1. Interlinkages and composite measures of systemic risk

1.1 Composite indicator of systemic stress

Sources: Thomson Reuters, ECB, and ECB calculations

The CISS comprises 15 raw, mainly market-based raw financial stress measures that are split equally into five categories, namely the financial intermediaries sector, money markets, equity markets, bond markets and foreign exchange markets. The raw stress indicators are homogenised by replacing each individual observation with its function value from the indicators' empirical cumulative distribution function. The five segment-specific sub-indices of financial stress are computed as averages of their three constituent transformed stress measures. The CISS aggregates the five sub-indices based on portfolio theoretical principles, i.e. by taking into account the time-varying cross-correlations between the sub-indices. The CISS thus places relatively more weight on situations in which stress prevails simultaneously in several market segments. It is unit-free and constrained to lie within the interval (0, 1). For further details see Hollo, D., Kremer, M. and Lo Duca, M., "CISS - A composite indicator of systemic stress in the financial system", Working Paper Series, No 1426, ECB, March 2012.

The Sovereign CISS applies the same methodological concept of the CISS. It comprises a total of 6 raw stress indicators for national sovereign bond markets: the yield spread against the euro swap interest rate of comparable maturity, the one-week realised volatility of daily yield changes, and the bid-ask bond price spread as a percentage of the mid-price, all computed for sovereign bonds of 2-year and 10-year maturity, respectively. These 6 indicators are transformed and aggregated into country-specific and euro area-wide composite stress indicators (SovCISSes) based on portfolio-theoretic principles, i.e. based on time-varying cross-correlations between them. As for the euro area-wide indicator, two different country-weighting schemes are applied: equal weights and GDP-weight.

1.2 Probability of a simultaneous default

Sources: Thomson Reuters and ECB calculations

An estimate of the probability of a systemic event, i.e. a simultaneous default by two or more large and complex banking groups within a period of one year, as measured by the systemic risk measure (SRM). The SRM covers a sample of 15 banks. For further details on the indicator, see Box 8 in Financial Stability Review, ECB, June 2012.

The estimated probability of a simultaneous default of two or more EU sovereigns reflects the markets' assessment of the risk to default within one year. Country-specific risks are derived from the CDS spreads for 14 EU countries (i.e. Austria, Belgium, Germany, Spain, France, Ireland, Italy, the Netherlands, Portugal, Sweden, Poland, Denmark, Czech Republic and United Kingdom).

1.3 Individual institutions' contributions to overall systemic risk

Source: Bloomberg

Notes: These indicators are based on the methodology proposed by Adrian and Brunnermeier (see Adrian, T. and Brunnermeier, M.K., "CoVaR", Federal Reserve Bank of New York Staff Reports, No 348, September 2011). The sample includes the (log) stock prices of 52 European banks and 34 European Insurance companies listed in the STOXX Europe 600. The average "systemic risk contribution" (loss) tends to be higher during stress periods.

1.4 Cross-border claims of banks

Sources: BIS international banking statistics and ECB consolidated banking statistics

The size of the bubbles corresponds to the share of total foreign claims (BIS data) in the total equity (ECB data) of a country's consolidated banking sector. The thickness of the arrows depends on the share of bilateral foreign claims (i.e. claims of banks in country A on banks and other borrowers in country B) in the total equity of the banking sector extending the loans. Arrows extend only from EU countries reporting consolidated banking statistics to the BIS (marked as lenders and borrowers, EU only) and only where the share of bilateral foreign claims in total equity is more than 75%. Data for foreign claims refer to claims on an immediate borrower basis; for more details, see "Guidelines to the international consolidated banking statistics", available at http://www.bis.org.

1.5 MFI credits by counterpart sector

Source: ECB

Credit extended by monetary financial institutions (MFIs), excluding the European System of Central Banks (ESCB), to counterpart sectors (excluding general government); credit comprises loans and holdings of securities. See ECB manual on MFI balance sheet statistics.[*]

1.6 MFIs deposits by counterpart sector

Source: ECB

Deposits placed at MFIs, excluding the European System of Central Banks (ESCB). See ECB manual on MFI balance sheet statistics.[*]

1.7 MFI credits to general government

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[*] https://www.ecb.europa.eu/pub/pdf/other/manualmfibalancesheetstatistics201204en.pdf?426543c0dbb56bb78f5afd978b44db17

Source: ECB

Credit extended by monetary financial institutions (MFIs), excluding the European System of Central Banks (ESCB), to counterpart sector general government; credit comprises loans and holdings of securities. See ECB manual on MFI balance sheet statistics. [*]

1.8 MFI loans for house purchase

Source: ECB

Loans extended by monetary financial institutions (MFIs), excluding the European System of Central Banks (ESCB), to counterpart sector households. See ECB manual on MFI balance sheet statistics. [*]

2. Macro risk

2.1 Current and forecast real GDP growth

Source: European Commission

Latest actual year-on-year growth, three-year historical average and Commission forecast for all 27 countries of the EU. The three-year historical average is the simple average of year-on-year growth rates over the last 12 quarters. Real GDP growth is calculated using seasonally and working-day adjusted data.

2.2 Domestic credit-to-GDP gap

Sources: BIS, European Commission, ECB and ECB calculations

Credit-to-GDP gap (the deviation of the ratio of credit to GDP from its long-term trend) is calculated as the deviation of the ratio of total credit to nominal GDP from its recursive one-sided Hodrick-Prescott trend (see Annex-Part I, ESRB Recommendation ESRB/2014/1). The smoothing parameter lambda is set to 400,000. BIS data for the broad measure of credit to the domestic non-financial private sector is used where available; where not available ECB Euro Area Accounts credit data is used instead. GDP is the four-quarter cumulated flow.

2.3 Current account balance-to-GDP ratio

Sources: European Commission and ECB

Quarterly data represent the sum of the four quarters up to an including the quarter of reference. The three-year average is compiled on the basis of the annualised ratio of the last 12 quarters.

2.4 Unemployment rate

Source: European Commission

Latvia: quarterly data for all series. Croatia, Cyprus, Romania and Slovenia: quarterly data for youth unemployment.

2.5 Aggregate debt-to-GDP ratio

Sources: ECB and European Commission

The total aggregated debt as percentage of GDP represents the sum of the consolidated debt-to-GDP ratio of NFCs and government sectors, as well as the non-consolidated debt-to-GDP ratio of households. The change represents the percentage point change in debt-to-GDP ratio over the last four quarters.

2.6 General government debt-to-GDP ratio

Sources: European Commission and ECB

The official debt (latest observations plus forecasts) reported in the context of the excessive deficit procedure (EDP) was used as a source of data on general government debt. Intra-general government transactions are consolidated (netted out). The line represents the 60% Stability and Growth Pact threshold for the government debt-to-GDP ratio.

2.7 General government deficit-to-GDP ratio

Sources: European Commission and ECB

The line represent the 3% is Stability and Growth Pact threshold for budget deficit.

2.8 CDS premia on sovereign debt

Sources: Thomson Reuters Datastream and CMA

Sovereign credit default swaps (CDSs) spreads for a sample of EU sovereign countries. The CDS spreads are expressed in basis points and refer to 5-year maturity contracts.

2.9 Sovereign Government debt service due within one year

Sources: ECB and ECB calculations

Redemption schedules refer to tradable debt securities only (loans are excluded), including debt issued in a currency other than the domestic one. Data on future debt redemptions for non-euro area Member States are converted into euro at the cut-off date's exchange rate. Ratios to GDP for non-euro area Member States are calculated using nominal debt redemptions and GDP (the latter as forecast by the European Commission), both denominated in national currency.

2.10 Household debt-to-gross disposable income ratio

Sources: ECB and European Commission

Household's outstanding loans as a ratio of gross disposable income. All three-year average values are calculated over a three year period up to the end date applicable for the given country, if enough back data was available.

2.11 NFC debt-to-GDP ratio

Sources: ECB and European Commission

Stock of NFCs' debt (defined as debt securities, loans and pension scheme liabilities) in each EU Member State. Data for loans are taken on a consolidated basis from the national accounts. Non-financial corporations' debt excludes financial derivatives due to lack of comparability across countries. All three-year average values are calculated over a three year period up to the end date applicable for the given country, if enough back data was available.

3. Credit risk

3.1 Annual growth rates of MFI loans to households

& 3.2 Annual growth rates of MFI loans to NFCs

Source: ECB

Loans extended by MFIs, excluding the European System of Central Banks (ESCB); data for euro area Member States refer to loans granted to euro area households and NFCs, while for non-euro area Member States to loans to domestic households and NFCs. Euro area Member States data are adjusted for the derecognition of loans from the MFI statistical balance sheet due to their sale or securitisation (data for Belgium and Italy are not adjusted for this effect). See ECB manual on MFI balance sheet statistics.[*]

3.3 Cost of borrowing from MFIs for households (for house purchase)

& 3.4 Cost of borrowing from MFIs for NFCs

Source: ECB

The cost-of-borrowing is a measure used to assess borrowing costs for non-financial corporations and households; they further enhance cross-country comparability. They are calculated on the basis of MFI interest rates statistics by aggregating the interest rates provided for the various maturities and sizes of new business loans granted by MFIs to non-financial corporations and households using their respective volumes as weights and smoothing them using a 24-month moving average. For more information on the calculation, please see: http://www.ecb.europa.eu/stats/pdf/MIR-Costofborrowingindicators-methodologicalnote.pdf

3.5 Lending margins of MFIs – loans to households (for house purchase)

& 3.6 Lending margins of MFIs – loans to NFCs

Source: ECB

Lending margins are measured as the difference between MFIs' interest rates for new loans to households for house purchase (new business loans to non-financial corporations excluding revolving loans and overdrafts, convenience and extended credit) and a weighted average rate of new deposits with agreed maturity from households and non-financial corporations.

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[*] https://www.ecb.europa.eu/pub/pdf/other/manualmfibalancesheetstatistics201204en.pdf?426543c0dbb56bb78f5afd978b44db17

For non-euro area countries, rates for loans and deposits in both euro and the national currency are used; the spread is calculated as the difference between the average lending rates and the average deposit rate, where average rates are calculated using the business volumes in both euro and national currency as weights.

3.7 Changes in credit standards for loans to households (for house purchase)

& 3.8 Changes in credit standards for loans to NFCs

Sources: ECB and Bank of England

Weighted net percentage of banks contributing to the tightening of standards over the past three months.

3.9 Option-adjusted spreads on euro area corporate bonds

Sources: Bank of America Merrill Lynch

Bank of America Merrill Lynch Bond Index for the euro area non-financial corporate sector, broken down by rating class (AAA and BBB) and high yields.

3.10 Expected default frequency of the corporate sector

Sources: Moody's KMV and ECB calculations

Averages weighted by non-equity liabilities based on the Moody's EDF data for financial and non-financial companies.

3.11 Foreign currency loans

Source: ECB

Loans extended by MFIs, excluding the European System of Central Banks, to domestic non-MFIs (excluding general government); share of foreign currency loans in total loans to domestic non-MFIs (y-axis) and annual growth rate of foreign currency loans to domestic non-MFIs (x-axis).

3.12 Over/undervaluation of residential property prices

Sources: ECB and ECB calculations

The methodology applied for estimating the over/undervaluation of residential property prices is based on four different valuation methods: price-to-rent ratio, price-to-income ratio and two model-based valuation methods (see Box 3 in Financial Stability Review, ECB, June 2011, p. 53). Price indices data refer to total dwellings, whole country; national differences may however exist.

3.13 Change in nominal residential property prices

Sources: ECB and ECB calculations

Residential property price indicators differ in terms of: (i) geographical coverage (with some referring only to property transactions in larger cities); (ii) property-type coverage (with some excluding new dwellings); (iii) the types of price observation collected (e.g. transaction prices obtained from land registries or notaries or

values as assessed by professional property values); (iv) the time at which a price observation enters the index; and (v) quality adjustment (i.e. how the observed prices are adjusted for changes in the quality or composition of the observed properties).

4. Funding and liquidity

4.1 Interbank interest rate spreads

Source: Thomson Reuters

Difference between the overnight interbank rates and the overnight indexed swap (OIS) rates, for the euro area, the United States, and the United Kingdom.

4.2 Financial market liquidity indicator

Sources: ECB, Bank of England, Bloomberg, JPMorgan Chase & Co., Moody's KMV, and ECB calculations

This composite indicator is calculated by the ECB as an overall measure of liquidity, based on two components: money market liquidity risk and equity, bonds and foreign currency liquidity risk. The composite indicator comprises unweighted averages of individual liquidity measures, normalised over the period 1999-2006 for non-money market components. The data shown have been exponentially smoothed.

4.3 EUR/USD cross-currency basis swap spreads

Source: Bloomberg

The indicators show the cost of swapping euro into US dollars with a one-year or three-month tenor. The lower the spread, the more expensive it is to swap euro into US dollars.

4.4 Banks' funding by central banks

Sources: IMF, ECB and ECB calculations

Liabilities of credit institutions (i.e. monetary financial institutions (MFIs) excluding the European System of Central Banks (ESCB) and money market funds) vis-à-vis the Eurosystem (for euro area countries) or the national central bank (for other EU countries) as a share of the sector's total liabilities (excluding capital and reserves and remaining liabilities). ESCB funding comprises loans to other MFIs and excludes holdings of securities other than shares issued by other MFIs.

4.5 Money markets and the Eurosystem's standing facilities

Sources: ECB and Bloomberg

The chart shows the evolution of the Eurosystem current account (including minimum reserves) and the marginal lending/deposit facility (for overnight lending/deposits), and the volume of euro-denominated transactions in the interbank overnight market (EONIA volume).

4.6 Maturity profile of Banks' outstanding debt securities

Sources: Dealogic and ECB calculations

The maturity profile refers to the residual maturity of long-term and short-term debt securities issued by European banks. Banks' long-term debt includes corporate bonds, medium-term notes, covered bonds, asset-backed securities and mortgage-backed securities with a maturity of more than 12 months. Banks' short-term debt includes commercial papers, certificates of deposits and short-term notes with a maximum maturity of 12 months. Data are based on amounts outstanding at the end of the corresponding year or month.

4.7 Banks' long-term debt securities issuance

Sources: Dealogic DCM analytics

Debt issuance by EU public sector banks, excluding issuance of short term debt (i.e. with original maturity of below one year) and excluding ABS, MBS and agency related issuances.

4.8 Loan-to-deposit ratio

Sources: ECB

Data refers to the ratio between total loans and total deposits vis-à-vis the domestic and euro area non-financial private sector and vis-à-vis non-banks (excluding general government) from other jurisdictions.

5. Market risk

5.1 Global risk aversion indicator

Sources: Bloomberg, Bank of America Merrill Lynch, UBS, Commerzbank, and ECB calculations

The indicator is constructed as the first principal component of five currently available risk aversion indicators, namely Commerzbank Global Risk Perception, UBS FX Risk Index, Westpac's Risk Appetite Index, BoA ML Risk Aversion Indicator and Credit Suisse Risk Appetite Index.

5.2 Price/earnings ratio of equity indices

Sources: Thomson Reuters Datastream

The indices used are: EU non-financial corporations; Price-Earnings Ratio, EU main index; Price-Earnings Ratio, EU banking sector; Price-Earnings Ratio, EU insurance sector; Price-Earnings Ratio.

5.3 Equity indices

Sources: Bloomberg and Thomson Reuters

The equity indices displayed are EU Banks Datastream Index, EU Insurance Datastream Index, EU Building Materials and Fixtures Datastream Index and EU Diversified Industrials Datastream Index. Volatility is implied by at-the-money options observed in the market. The VSTOXX Index is based on a new methodology jointly developed by Deutsche Börse and Goldman Sachs to measure volatility in the euro area. VSTOXX is based on the EURO STOXX 50 Index options traded on Eurex. It measures implied volatility on options across all maturities.

5.4 Short-term interest rates – implied volatility

Source: Bloomberg

The indicators reflect the volatility of short-term interest rates implied by at-the-money swaptions prices observed in the market.

5.5 Long-term interest rates – implied volatility

Source: Bloomberg

The indicators reflect the volatility of long-term interest rates implied by at-the-money swaptions prices observed in the market.

5.6 Exchange rate volatility

Source: Bloomberg

The indicators reflect the volatility of foreign currency interest rates implied by at-the-money options prices observed in the market for the major currencies, based on a three-month maturity.

6. Profitability and solvency

6.1 Banking groups' profitability indicators

a. Return on equity

Source: EBA

Data refer to group consolidated data. The indicator is based on a sample of 56 large EU banks and the data are subject to changes in the composition of the sample over time. The indicator is based on the net income from FINREP 2 (total profit or loss after tax and discontinued operations) and on the total equity from FINREP 1.3. Quarterly flows are annualised.

b. Return on assets

Source: EBA

Data refer to group consolidated data. The indicator is based on a sample of 56 large EU banks and the data are subject to changes in the composition of the sample over time. The indicator is based on the net income from FINREP 2 (total profit or loss after tax and discontinued operations) and on the total assets (period averaged) from FINREP 1.1. Quarterly flows are annualised.

c. Cost-to-income ratio

Source: EBA

Data refer to group consolidated data. The indicator is based on a sample of 56 large EU banks and the data are subject to changes in the composition of the sample over time. The indicator is based on the costs as defined in FINREP 2 (template rows: Administration costs; Depreciation) and in the total operating income as defined in FINREP 2 (Total operating income: rows: Interest income; Interest expenses; Expenses on share capital repayable on demand; Dividend income; Fee and commission income; Fee and commission expenses;

Realised gains (losses) on financial assets and liabilities not measured at fair value through profit or loss, net; Gains (losses) on financial assets and liabilities held for trading, net; Gains (losses) on financial assets and liabilities designated at fair value through profit or loss, net; Gains (losses) from hedge accounting, net; Exchange differences, net; Gains (losses) on derecognition of assets other than held for sale, net; Other operating income; Other operating expenses). Quarterly data refer to cumulative flows over the corresponding year.

d. Net interest income-to-total operating income ratio

Source: EBA

Data refer to group consolidated data. The indicator is based on a sample of 56 large EU banks and the data are subject to changes in the composition of the sample over time. Net income as defined in FINREP 2 (template rows: Interest income; Interest expenses) and total operation income as above. Quarterly data refer to cumulative flows over the corresponding year.

6.2 Banking groups' solvency indicators

a. Ratio of Tier 1 capital to total assets, excluding intangible assets

Source: EBA

Data refer to group consolidated data. The indicator is based on a sample of 56 large EU banks and the data are subject to changes in the composition of the sample over time. Tier 1 capital is as defined in COREP template Capital Adequacy 1.1, and total assets excluding intangible assets as derived from FINREP 1.1. Quarterly COREP data from Q1 2014 onwards are based on the EBA's ITS on supervisory reporting. For further details on the main methodological aspects of the EBA's ITS, please refer to EBA's webpage (http://www.eba.europa.eu/regulation-and-policy/supervisory-reporting/implementing-technical-standard-on-supervisory-reporting).

b. Ratio of impaired loans and past due loans to total loans (>90 days)

Source: EBA

Data refer to group consolidated data. The indicator is based on a sample of 56 large EU banks and the data are subject to changes in the composition of the sample over time. Impaired loans as derived from FINREP 7 and FINREP 30B (template row: Loans and advances, column: Net carrying amount of the impaired assets; row: Loan and advances, specific allowances for individually assessed financial assets and specific allowances for collectively assessed financial assets, column: Closing balance) and total loans as defined in FINREP 1.1. and FINREP 30B (Total loans advances (template rows: Loans and advances AFS, Loans and receivables, HTM), rows: loans and advances, specific allowances for individually assessed financial assets and specific allowances for collectively assessed financial assets, allowances for incurred but not reported losses on financial assets, column: Closing balance).

6.3 CDS spread between senior and subordinated debt

Sources: Thomson Reuters Datastream, CMA and ECB calculations

Median of the difference between CDS spreads on senior and subordinated debt respectively for banks within the EBA sample.

6.4 Insurances groups' profitability indicators

a. Return on equity

Source: EIOPA

The indicator is based on the data available for a sample of 27 EU-headquartered insurance groups and is subject to changes in the composition of the sample over time. The return on equity is defined as the cumulated profit (loss) after tax and before dividends over the last four quarters, divided by the average available solvency capital over the last four quarters.

b. Combined ratio – non-life insurance

Source: EIOPA

The indicator is based on the data available for a sample of 25 EU-headquartered insurance groups and is subject to changes in the composition of the sample over time. The combined ratio is defined as net claims incurred and net operating expenses divided by net premiums earned. Semi-annual data refer to cumulative flows over the corresponding year.

c. Gross premiums written – life insurance

Source: EIOPA

The indicator is based on the data available for a sample of 25 EU-headquartered insurance groups and is subject to changes in the composition of the sample over time. The chart refers to the annual percentage change in the gross premiums written for life insurance business. Semi-annual data refer to cumulative flows over the corresponding year.

d. Gross premiums written – non-life insurance

Source: EIOPA

The indicator is based on the data available for a sample of 25 EU-headquartered insurance groups and is subject to changes in the composition of the sample over time. The chart refers to the annual percentage change in the gross premiums written for non-life insurance business. Semi-annual data refer to cumulative flows over the corresponding year.

6.5 Insurances groups' solvency indicators

a. Solvency ratio – life insurance

Source: EIOPA

The indicator is based on the data available for a sample of 25 EU-headquartered insurance groups and is subject to changes in the composition of the sample over time. The solvency ratio is defined as the available solvency capital divided by the required solvency capital for life insurance business.

b. Solvency ratio – non-life insurance

Source: EIOPA

The indicator is based on the data available for a sample of 25 EU-headquartered insurance groups and is subject to changes in the composition of the sample over time. The solvency ratio is defined as the available solvency capital divided by the required solvency capital for non-life insurance business.

6.6 Insurances groups' Retention ratio

Source: EIOPA

The indicator is based on the data available for a sample of 27 EU-headquartered insurance groups and is subject to changes in the composition of the sample over time. The retention ratio is defined as net premiums written divided by gross premiums written. Semi-annual data refer to cumulative flows over the corresponding year.