.2
FR	0.3	0.9	14.0	4.0	3.2	1.0	1.7	56.5	394.1	10.0	1.0	0.0
GR	-5.0	0.6	-25.0	-5.0	-3.6	0.8	2.7	61.8	216.3	21.8	0.7	-0.2
HR	-2.1	0.8	-11.0	-16.0	-4.8	0.8	4.4	36.9	302.7	8.8	0.0	-0.6
HU	4.3	0.9	-7.0	-15.0	-3.3	0.6	4.6	21.2	563.5	7.6	0.1	-0.9
IE	7.4	0.7	-3.0	-23.0	-4.2	0.6	3.4	57.8	237.3	19.9	0.7	-0.4
IT	-1.2	0.8		-5.0	0.9	1.0	1.6	42.1	581.5	11.8	0.3	-0.3
LT	10.5	0.7	-3.0	-8.0	6.6	1.0	1.9	22.3	414.2	5.1	0.6	-0.4
LU	4.5	1.1	18.0	9.0	7.0	1.2	1.7	57.4	242.1	10.8	1.8	0.4
LV	7.4	0.7	-6.0	-19.0	-2.2	0.7	3.3	24.3	430.8	5.7	0.2	-0.8
MT	10.0	1.1	10.0	-9.0	7.9	1.2	2.3	57.8	462.8	12.8	1.6	0.1
NL	4.4	0.9	-4.0	2.0	6.2	1.1	2.8	111.4	296.7	21.5	0.9	0.3
PL	1.8	0.9	-9.0	-17.0	0.7	1.1	1.4	36.2	268.6	13.4	0.5	-0.2
PT	5.0	0.9	-9.0	-3.0	-3.5	0.8	2.0	76.3	269.5	16.4	0.6	0.0
RO	3.6	0.7	-20.0	-29.0	16.5	1.3	2.8	17.2	414.6	6.5	0.6	-0.6
SE	12.9	1.3	69.0	47.0	8.7	1.1		84.7	333.4	16.0	2.2	1.2
SI	0.8	0.8	-10.0	-8.0	3.2	1.0	2.0	27.5	367.4	5.8	0.1	-0.4
SK	1.0	0.8	-6.0	-15.0	13.8	1.3	2.3	35.8	213.9	10.0	1.0	-0.1
UK	8.7	1.0	30.0	11.0	4.6	1.1		87.0	372.9	18.4	1.7	0.6
EAA	2.4	1.0	4.7	-1.0	2.1	1.0		59.3	356.1		0.5	0.0
EAM	4.5	0.9	-3.0	-3.0	3.2	1.0	2.0	57.4	296.7	10.8	0.8	0.0
EUA		1.0									1.0	0.4
EUM	4.4	0.9	-3.0	-3.0	3.2	1.0	2.1	54.9	335.8	10.8	0.7	-0.1
T1	4.0	0.9	2.5	2.5	5.0	1.0	1.5	50.0	220.0	10.0	1.0	0.0
T2	6.5	1.0	5.0	5.0	7.5	1.1	1.8	70.0	240.0	15.0	1.2	0.2
T3	9.0	1.1	7.5	7.5	10.0	1.2	2.0	90.0	260.0	20.0	1.7	0.5
TR	4.0	0.9	2.5	2.5	5.0	1.0	2.0	60.0	260.0	10.0		

Source: MPDB, see Annex B of ESRB report on vulnerabilities in residential real estate markets, November 2016 for details.

Notes: EAA is the euro area average; EAM is the euro area median; EUA is the EU average; EUM is the EU median; T1, T2, T3 and TR are the risk thresholds. See Box 1 and Annex B of ESRB report on vulnerabilities in residential real estate markets, November 2016 for a description of the methodology underlying these results. In Finland, the household financial asset-to-debt indicator excludes earnings-related pension assets. Including assets held by the Finnish employment pension scheme, the ratio would be around 337%.

### 3.4 Commercial real estate variables

Excessive developments in the commercial real estate (CRE) sector can harm the stability of the financial sector and have negative consequences for the real economy. CRE markets are inherently more pro-cyclical than RRE markets, due to more inelastic supply conditions, stronger co-movements with broad macroeconomic developments and the more international investor base (ESRB, 2015). Furthermore, providers of CRE financing are diverse, encompassing both bank and non-bank entities, such as insurance companies and asset managers. In addition, the CRE sector is heterogeneous both with respect to the type of property being financed (e.g. retail, industrial, office, residential...) and for the underlying purpose underlying the acquisition of CRE property. In fact, commercial property is more often bought as a speculative investment by professional investors than residential property, which often serves as accommodation for its owners.

The analysis of risks and vulnerabilities related to CRE is still hampered by severe data gaps and, until recently, by the absence of a commonly agreed definition of CRE. However, the 2016 ESRB Recommendation on Closing Real Estate Data Gaps (ESRB/2016/14) sets the stage for overcoming these limitations and lays the foundations for an effective monitoring framework for CRE markets in the EU. First, the ESRB Recommendation provides a definition of CRE, namely "any income-producing real estate, either existing or under development, excluding social housing, property owned by end-users and buy-to-let housing"<sup>18</sup> (Section 2.1.4). Secondly, the Recommendation provides detailed guidance on the set of indicators necessary for the monitoring of emerging CRE risks, covering several dimensions, including the physical market for CRE properties, the financial sector's exposures to CRE and related lending standards.

However, the MPDB currently, covers a very limited number of CRE-related variables, encompassing mainly available CRE price indicators and information on CRE-related exposures in the financial sector (even if these exposures may only be considered to be broad proxies of what would fall under a more precise definition of CRE).<sup>19</sup> Enhancing the availability of CRE-related indicators is one of the priorities for the future enhancement of the database.

### 3.5 Bank sector variables

The recent financial crisis demonstrated that the financial system in general and the banking sector in particular can be an important source and propagation channel of shocks. In fact, while vulnerabilities can materialise within the banking sector, the degree of banks' resilience determines the degree to which adverse developments are transmitted to the real economy and potentially amplified. More specifically, a banking sector characterised by high capitalisation, low leverage and low degree of

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<sup>18</sup> Buy-to-let housing, defined in the Recommendation as "any residential real estate property directly owned by a private household primarily for letting to tenants", falls under the scope of residential real estate.

<sup>19</sup> See for example ESRB (2015), Report on commercial real estate and financial stability in the EU, December.

liquidity mismatch is better able to withstand negative shocks, and to limit their propagation to the real economy.

Several studies in the early-warning literature reveal that the probability of banking crises is reduced when the banking sector is characterised by low leverage (e.g. Barrell et al., 2010; Anundsen et al., 2016; Behn et al., 2016) lower liquidity mismatch (e.g. Barrell et al., 2010; Drehman and Juselius, 2014; Anundsen et al., 2016), and a high capital ratio (Betz et al. 2014). Betz et al (2014) also find that, at the country level, rapid growth in non-core liabilities, a high debt-to-equity ratio as well as a large banking sector, are associated with higher probabilities of bank distress. The role of the banking sector in both originating and transmitting adverse shock is the subject of a vast body of theoretical studies. According to the literature, two important transmission channels are the bank balance sheet and the liquidity channel.<sup>20</sup>

The MPDB includes several indicators used to measure banking sector performance and vulnerabilities in the different EU countries as well as at the EU and euro area level, which are grouped under the following categories:

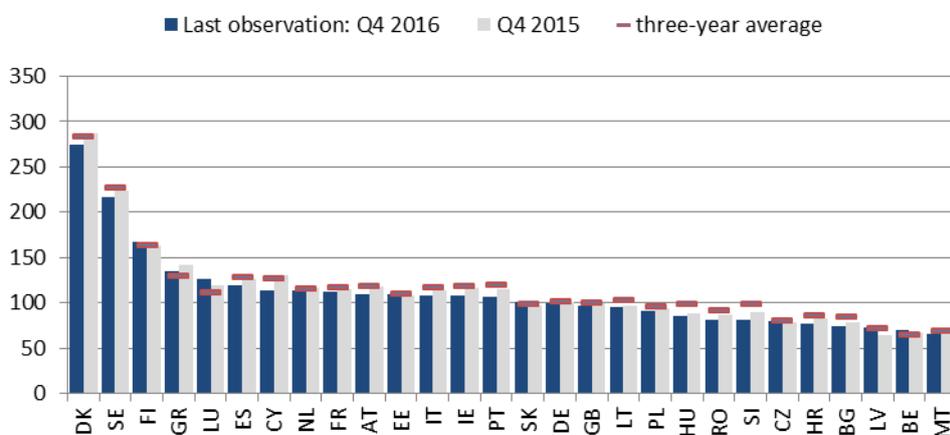
- **Banking structure:** This set of indicators shows the degree of financial intermediation and banking concentration to support the identification of structural risks.
- **Main elements of the income statement:** In this section basic components of the profit and loss account are shown.
- **Profitability:** Based on the main elements of the income statement this section includes various ratios concerning profitability and efficiency.
- **Main elements of the balance sheet:** The section on elements of the balance sheet covers the structure of assets and liabilities on a detailed basis.
- **Liquidity and funding:** These indicators aim at assessing the resilience of banks' liquidity position, the diversification of funding sources and maturity mismatches between assets and liabilities so as to reduce liquidity risk and cover any unforeseen funding requirements. A high value of the loan-to deposit ratio, implying that the financing of the stock of loans has to rely on additional wholesale funding, could signal higher aggregated liquidity risk for those banking systems, since wholesale funding tends to be more volatile than deposits.

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<sup>20</sup> See BCBS (2011).

Chart 3: Loan to deposit ratio of EU banking sector

Percentages



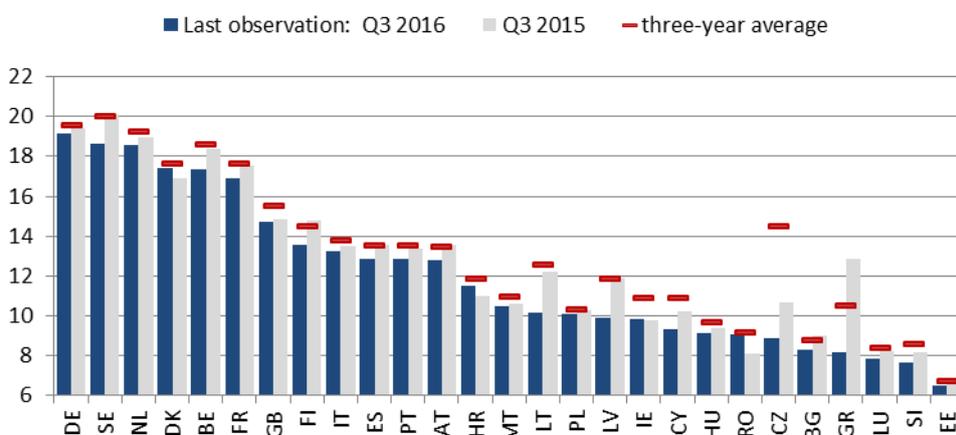
Source: ECB, ESRB Risk Dashboard

Notes: MFIs sector excluding the ESCB. Data refers to the ratio between total loans and total deposits vis-à-vis the domestic and euro area households, NFCs and non-MFI residents excluding the general government. Mortgage banks in Denmark, which represent around 55% of total MFI loans to domestic NFCs, are not allowed to take deposits owing to regulations, but must fund their lending through issuance of covered bonds only. Excluding mortgage banks from the indicator, the loan-to-deposit ratio for DK is equal to 0.75 for Q4 2016 and 0.79 for Q4 2015.

- Lending and leverage: Indicators in this category allow to assess different types of risks related to the provision of credit to the real economy, such as risks from lending in foreign currency, variable rate loans, large exposures and loan concentration per sector, as well as risks related to the excessive build-up of leverage (leverage ratio indicator).

Chart 4: EU banking sector leverage

Total assets, as multiple of capital



Sources: ECB.

Notes: Share of total assets in capital for domestic banking groups and stand-alone credit institutions. Consolidated data

- Capital: This category assesses the capacity of the financial sector to absorb shocks on both asset and liability sides of their balance sheets. Indicators cover the main regulatory capital ratios, the quality of regulatory capital as well as the composition of the risk-weighted assets.
- Asset quality: The indicators assess the credit quality of the loan portfolio and banks' related provisioning.
- Locational funding indicators: This section complements indicators provided in other sections.

### 3.6 Non-bank variables

As systemic risks can also emerge outside the banking sector, other segments of the financial system also warrant monitoring. This is even more relevant given the shift to market-based financing or to more lightly regulated intermediaries. Identifying the build-up of systemic risk in the so called "shadow banking" sector is a priority on the international policy agenda, as illustrated by the work of the Financial Stability Board.<sup>21</sup>

Monitoring the non-bank sector is not an easy task, principally because of the very heterogeneous entities and activities which it encompasses. Besides insurance companies and pension funds, the non-bank sector also comprises entities such as money market funds, real estate investment trusts, special purpose vehicles and hedge funds, just to name a few. As outlined by Doule et al. (2016), potential risks in the non-bank sector might arise from liquidity and maturity mismatches, excessive leverage and pro-cyclicality of margins and haircuts.

The ability to monitor risks in the non-bank sector is severely hampered by data gaps. However improvements are being made in this respect. An important step forward in the monitoring of the shadow banking sector has been marked in 2016 by the publication of the ESRB "EU Shadow Banking Monitor"<sup>22</sup> and the paper by Grillet-Aubert et al (2016). In addition, oversight of the EU insurance sector has been recently significantly improved by the availability of new data based on the Solvency II reporting.<sup>23</sup>

The MPDB includes a domain containing variables to assess risks to financial stability originating from outside the banking sector. The indicators deal for example with structural features of insurance corporations and pension funds and their exposures to sovereigns. It also covers information on financial vehicle corporations (FVCs).

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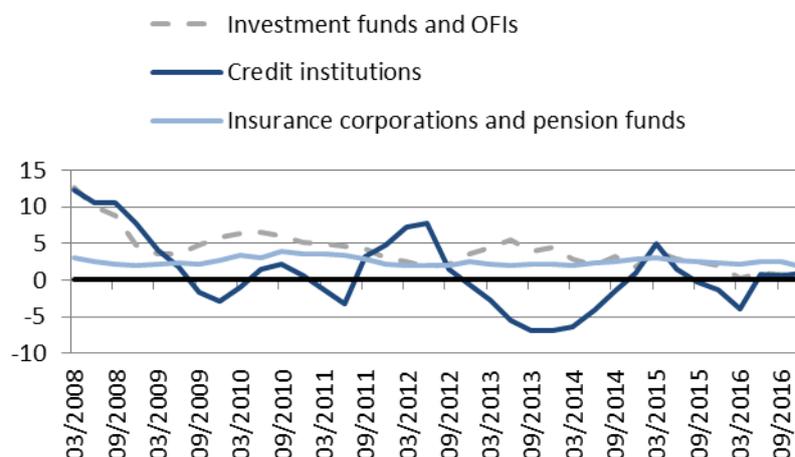
<sup>21</sup> See for instance the last FSB Global Shadow Banking Monitoring Report, <http://www.fsb.org/2015/11/global-shadow-banking-monitoring-report-2015/>

<sup>22</sup> [https://www.esrb.europa.eu/pub/pdf/.../20160727\\_shadow\\_banking\\_report.en.pdf](https://www.esrb.europa.eu/pub/pdf/.../20160727_shadow_banking_report.en.pdf)

<sup>23</sup> This data is available to the ESRB on aggregated basis, based on agreement with EIOPA. First transmission, comprising insurance data for Q3 2016, took place in March 2017

Chart 5: Growth of components of the EU financial sector

EU; percentages; total assets annualised growth rates; last observation: Q4 2016



Sources: ECB.

Notes: Data based on financial accounts and monetary statistics. Data refer to the non-consolidated balance sheets of the respective entities

### 3.7 Interconnectedness variables

Interconnectedness plays a major role in the propagation of financial distress both within the financial sector and across countries. The recent financial crisis made evident that direct and indirect financial linkages (i.e. bilateral contractual obligations or exposures to common assets) may result in a contagion cascade with the potential of spreading financial distress worldwide.. Recent studies have confirmed that the network structure matters in both the origination (Allen et al., 2011) and the transmission of systemic risk (e.g., Gai and Kapadia, 2010; Georg, 2013).

The MPDB includes variables that capture interconnectedness within the financial system, among which indicators that have been selected for the ESRB's quantitative risk analysis tools. The Financial Stability Board for instance developed a common data template to be reported by global systemically important banks (G-SIBs).<sup>24</sup> The MPDB encompasses indicators such as total bank assets relative to GDP, banks' interbank liabilities (in addition to their interbank assets) and positions in derivatives, among others.

<sup>24</sup> See the FSB Data Gaps Initiative on a Common Data Template for G-SIBs: [http://www.fsb.org/2013/04/r\\_130418/](http://www.fsb.org/2013/04/r_130418/)

## Box1: Comparison between MPDB and IMF Financial Soundness Indicators (FSI)

The IMF Financial Soundness Indicators (FSIs) project was the first structured initiative aimed at compiling a database specifically tailored to macroprudential statistical needs and analysis. The regular data collection started in 2008, following two preliminary implementation phases: a) the development of the compilation guide meant to set the methodological standards to derive the FSIs, and b) an initial pilot data collection exercise that began in 2006. Work is currently ongoing on revising the list of FSIs in response to the global financial crisis.

The main characteristics of the MPDB and FSIs are summarised in the table below. FSIs currently cover around 40 indicators (52 in the revised list of indicators foreseen to be implemented), mainly focused on the financial system and their corporate and household counterparts. The MPDB is much broader in scope (around 275 indicators), also encompassing the macroeconomic environment, financial markets, debt/credit developments and government sector. Such broader coverage results from the availability of a large variety of in-house statistics. On the other hand, the country coverage is significantly higher for FSIs compared to MPDB (103 countries vs 28 EU countries).

Another relatively notable difference is that all data in the MPDB is fully harmonised across countries in terms of statistical methodologies. In the case of the FSIs, given the much higher coverage of countries, there is still scope in enhancing the comparability and homogeneity of data across all countries, the FSIs compilation guide plays an important role in this respect.

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### Comparison of MPDB and IMF FSIs

	MPDB	IMF FSIs
Country coverage	28 (EU countries)	103
Number of indicators	275	40
Overlapping	~30 indicators (however significant methodological differences may exist for the same indicator between the two datasets)	
Harmonisation	Fully harmonised data	Scope to enhance comparability of cross-country data
Data collection	Selected data already available at the ECB	Dedicated data collection
Frequency	Depends on the underlying data (generally monthly or quarterly)	Generally quarterly (other frequencies depending on the indicator)
Release year	2015	2006 pilot exercise/2008 regular reporting

Source: ECB, IMF

## Box2: Confidentiality protection and the three layers of MPDB

The MPDB follows the dissemination policy in place for the datasets already available in the ECB SDW, thereby being fully compliant with the confidentiality features of the underlying data.

In this regard, the MPDB has three different layers, which differ in the data availability:

- ECB internal MPDB
- ESCB layer of MPDB
- Public MPDB

### *ECB internal MPDB*

ECB users can access the entire content of the MPDB, including data sourced from commercial data providers. In some cases, access to particular datasets is granted on the principle of business-related "need to know", so as to ensure that given data are only accessed by authorised individuals who need these resources in order to undertake their work.

### *ESCB layer of MPDB*

Data are visible to the European System of Central Banks and also associated institutions for which a memorandum of understanding is in place: the European Banking Authority (EBA), the European Commission, the European Insurance and Occupational Pensions Authority (EIOPA), the European Securities and Markets Authority (ESMA), the European Stability Mechanism (ESM), the European Systemic Risk Board (ESRB) and the Bank of International Settlements (BIS). In this layer, some of the data from commercial data providers are not available to the users, due to contractual limitations. If the variables coming from third institutions (e.g. OECD and BIS) are not available in this layer, the MPDB catalogues gives clear instructions on where and how to obtain this data.

### *Public MPDB*

Since the start of the project much effort has been put in making as much data as possible available to the general public.

Admittedly, the coverage of the MPDB available for the general public is limited compared to the ECB or even the ESCB layer, as a significant amount of data reported to the ECB from national authorities, is flagged as non-publishable and thereby can only be shared within the ESCB.

Nevertheless, the public layer of the MPDB is expected to be a useful reference, providing as much information as possible presented in one place. As in the ESCB layer, the MPDB catalogues provides clear instructions where and how to obtain certain time series from commercial providers or third institutions (e.g. OECD and BIS).

## 4. Future enhancements

### 4.1 Regular reviews and closing of data gaps

The creation of the MPDB was accompanied by a data gap analysis. The most relevant areas affected by data gaps identified in this analysis are real estate (both commercial and residential), non-banking intermediaries and interconnectedness measures. Following an in-depth assessment, carried out in close collaboration with NCBs/NCAs, some of these gaps were deemed "possible to be addressed" by collecting information already available at national level.

Within this set of missing statistical information, a number of relevant indicators for macroprudential analysis (labelled as "Orange Indicators") could in principle be derived from the information reported within the banking supervisory reports (EBA Implementing Technical Standards on Supervisory Reporting (FINREP/COREP templates), available with the national authorities.

While a decision on the collection of these data by the ECB is still to be finalised, the actual implementation would close some of the data gaps related to both commercial and residential real estate in the short run, even though only to a limited extent (around 15 new indicators) compared to the actual data needs in this area. These indicators mainly refer to different measures that are relevant for the assessment of credit risk, provisioning and solvency for various real estate type of exposures.

In addition to the potential implementation of these indicators, further improvements towards the closing of data gaps in the real estate sector could likely be expected around 2020 in the context of the implementation of the ESRB Recommendation on closing real estate data gaps and of the AnaCredit project, which will provide granular loan information covering the non-financial corporations sector.

Data gaps in the area of residential and commercial real estate are difficult to bridge in a satisfactory fashion through ad hoc surveys. A good and comparable dataset on very important parameters for the macro-prudential analysis of RRE (such as LTV ratios) will require establishing common definitions and co-ordinated collections of data that are at least representative for the domestic mortgage and housing markets, which is exactly what the ESRB recommendation on closing real estate data gaps aims at.

Apart from the already foreseen expansions and enhancements, the MPDB is being regularly reviewed to keep up with evolving users' needs. It is fair to add that such developments may imply costs for the compilers in NCBs/NCAs as well as lead to additional reporting from industry. The ESCB and ESRB will take a cost-conscious and effective approach prior to any significant increase in coverage, and the more so the more costly such extensions may be.

## 4.2 Further expanding coverage in the area of non-banks

While many systemic crises are characterised by bank failures or bail-outs, experience shows that financial instability is not always triggered by traditional banking intermediation. As the Regulation that establishes the ESRB provides it with a mandate to oversee systemic risk in the financial system as a whole, a further development of the MPDB to measure risks stemming from outside the banking sector would support the ESRB in its tasks. One example of the direct application of the non-banking data is the ESRB Heatmap - risk analysis tool, currently in the development phase. The heatmap should help policy makers and financial stability analysts to monitor the EU financial system and the potential build-up of systemic risks. To achieve this, input of high quality data covering non-banking sectors is essential.

Non-bank entities and activities contributed to the propagation of the global financial crisis. The securitisation of mortgages prior to the crisis increased vulnerabilities and led to over-borrowing. Money market funds following the failure of Lehman Brothers played an amplifying role in the global financial crisis. So too did the near-failure of AIG, an insurer which had become 'too big to fail'.

Identifying and addressing such risks and assessing the resilience of the financial system are becoming ever more important with the recent growth of the non-bank financial system in the EU.

In addition, the drive toward greater market financing – a key goal of the European capital markets union (CMU) – will likely spark further growth among non-banks.

## 4.3 Type of indicators

The materialisation of systemic risks emanating from non-banks can be understood in similar terms to those from banking. The impact, sources and transmission channels, however, may vary substantially across sectors.

### 4.3.1 Credit growth and leverage

By providing services to the real economy some financial firms may take on leverage and undertake maturity transformation. Excessive leverage amplifies the financial cycle, allowing more borrowing to take place, and may lead to a reduction in the resilience of market players. In addition, reliance on short-term and unstable funding may lead in case of dry-up to fire sales, market illiquidity and contagion as firms seek to meet withdrawals.

### 4.3.2 Interconnectedness

Links between financial institutions can help manage risk and distribute funds to where they can be deployed more effectively. Interlinkages between entities may also reduce the system's ability to withstand stress given direct and indirect contagion channels. Risks may materialise also when banks provide financial support to non-bank financial entities beyond contractual obligation.

### 4.3.3 Too big to fail

Non-bank entities can become systemically important. On the one hand, mandatory clearing of standard derivatives through CCPs has the potential to increase transparency and the stability of the network. On the other hand it also creates new networks and concentrates risks at CCPs. Due to their central position in the network; CCPs may themselves become systemically important.

## 5. Conclusions

A suitable statistical basis for macroprudential analyses and policies comprises a comprehensive and high-quality set of data and indicators. A wide set of statistics on macroeconomic variables, financial and real estate markets, credit, debt and funding patterns are needed. Moreover, in order to detect possible contagion risks, created by increasing interconnectedness and herd behaviour, also interconnectedness variables have to be monitored.

This paper describes a major initiative undertaken by the E(S)CB, in cooperation with the ESRB, to build such a statistical repository with the creation of the Macroprudential Database (MPDB). The rationales for setting up the MPDB are put forward, together with the structure of the database and a broad overview of its indicators. Relevant confidentiality issues are dealt with.

As a by-product, the design and implementation of the MPDB showed how cooperation and mutual involvement of financial stability experts and statisticians can create relevant synergies and value added in terms of conceptual analysis, technical infrastructures, collection and compilation of data.

With the creation of the MPDB a first important step was taken, but more has to be done. Data gaps are still there, especially in some domains of the MPDB and they will have to be filled, always keeping an eye on the burden to data compilers and matching merits and costs of additional data. Data gaps appear to be relevant for instance in the area of residential and commercial real estate. A further important challenge will be expanding the coverage in the area of non-banks credit intermediation, given the growing relevance of the so-called “shadow-banking” sector. Progress in the EU-driven project of developing a Capital Market Union will make this area even more relevant. More in general, the MPDB will be regularly reviewed to ensure a robust and harmonised data system capable of satisfying the information needs of macroprudential analysts and policymakers.

## Annex 1 - MPDB structure

The database consists of seven domains with various sub-domains and has the following structure:

### Macroeconomic and financial market variables

- Monetary indicators
- Macroeconomic indicators
- GDP indicators
- Foreign exchange indicators
- Financial market indicators
- Risk and uncertainty indicators
- Financial condition indicators
- Borrowing and lending indicators

### Debt and credit variables

- Total credit and debt service indicators
- Bank credit indicators
- Financial sector credit by sub-sector (whom-to-whom accounts)
- Cross border / currency / securities exposures
- Credit exposure of banks (FINREP data)
- Credit exposure of banks (COREP data)
- Credit conditions according to bank lending survey

### Residential real estate variables

- Mortgage debt and household balance sheet
- Mortgage loan features / credit standards
- House price and house price valuation indicators
- Housing transactions and supply side

### Commercial real estate variables

- CRE market: risk indicators
- Financial sector exposure to CRE

### Bank sector variables

- Banking structure

- Main elements of the P&L
- Profitability
- Main elements of the balance sheet
- Liquidity and funding
- Lending and leverage
- Capital
- Asset quality

#### Non-bank variables

- Insurance companies and pension funds
- Other financial institutions

#### Interconnectedness variables

- Interconnectedness variables

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## European Macroprudential Database<sup>1</sup>

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<sup>1</sup> This presentation was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.



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**EUROPEAN CENTRAL BANK**

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# European Macroprudential Database (MPDB)

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Disclaimer: The views expressed are those of the authors and do not necessarily reflect those of the ECB, ESRB and NBB

- 1 Macroprudential Database – Overview and Rationale
- 2 MPDB structure
- 3 Data gaps

- **Macroprudential Database (MPDB)** - Statistical basis for ECB macroprudential policy and also covering ESRB data needs
  - comprehensive and harmonised dataset of indicators selected on the basis of institutions' experience, information about indicators used in various macroprudential tools and relevant academic literature.
- A first large dataset went *live in October 2015* and can be consulted in the **ECB's Statistical Data Warehouse (SDW)**: [Link to the MPDB](#)
- **Semi-annual review** of the indicator list to meet evolving user needs and potential availability of new data sources
  - Criteria: relevance, availability, quality and confidentiality of the data

# The rationale for the MPDB (1)

- The financial crisis confirmed need for system-wide surveillance of systemic risk and led to establishment of **macroprudential policy as key policy area** with objective of early detection of systemic risk and, in case of materialisation, promoting actions to limit its contagion effects
- Originally, macroprudential powers in the European Union were established primarily at the national level, but ...
- ... the implementation of the Single Supervisory Mechanism (SSM) Regulation also strengthens consistency of **macroprudential policy at EU level**.
- *Background information:* **SSM Regulation** - Council Regulation (EU) No 1024/2013 conferring specific tasks on the ECB concerning policies relating to the **prudential supervision of credit institutions** in the EU

## The rationale for the MPDB (2)

- In particular, the **SSM Regulation** confers specific powers and responsibilities in the field of macroprudential policy upon the ECB and National Competent Authorities or National Designated Authorities.
  
- The role of the ECB in this area is twofold:
  1. **First**, the ECB is involved in the decision making process of macroprudential policy in SSM countries.
  2. **Second**, the ECB has the right to apply more stringent measures at the national level for the instruments included in the EU laws.

## Macroprudential tasks and tools of the ECB in the context of the SSM

### ■ *Coordinating with national macroprudential authorities*

- The concerned authority of Member States shall duly notify its intention to the ECB prior to taking a decision
- Where the ECB objects, it shall state its reasons in writing within five working days
- The concerned authority shall duly consider the ECB's reasons prior to proceeding with the decision as appropriate

### ■ *Taking macroprudential actions*

- Instead of national authorities of the participating Member State, or jointly with them, the ECB may apply
  - ✓ higher requirements for capital buffers
  - ✓ apply more stringent measures aimed at addressing systemic risks

*Measures are subject to procedures set out in **CRR/CRD IV and SSM Regulation***

## The rationale for the MPDB (4)

- The shared responsibilities regarding macroprudential policies between national authorities and the ECB triggered the need to establish a common ground for macroprudential analysis.
- A **comprehensive** and **harmonised** database was essential for analytical and policy oriented work flowing into internal and external reports, and for a consistent cross-country analysis of systemic risk.
- The **Macroprudential Database (MPDB)** became operational in October 2015 and is available publicly, accessible through ECB's Statistical Data Warehouse (SDW)



## Statistical Data Warehouse

[Google Search](#)

[SDW Series Search](#)

Google™ Custom Search

[Home](#) > [Supervisory and prudential statistics](#) > [Macroprudential Database](#)

- + Publications
- + Full Content
- + ECB/Eurosystem policy and exchange rates
- + Money, credit and banking
- + Financial corporations
- + Financial markets and interest rates
- + Macroeconomic and sectoral statistics
- + Balance of payments and other external statistics
- **Supervisory and prudential statistics**
  - + Consolidated banking data
  - **Macroprudential Database**
    - + Macroeconomic and financial market variables
    - + Debt and credit variables
    - + Residential real estate variables
    - + Commercial real estate variables
    - + Bank sector variables
    - + Non-bank variables
    - + Interconnectedness variables
  - Banking supervision
- + Payments statistics
- + ECB surveys

## Macroprudential Database

The Macroprudential Database (MPDB) is a comprehensive and harmonised dataset of indicators covering various sub-categories of indicators judged relevant for macroprudential analysis. The database focuses on the indicators that can be used to explain and predict financial crisis episodes. The indicators were selected based on institutions' experience of using time series for macroprudential analyses, information about indicators used in macroprudential tools and relevant academic literature. They include indicators selected for the ESRB's quantitative risk analysis tools, such as the ESRB Risk Dashboard, and the indicators used to monitor developments in national banking markets. The indicators in the database are grouped into seven categories, each of which include various sub-categories, according to the below structure (see overview tab).

The list of indicators, together with the underlying SDW codes and indicator calculations, can be accessed in the MPDB catalogue. The catalogue may also include references to time series that cannot be shown in the SDW but are available from other data sources.

[📄 Download the MPDB catalogue](#)

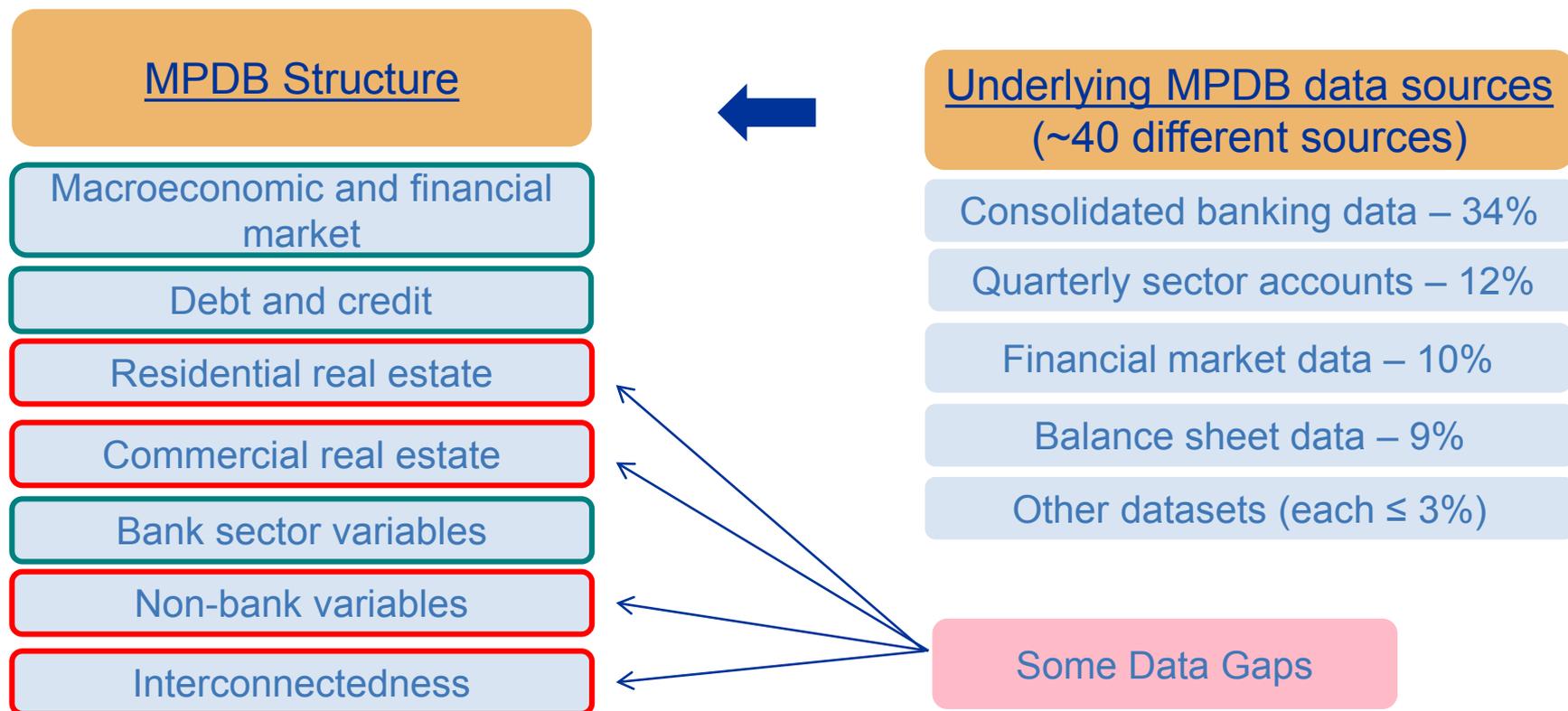
[Overview](#)

[Publications and Dashboards](#)

### ➤ *Macroeconomic and financial market variables*

[Monetary indicators](#) | [Macroeconomic indicators](#) | [GDP indicators](#) | [Foreign exchange indicators](#) | [Financial market indicators](#) | [Risk and uncertainty indicators](#) | [Financial condition indicators](#) | [Borrowing and lending indicators](#)

- **MPDB coverage:** ~370 variables internal SDW (~275 public SDW)
  - Grouped in 7 domains/ 34 sub-domains

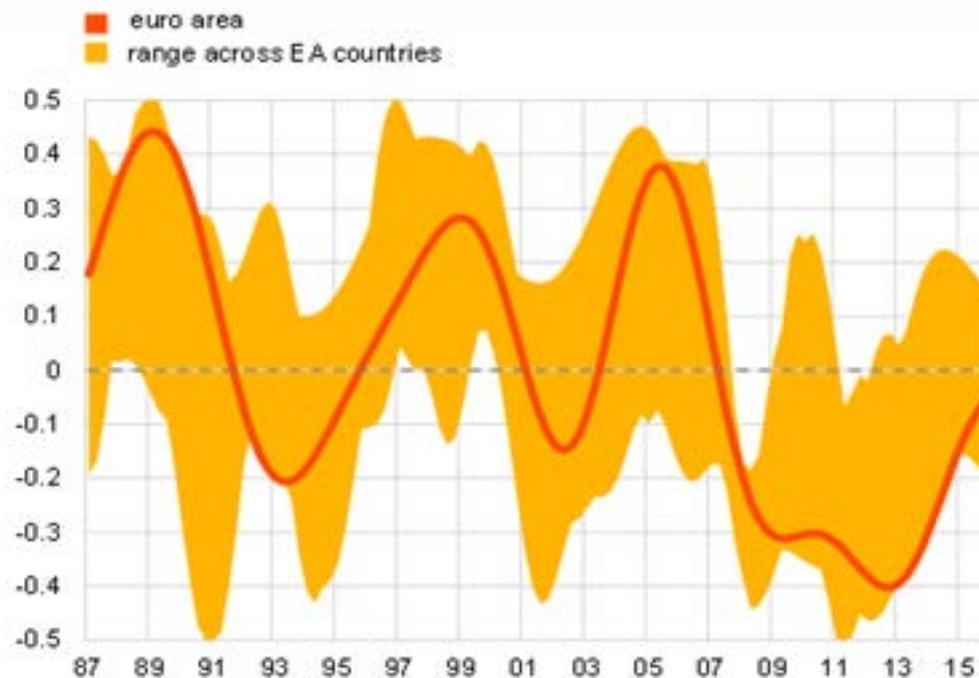


# Structure and key features (1)

- **Macroeconomic and financial market variables:** very wide range of macroeconomic and financial market variables that can be used to measure build-up of cyclical and structural systemic risks in financial system or in real economy, both on a national and European level.
  - Macroeconomic aggregates (monetary and real variables)
  - Financial market variables
  - Risk and uncertainty variables
  - Financial condition indicators for the main economic sectors (government sector, households, non-financial corporations)
  - Borrowing and lending conditions

## Euro area financial cycle and density of SSM country cycles

SSM area financial cycle deviation from historical median



Source: ECB calculations following the methodology in Schüler, Hiebert and Peltonen (2015) "Characterising the financial cycle: a multivariate and time-varying approach" ECB Working Paper No 1846.

Notes: Financial cycle estimates exist for 10 SSM countries. The yellow-shaded area represents the min-max range across these 10 countries.

## Structure and key features (2)

- **Debt and credit variables:** a wide range of variables aimed to timely detect the build-up of periods of excessive credit growth or the possible emergence of credit bubbles in the economy that might pose a threat to the resilience of the financial sector.
  - Total credit (loans plus debt securities) granted to households, non-financial corporations and (private) non-financial sector;
  - Bank credit (loans) to various types of counterparties;
  - Cross-border exposures;
  - Information on credit exposures in banks' balance sheet (data from the consolidated prudential COREP and FINREP reports);
  - Bank Lending Survey indicators related to the banks' practices and expectations regarding credit standards and lending conditions

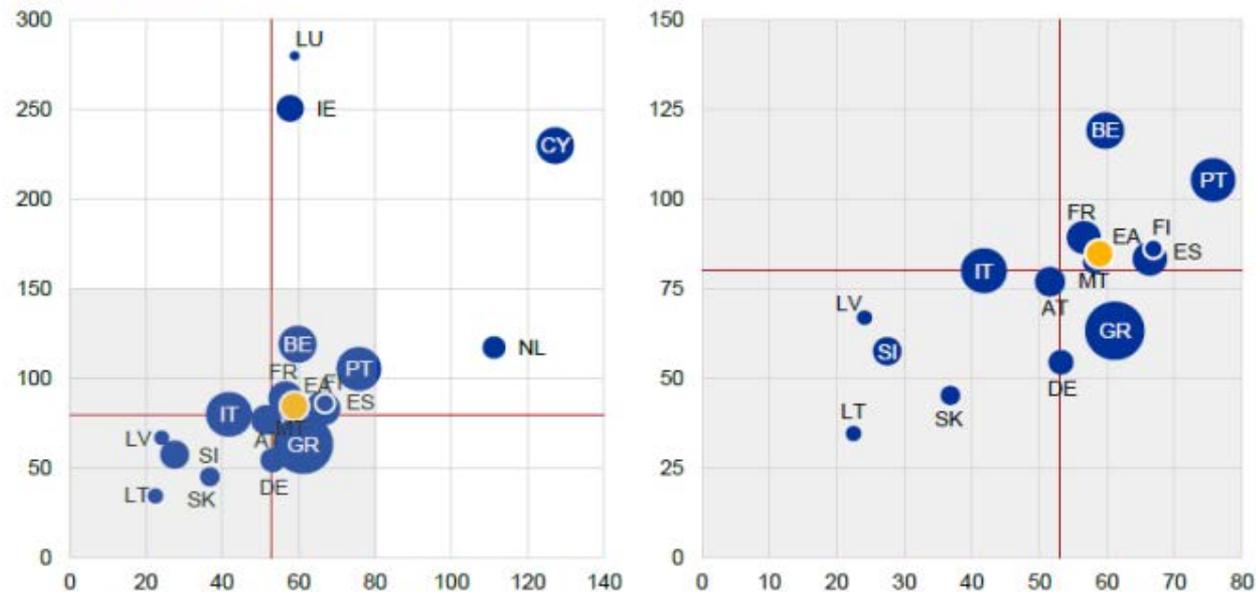
# Structure and key features (2 - continued)

## Chart 1.26

High indebtedness across sectors remains a cause for concern in some countries

Household indebtedness (x-axis) and non-financial corporate indebtedness (y-axis)

(Q2 2016; percentage of GDP)



Sources: European Commission and ECB.

Notes: The size of the bubble reflects the level of general government debt as a share of GDP. Non-financial corporate debt is consolidated. Consolidated non-financial corporate debt figures include cross-border inter-company loans, which tend to account for a significant part of debt in countries where a large number of foreign entities, often multinational groups, are located (e.g. Belgium, Cyprus, Ireland, Luxembourg and the Netherlands). The horizontal and vertical lines represent the estimated macroeconomic imbalance procedure (MIP) benchmarks of 80% of GDP for consolidated non-financial corporate debt and 53% of GDP for household debt. The 133% of GDP MIP limit for fully consolidated non-financial private sector debt is split between firms and households based on their average past shares in the stock of non-financial private sector debt.

## Structure and key features (3)

- **Residential real estate (RRE) variables:** include times series on variables that have been identified as potential leading indicators for RRE crises.
  - indicators for the domestic household sector's balance sheet and its mortgage liabilities.
  - indicators that provide time-series information on mortgage loans' key features (i.e the interest rate of these loans). In the future, these should be complemented with comprehensive and comparable data on mortgage loan maturities and LTV, DSTI or LTI ratios.
  - indicators with time series information on house prices and house price valuation.
  - indicators with time series that provide information on the supply side of the residential real estate market

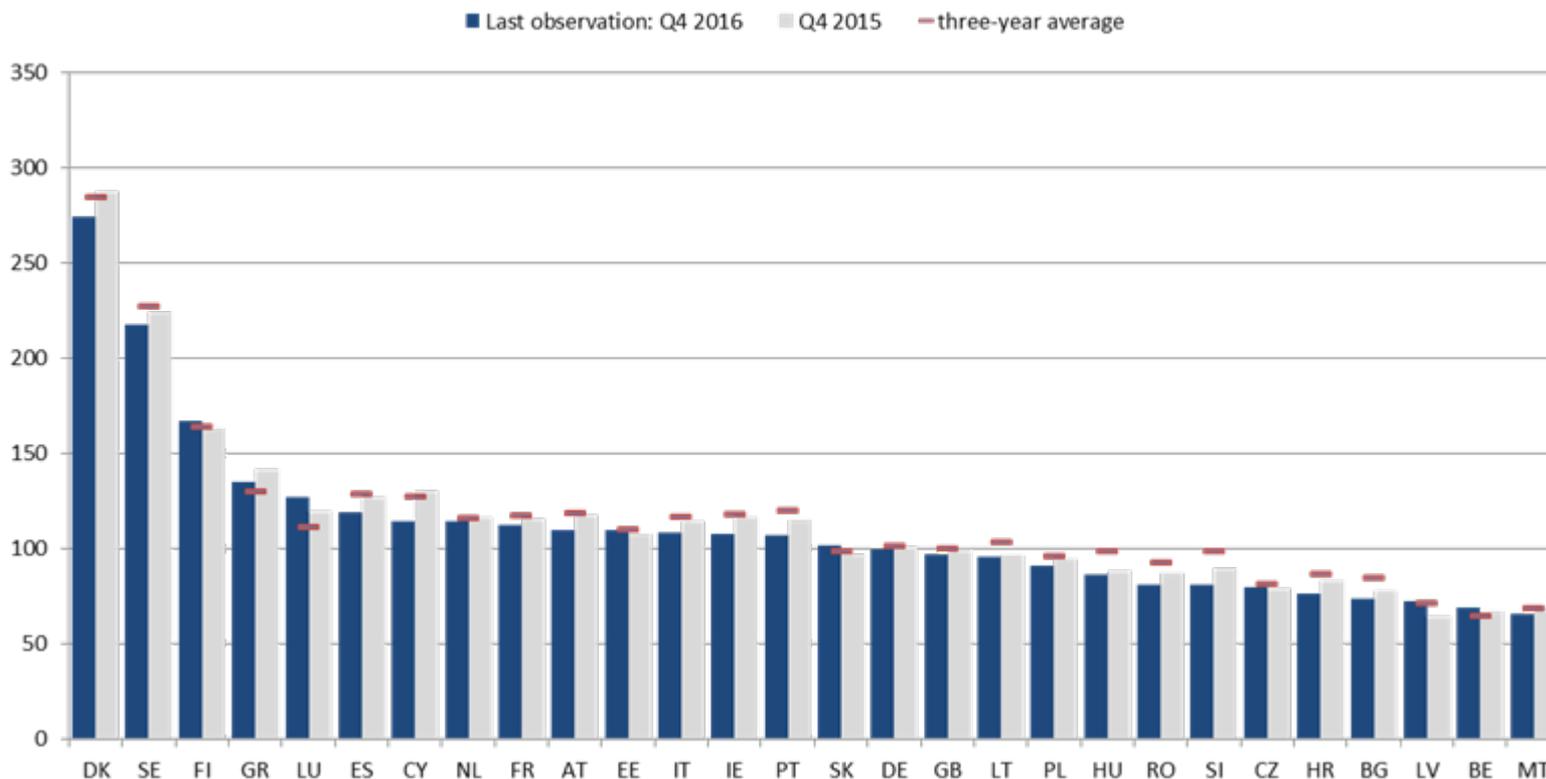
**Still significant data gaps!**

- **Commercial real estate (CRE) variables:** currently MPDB covers very limited number of CRE-related variables, encompassing mainly available CRE price indicators and information on CRE-related exposures in financial sector (even if these exposures are only broad proxies of what would fall under a more precise definition of CRE)

**Significant data gaps!**

- **Bank sector variables** measure banking sector structure, performance and vulnerabilities in the different EU countries
  - Banking structure
  - Main elements of the income statement
  - Profitability variables
  - Main elements of the balance sheet
  - Liquidity and funding
  - Lending and leverage
  - Capital
  - Asset quality
  - Locational funding indicators

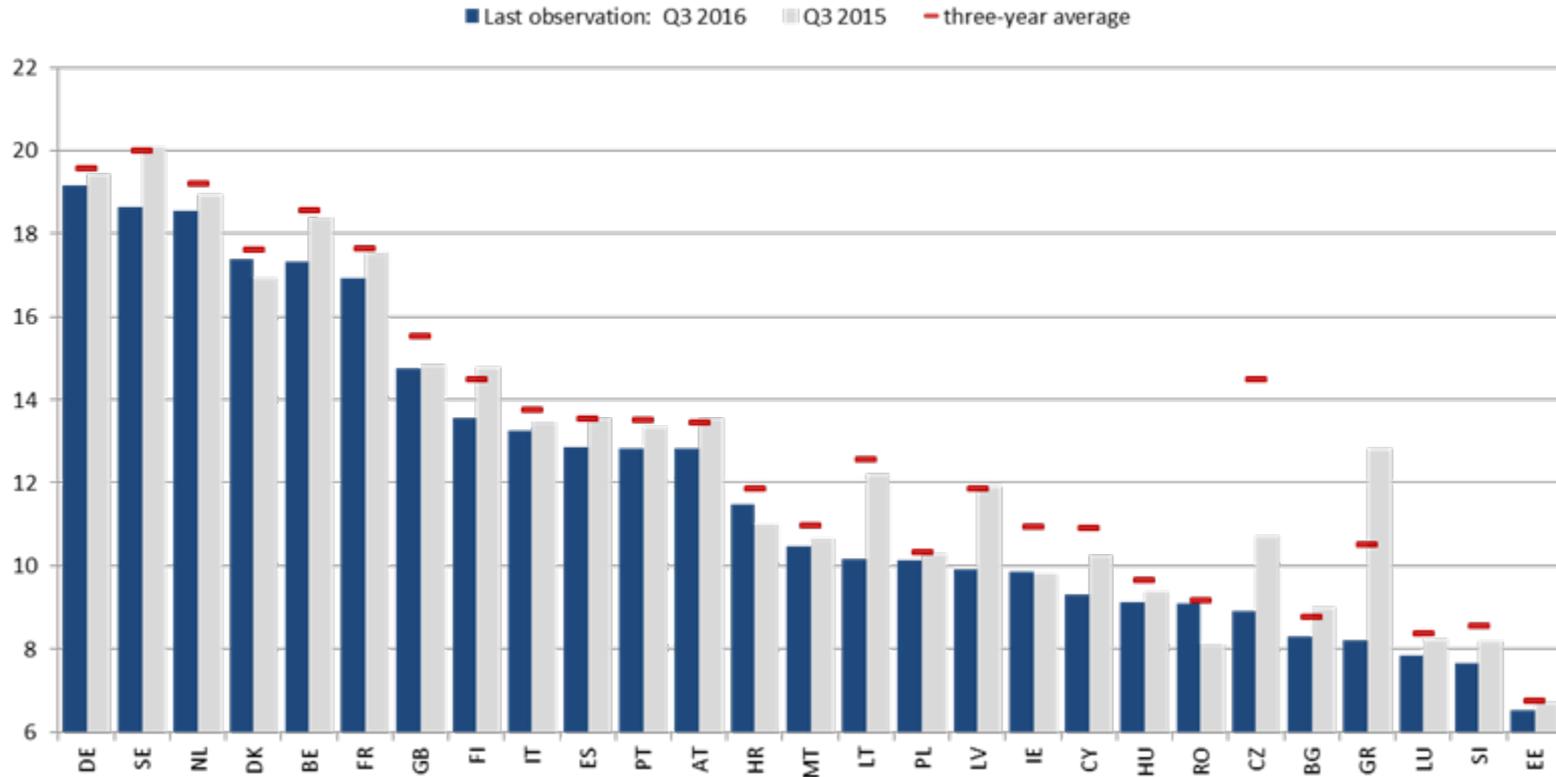
## Loan to deposit ratio of EU banking sector (Percentages)



Source: ECB, ESRB Risk Dashboard.

Notes: MFIs sector excluding the ESCB. Data refers to the ratio between total loans and total deposits vis-à-vis the domestic and euro area households, NFCs and non-MFI residents excluding the general government. Mortgage banks in Denmark, which represent around 55% of total MFI loans to domestic NFCs, are not allowed to take deposits owing to regulations, but must fund their lending through issuance of covered bonds only. Excluding mortgage banks from the indicator, the loan-to-deposit ratio for DK is equal to 0.75 for Q4 2016 and 0.79 for Q4 2015.

## EU banking sector leverage (Total assets as multiple of capital)



Source: ECB.

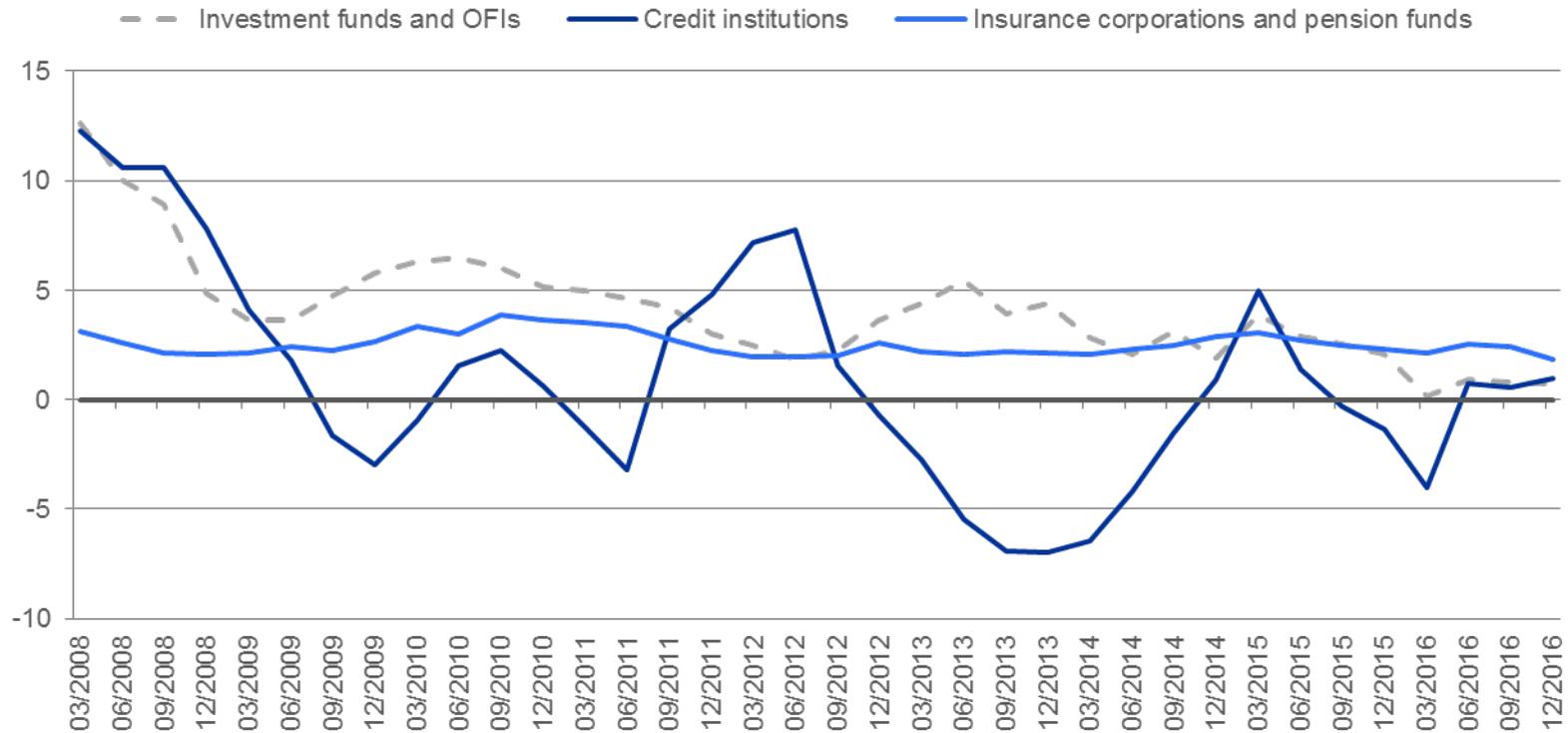
Notes: Share of total assets in capital for domestic banking groups and stand-alone credit institutions. Consolidated data.

## Structure and key features (6)

- **Non-bank variables:** a domain containing variables to assess risks to financial stability originating from outside the banking sector.
- The indicators deal for example with structural features of insurance corporations and pension funds and their exposures to sovereigns.
- It also covers information on financial vehicle corporations (FVCs)

# Structure and key features (6)

## Growth of components of the EU financial sector (Percentages, total assets annualised growth rates)



Source: ECB.

Notes: Data based on financial accounts and monetary statistics. Data refer to the non-consolidated balance sheets of the respective entities.

## Structure and key features (7)

- **Interconnectedness variables:** Interconnectedness plays a major role in the propagation of financial distress both within the financial sector and across countries (*cross-sectional dimension of systemic risk*).
- MPDB comprises variables that capture interconnectedness within the financial system.
- Includes indicators dealing for example with total bank assets relative to GDP, banks' interbank liabilities (in addition to their interbank assets) and positions in derivatives, among others.

- Creation of MPDB was accompanied by a **data gap analysis**. The most relevant areas affected by data gaps are :
  - commercial and residential real estate
  - non-banking intermediaries
  - interconnectedness measures.
- To close these data gaps, a number of relevant indicators (labelled as “**Orange** Indicators”) could in principle be derived from information **already available at national level** within banking supervisory reports (EBA ITS).
- This would at least close some of the data gaps for both commercial and residential real estate (even though only to a limited extent)

- Important data gap: **residential and commercial real estate**
- **Goal:** Need for a comparable/harmonised dataset of highly relevant indicators (such as LTV ratios) for enhancing the statistics for macroprudential analysis of RRE and CRE
- **No short-term solution:** rather difficult to bridge in a satisfactory manner through *ad-hoc surveys*, because of the lack of data harmonisation
- **Way forward: closing data gaps** could be achieved through *common definitions* and *coordinated data collections*

- First step in this direction: **ESRB recommendation on closing real estate data gaps (ESRB/2016/14)**
  - **Goal:** Implement a **risk monitoring framework** for domestic RRE and CRE, based on a recommended set of indicators by end-2020
  - **Guidance provided:** Detailed templates, definitions and methodologies
  - **Timeline** – National macroprudential authorities (NMA) have to deliver:
    - a) an interim report *by end-2018* on data available or expected to become so,
    - b) a final report on the implementation of this recommendation *by end-2020*
- **Criteria** for the implementation of the Recommendation:
  - ESRB recommendations are subject to a “comply or explain” mechanism
  - Due regard should be paid to the principle of proportionality: a) size and development of the CRE/RRE market in each MS, b) powers of each NMA

- Currently, MPDB gives prominence to the banking sector, but ...
- ... experience shows that financial instability is not always caused by traditional banking intermediation, and ...
- ... *Non-bank entities* and *activities* contributed to the propagation of the global financial crisis
  - Securitisation of mortgages increased vulnerabilities and led to over-borrowing
  - MMFs played an amplifying role following Lehman Brothers failure
  - Near-failure of AIG, an insurer which had become “too big to fail”

## Data gaps – Non-bank sector (2)

- The transmission channels of systemic **risks from non-banks** may vary substantially from the ones stemming from banking intermediation
- Growing relevance of non-bank financial intermediation, relative to the banking sector
- Capital Market Union will make this area even more relevant
- Type of indicators required for monitoring non-banks:
  - Credit growth and leverage – excessive leverage amplifies the financial cycle
  - Interconnectedness – interlinkages between banks and non-banks may reduce system ability to withstand stress
  - Too big to fail – non-bank entities can be systemically important (e.g. CCPs)
- **Ongoing work** in this field is led by the ESRB, which has an explicit mandate in the area of non-banks

- A suitable statistical basis for macroprudential analyses and policies requires a comprehensive and high-quality set of data and indicators.
- **MPDB** - major initiative undertaken by the E(S)CB, in cooperation with the ESRB, to build such a statistical repository
- Successful creation of the MPDB is an **significant development** in the area of statistics for macroprudential purposes
- Data gaps need to be addressed as part of **future MPDB development**

**Thank you** for your attention!

**Questions?**