



Banc Ceannais na hÉireann  
Central Bank of Ireland

Eurosystem

# Systemic Risk Pack

February 2018

Content reflects data available on - or before - 9 February 2018

# Systemic Risk Pack

## February 2018

Both domestic and international experiences have demonstrated the damaging effects brought about by a build-up of systemic risks in financial systems. The collection and reporting of macro-prudential indicators facilitates the assessment of these risks and can help identify the emergence of vulnerabilities within the financial system. Systemic risk can build up from a myriad of sources via a variety of channels over time. As a result, the monitoring of systemic risk requires a multi-faceted approach encompassing a wide range of indicators.

As Ireland's macro-prudential authority, the Central Bank of Ireland (the Central Bank) is responsible for the monitoring of risks to financial stability and the implementation of policies to mitigate the impact of those risks on both the financial system and the real economy.<sup>1</sup> Intermediate objectives are necessary to monitor progress toward achieving these high-level goals. The intermediate objectives of macro-prudential policy are:

1. to mitigate and prevent excessive credit growth and leverage,
2. to mitigate and prevent excessive maturity mismatch and market illiquidity,
3. to limit direct and indirect exposure concentrations,
4. to reduce the potential for systemically important banks to adopt destabilising strategies and to mitigate the impact of such actions.

The Central Bank has developed a Systemic Risk Pack (SRP), which presents indicators and visualisation methods for monitoring systemic risk in the Irish financial system. It builds on existing work regarding the use of macro-prudential indicators in policy setting, as set out in [Ryan \(2017\)](#). This bi-annual publication is created in order to facilitate macro-prudential analysis and to focus policy maker discussion. It complements existing financial stability analysis by providing a comprehensive systemic perspective alongside the detailed approach provided in other publications.<sup>2</sup>

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<sup>1</sup> For more on the Central Bank's approach to macro-prudential policy see [A Macro-Prudential Policy Framework for Ireland](#).

<sup>2</sup> Such as that provided by the [Macro-Financial Review](#), the [SME Market Report](#) and the [Household Credit Market Report](#).

Each edition includes a set of summary heatmaps and a selection of noteworthy or topical charts for consideration. Explanation of indicators used is provided for each section in the form of a glossary and metadata table. The heatmaps aim to distil information and highlight areas of elevated risk by colour coding indicators in line with their deviation from levels associated with financial system stability (thresholds). Red and orange colours highlight indicators moving in a direction associated with a build-up of systemic instability. Darker green colours will generally be associated with subdued financial system activity or the materialisation of systemic risk. As a result, light green and light yellow shades should be more indicative of benign conditions. For further information on the construction of these heatmaps see [Ryan \(2017\)](#).

While the heatmaps provide a useful overview of the systemic risk landscape, they are also a very simple risk assessment tool. For example, they do not take into account dynamics in the broader financial system or real economy which will determine whether or not an indicator's level can be considered excessive or unstable. As such, a number of key indicators and indicators highlighted by the heatmaps are presented in chart form for further consideration in the subsequent sections.<sup>3</sup> It is also important to note that the SRP should not be seen as an automatic warning system or as a policy-setting tool in and of itself. Rather, the pack can inform policy maker judgement.

The indicators presented in this pack are drawn from the broad range of data available to the Central Bank. These include publically available data such as those found on the Central Bank's [website](#) and those of the [CSO](#) and [ECB](#), as well as commercially sourced data supplied by third parties and data reported by regulated entities.

The approach that has been taken to developing the risk pack makes it a very flexible tool and will allow for it to evolve over time, as new data sources become available, other relevant indicators are identified, and approaches to data visualisation evolve.

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<sup>3</sup> These sections may also be used to examine indicators, which are not compatible with the heatmap structure.

# Systemic Risk Heatmap

		>1.5 SDs below	>1.0 SDs below	>0.5 SDs below	Threshold	>0.5 SDs above	>1.0 SDs above	>1.5 SDs above	
Intermediate objective	Indicator	Threshold			Risk level	Latest observation	Latest observation date	6 month change	Annual change
Objective 1: Mitigate & prevent excessive credit growth and leverage	Aggregate credit and leverage	Standardised credit gap	Lower threshold for CCyB setting (BCBS 2010)			-78.7pps	Sep-17	-19.4 pps	-37.6 pps
		Private-sector credit growth	Historical average			-1.1%	Dec-17	0.8 pps	1.5 pps
		National credit-to-GNI* gap	Lower threshold for CCyB setting (BCBS 2010)			-80.4pps	Sep-17	3.6 pps	6.0 pps
		Ratio of total assets to total equity	Historical average (retail banks)			7.97	Sep-17	-0.36	-0.53
		Ratio of total assets to total equity	European average			8.86	Jun-17	-0.34	-1.21
	Asset prices	Residential property price growth	MIP threshold			12.2%	Sep-17	2.4 pps	4.1 pps
		Residential property price-to-rent ratio	Historical average			17.93	Sep-17	5.5%	5.6%
		Residential property price-to-income ratio	Historical average			4.21	Sep-17	5.5%	7.1%
		Residential property turnover	Zero			-1.3%	Sep-17	6.8 pps	7.3 pps
		Residential property turnover	European average			2.3%	Dec-16		0.1 pps
		Residential property stock / 1,000 adults	European average			428.2	Dec-16		-2.0%
		Residential property completions / stock	European average			0.7%	Dec-16		0.1 pps
		Growth in residential mortgage drawdowns	No threshold established			18.1%	Dec-17	2.9 pps	12.9 pps
		Commercial real estate price growth	Historical average			1.6%	Dec-17	-3.5 pps	-5.7 pps
		CRE price-to-rent index	Historical average			94.2	Dec-17	-1.9%	-2.2%
Objective 2: Prevent excessive maturity mismatch & market illiquidity	Sectoral credit and leverage	Res. real estate misalignment measure	Zero			-5.2%	Sep-17	0.2 pps	1.2 pps
		ISEQ 3 month MA QoQ growth	Historical average			3.0%	Feb-18	0.3 pps	-3.3 pps
		Total domestic credit - herfindahl	Historical average			0.5	Sep-17	1.6 pps	2.7 pps
		Household debt gap	Lower threshold for CCyB setting (BCBS 2010)			-47.2pps	Sep-17	0.8 pps	0.7 pps
		Household credit growth	Historical average			-1.5%	Dec-17	0.4 pps	1.0 pps
	Balance sheet mismatch and liquidity	Domestic NFC debt gap	Lower threshold for CCyB setting (BCBS 2010)			-33.2pps	Sep-17	2.7 pps	5.2 pps
		Domestic NFC credit growth	Historical average			0.1%	Dec-17	2.1 pps	3.0 pps
		Property related lending (% share of total)	Historical average of total			68.6%	Sep-17	0.7 pps	0.5 pps
		CRE related credit growth	Historical average			-6.8%	Sep-17	4.1 pps	4.6 pps
		Residential fixed cap. formation/GNI*	European average			2.6%	Sep-17	0.6 pps	0.7 pps
		Loan-to-deposit ratio	Historical average			93.8	Dec-17	0.4%	1.1%
		Non-deposit funding	European average			47.3%	Dec-16		-3.5 pps
		Share of funding from ESCB	Pre-crisis average (pre-2008)			1.4%	Dec-17	0.0 pps	0.1 pps
		Overnight interbank borrowing volume 1M avg.	No threshold established			0.0	Jun-17	0.0%	-100.0%
		Overnight interbank borrowing int rate 1M avg.	No threshold established			-0.4%	Nov-16	0.0 pps	-0.3 pps
Overnight interbank borrowing spread 1M avg.	No threshold established			0.0%	Nov-16	0.0 pps	-0.1 pps		
Objective 3: Limit direct and indirect exposure concentration	Market conditions	Liquidity coverage ratio	European average			169.5%	Dec-16		-3.8 pps
		EURIBOR OIS 3M Spread - 1 quarter max (bps)	Historical average			-0.7 bps	Feb-18	-1.3 bps	0.9 bps
		Irish composite stress index - 1 quarter max	Historical average			0.22	Dec-17	280.8%	198.0%
		CISS euro area - 1 quarter max	Historical average			0.06	Dec-17	-24.9%	-56.1%
		Euro NFC spreads - 1 quarter avg (bps)	Historical average			-9.6 bps	Feb-18	2.8 bps	-23.0 bps
	Large exposures	Euro financials spreads - 1 quarter avg (bps)	Historical average			-7.8 bps	Feb-18	7.9 bps	-20.2 bps
		Euro gov spreads - 1 quarter avg (bps)	Historical average			-7.7 bps	Feb-18	10.1 bps	-19.8 bps
		Total LE / own funds - All banks	European average			317.7%	Sep-17	-11.5 pps	-56.9 pps
		Total LE / own funds - Retail banks	European average			219.1%	Sep-17	-20.9 pps	-26.8 pps
		10 largest LE / own funds - All banks	No threshold established			104.0%	Sep-17	-6.0 pps	-9.0 pps
		10 largest LE / own funds - Retail banks	No threshold established			134.2%	Sep-17	-8.8 pps	-14.2 pps
		LE to NFCs/ own funds - All banks	No threshold established			15.6%	Sep-17	2.5 pps	-1.7 pps
		LE to NFCs/ own funds - Retail banks	No threshold established			6.0%	Sep-17	-2.5 pps	-6.2 pps
		LE to credit inst./own funds - All banks	No threshold established			98.5%	Sep-17	-9.8 pps	-35.4 pps
		LE between dom. retail banks / own funds	No threshold established			2.8%	Sep-17	-0.5 pps	-0.3 pps
Objective 4: Reduce the potential for systemically important banks to adopt destabilising strategies and to mitigate the impact of such actions	Sectoral concentration & interconnectedness	LE between dom. retail banks - total EURbn	No threshold established			€0.8 bn	Sep-17	-13.5%	-10.0%
		Total domestic credit - herfindahl	Historical average			0.5	Sep-17	1.6 pps	2.7 pps
		Property related lending (% share of total)	Historical average of total			68.6%	Sep-17	0.7 pps	0.5 pps
		Interbank loans/total financial assets	European average			5.3%	Dec-16		0.1 pps
		% funding from interbank deposits	European average			9.8%	Dec-16		-3.4 pps
	Size	Static delta coVar	Historical average			0.07	Dec-17	64.0%	-48.0%
		Domestic bank assets-to-GNI*	European average			110.6%	Sep-17	-20.1 pps	-33.4 pps
		Total O-SII assets to GNI*	European average			169.4%	Sep-17		-42.3 pps
		LE to credit institutions - All banks	No threshold established			€53.5 bn	Sep-17	-11.2%	-26.5%
		LE to credit institutions - Retail banks	No threshold established			€13.4 bn	Sep-17	-7.6%	-24.2%
		LE to Irish gov - All banks	No threshold established			€38.8 bn	Sep-17	-6.9%	-15.4%
		LE to Irish gov - Retail banks	No threshold established			€29.2 bn	Sep-17	-10.6%	-16.9%
		Interbank loans/total financial assets	European average			5.3%	Dec-16		0.1 pps
		% funding from interbank deposits	European average			9.8%	Dec-16		-3.4 pps
		Concentration	Market share top 5 inst: priv sector lending	Post-crisis average			88.1%	Dec-17	1.0 pps
Market share top 5 inst: priv sector deposits	Post-crisis average				82.4%	Dec-17	1.7 pps	2.1 pps	
Market share top 5 inst: NFC lending	Post-crisis average				89.7%	Dec-17	-0.2 pps	0.0 pps	
Market share top 5 inst: SME lending	Post-crisis average				97.4%	Sep-17	0.3 pps	-0.3 pps	
Market share top 5 inst: HI lending	Post-crisis average				80.2%	Dec-17	0.8 pps	0.9 pps	
Market share top 5 inst: OFI lending	Post-crisis average				81.2%	Dec-17	0.4 pps	0.4 pps	
Share of the 5 largest inst: total assets	European average				44.3%	Dec-16		-1.7 pps	
Total LE / own funds - All banks	European average				317.7%	Sep-17	-11.5 pps	-56.9 pps	
Complexity	Derivatives (notional value) to total assets		European average			117.1%	Dec-16		5.0 pps
	Share non-loan assets		European average			54.4%	Dec-16		1.8 pps
	Share non-interest income	European average			42.8%	Dec-16		14.8 pps	

**Note:** A grey fill is used where heatmap colour coding cannot be constructed or data are not available. The latter may be due to the length of a time series or its reporting frequency (e.g. six monthly growth rates cannot be calculated for annual series). The six month and annual change columns are coloured green when an indicator is decreasing and red when it is increasing. **For more details on individual indicators see Heatmap Glossary on page 9.**

The primary focus of the Systemic Risk Pack is to examine the build-up of risks to the Irish financial system and its participants. For banking sector indicators, the sample of banks focuses on those institutions that interact with the Irish economy, unless otherwise specified. However, due to the nature of the indicator and the availability of data, banking samples may vary between indicators. For example, data on credit exposures are drawn from published resident statistics data available on the Central Bank's website and include branches of foreign institutions active in Ireland. Indicators based on supervisory data reflect banks that are licenced by the Central Bank of Ireland and are compiled for Irish retail banks i.e., Allied Irish Banks, Public Limited Company, KBC Bank Ireland plc, Permanent TSB plc, the Governor and Company of the Bank of Ireland and Ulster Bank Ireland Designated Activity Company.



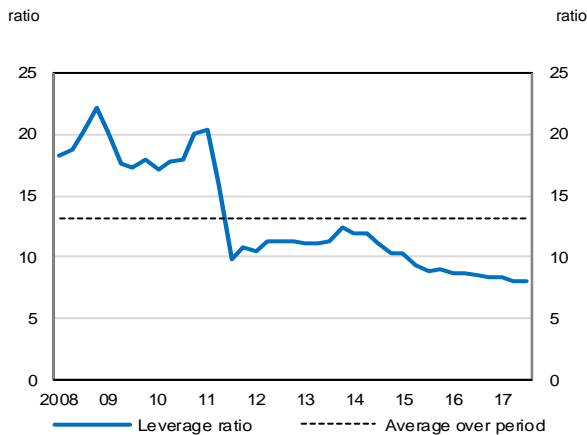
## OBJECTIVE 14:

### (to mitigate and prevent excessive credit growth and leverage)

*Irish banks' ratio of total assets to total equity remains below its historic average, which indicates that the institutions examined are less leveraged and have a higher likelihood of withstanding negative shocks to their balance sheets.*

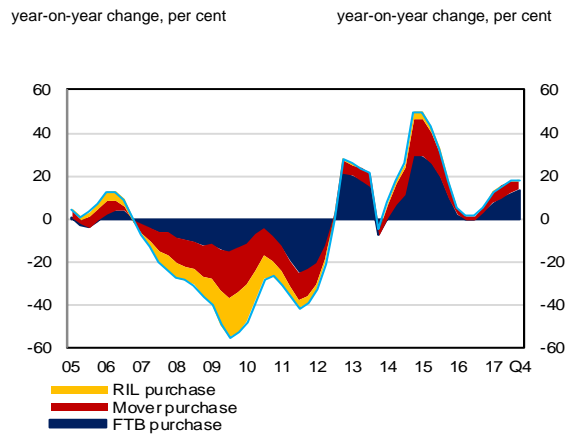
*Mortgage market activity has continued to pick-up in recent quarters, driven mainly by first-time buyers.*

**Chart 1: Ratio of total assets to total equity: Irish retail banks**



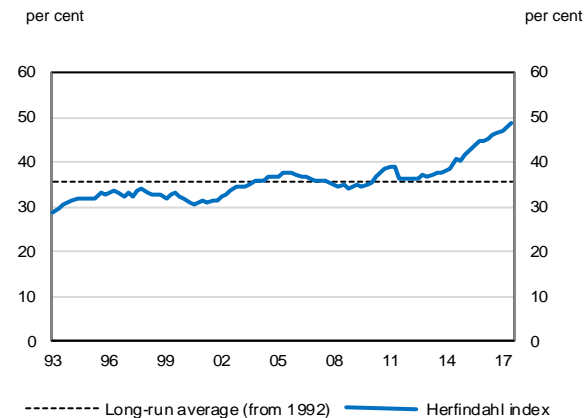
Source: Central Bank of Ireland  
 Note: The ratio of total assets to total equity is a financial indicator of leverage that assesses the ability of a company to meet its financial obligations. This ratio is calculated as the value of total assets relative to the value of total equity. Latest observation. 2017Q3

**Chart 2: Annual change in number of mortgages drawn down, by buyer category**



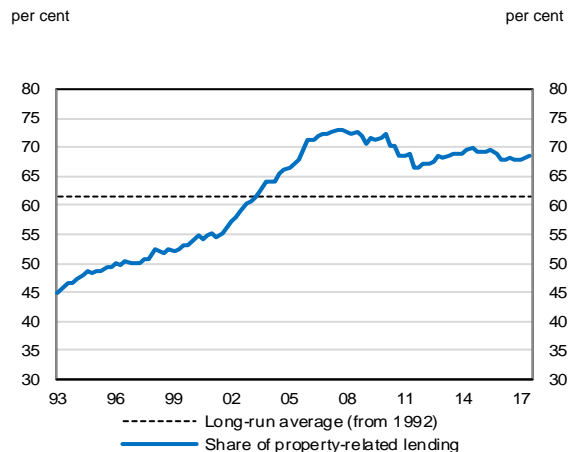
Source: Banking and Payments Federation Ireland  
 Note: Calculations based on rolling 4 quarter totals of the number of mortgages drawn down for housing transactions. FTB = first-time buyer, RIL = residential investment lettings. Latest observation. 2017Q4

**Chart 3: Total domestic credit - herfindhal index**



Source: Central Bank of Ireland  
 Note: A Herfindahl index is a measure of concentration. In the context of sectoral lending, an increasing index suggests that lending is becoming more concentrated in specific types of lending. Data relate to Irish resident banks and exclude exposures to the financial sector. Latest observation. 2017Q3.

**Chart 4: Property-related lending as a share of total lending**



Source: Central Bank of Ireland  
 Note: Property-related lending includes loans for house purchases and loans for commercial real estate and construction. Data relate to Irish resident banks. Latest observation. 2017Q3

*Outstanding lending to Irish residents has become increasingly concentrated in recent years. The increase in concentration reflects the large share of outstanding credit accounted for by households. While outstanding household credit has declined in recent years, other categories of lending have generally declined at a faster rate.*

*Property-related lending continues to account for almost 70 per cent of Irish banks loan book, highlighting a concentration risk amongst Irish resident banks.*

<sup>4</sup> For Metadata see Chart Metadata on page 13

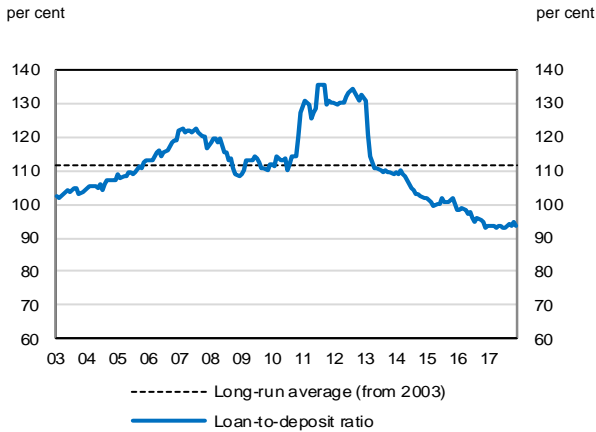
## OBJECTIVE 2:

### (to prevent excessive maturity mismatch and market illiquidity)

The loan-to-deposit ratio is an indicator of a bank's liquidity. Notwithstanding a slight increase in recent quarters, the ratio of loans to deposits on Irish credit institutions' balance sheet remains below the historic average.

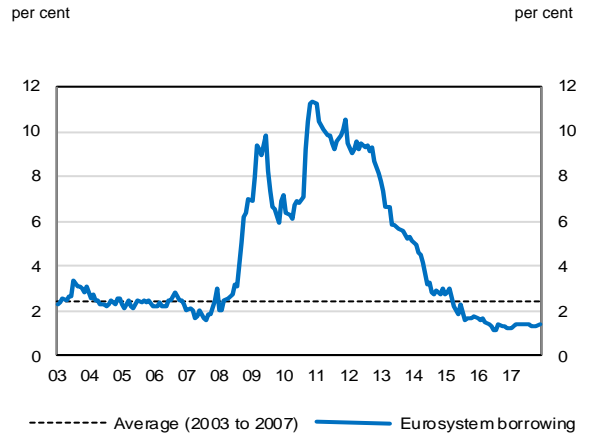
Irish credit institutions' reliance on Eurosystem funding is significantly below the peaks experienced in 2011 and close to historic lows.

**Chart 1: Irish credit institutions' loan-to-deposit ratio**



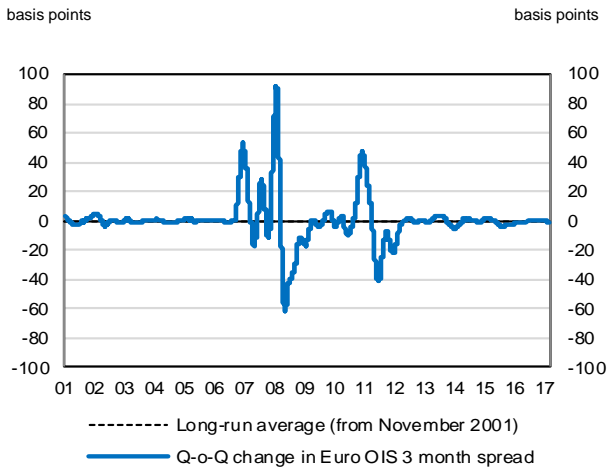
Source: Central Bank of Ireland  
 Note: Data take account of all loans to and deposit from Irish, Euro Area, and other Non-Residents (see: Table A.4.1 in the Central Bank Credit Money and Banking Statistics). The composition of credit institutions changes through the sample given the entry/exit of banks from the Irish market. Credit unions are included from January 2009. Prior to December 2010 loans were reported net of impairment provisions. After this date, loans are reported gross of impairment provisions. Latest observation. December 2017

**Chart 2: Share of Irish credit institutions' funding from the Eurosystem**



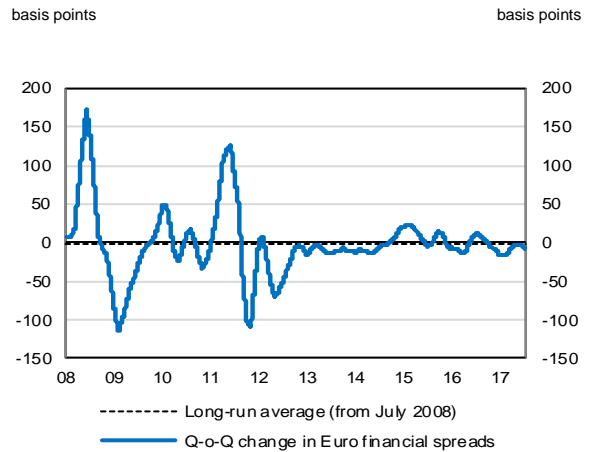
Source: Central Bank of Ireland  
 Note: Latest observation. December 2017

**Chart 3: Quarterly change in Euro OIS 3 month spread**



Source: Bloomberg  
 Note: Quarterly change based of 3 month moving average  
 Latest observation. February 09 2018

**Chart 4: Quarterly change in spreads of debt securities issued by financial institutions**



Source: Bloomberg  
 Note: Quarterly change based of 3 month moving average  
 Latest observation. February 09 2018

Market risk, as measured by the change in banks' spreads, are currently low in comparison with previous periods associated with elevated systemic risk.

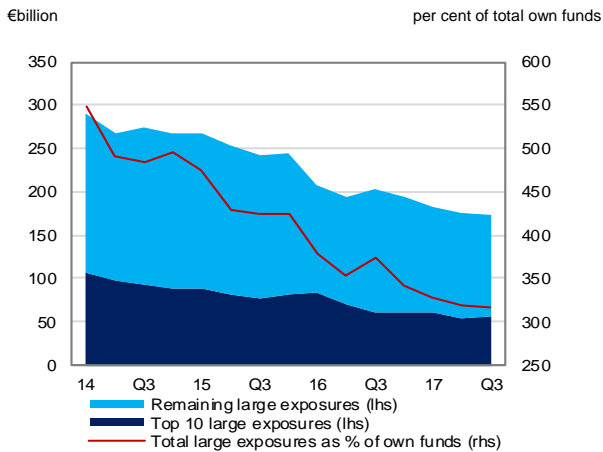
Similarly, volatility in debt markets appears muted relative to the 2008-2012 experience.

# OBJECTIVE 3:

## (to limit direct and indirect exposure concentrations)

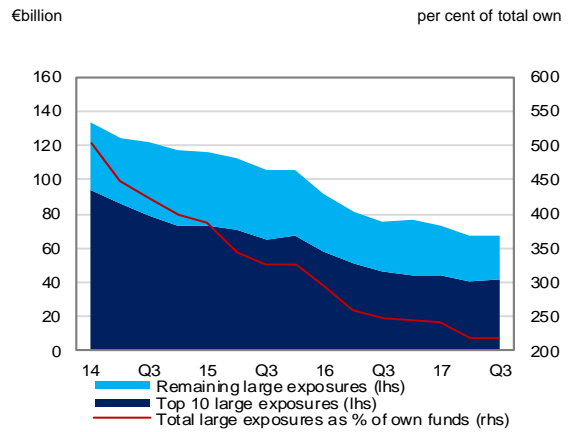
Regular analysis of large exposure data facilitates the assessment of concentration risk. Concentration at an individual exposure level has decreased over the period for which data are available. However, among Irish retail banks, the Top-10 large exposures account for a greater share of total large exposures, vis-a-vis all Irish banks.

**Chart 1: Total large exposures – All Irish banks**



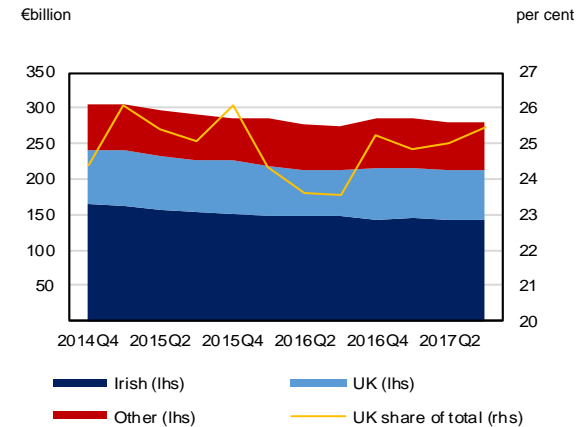
Source: Central Bank of Ireland  
 Note: A large exposure is defined as an exposure that is 10 per cent or more of a bank's eligible capital base. Banks whose parent institution is authorised in Ireland (Irish headquartered banks) also report any exposure, which is greater than €300 million. These exposures consist largely of loans but also include derivatives, guarantees and debt or equity holdings. Top 10 large exposures exclude intragroup exposures. Latest observation: 2017Q3

**Chart 2: Total large exposures – Irish retail banks**



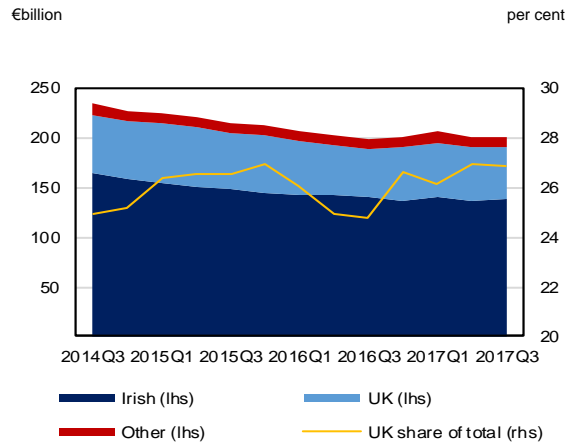
Source: Central Bank of Ireland  
 Note: A large exposure is defined as an exposure that is 10 per cent or more of a bank's eligible capital base. Banks whose parent institution is authorised in Ireland (Irish headquartered banks) also report any exposure, which is greater than €300 million. These exposures consist largely of loans but also include derivatives, guarantees and debt or equity holdings. Top 10 large exposures exclude intragroup exposures. Last observation: 2017Q3

**Chart 3: Breakdown of Irish banks' credit exposures by geography**



Source: Central Bank of Ireland  
 Note: For a consistent sample of credit institutions that submit a geographical breakdown of loans and advances. Last observation 2017Q3.

**Chart 4: Breakdown of Irish retail banks' credit exposures by geography**



Source: Central Bank of Ireland  
 Note: For a consistent sample of retail credit institutions that submit a geographical breakdown of loans and advances. Last observation: 2017Q3.

*Irish banks' credit exposure to the UK remains considerable accounting for more than a quarter of total credit exposures.*

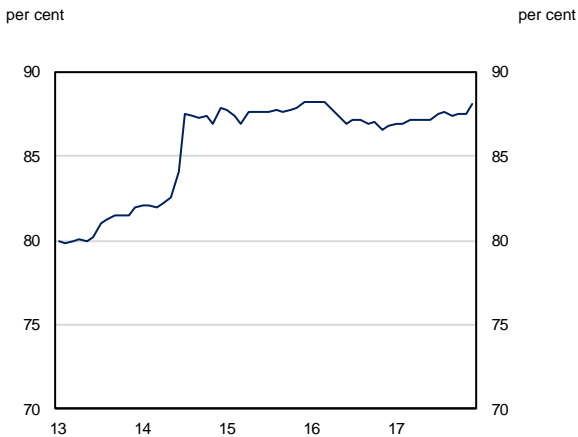


## OBJECTIVE 4:

**(to reduce the potential for systemically important banks to adopt destabilising strategies and to mitigate the impact of such actions)**

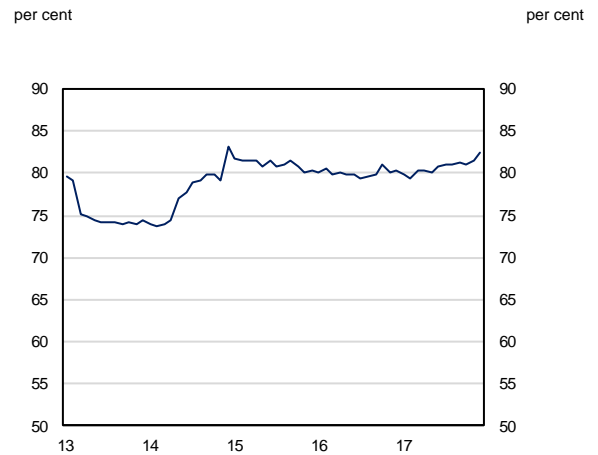
*Concentration within loan and deposit-taking markets has remained broadly unchanged over the last 3 years. This followed a period that saw the withdrawal of a number of credit institutions from the Irish market.*

**Chart 1: Irish private-sector loans - share of 5 largest credit institutions**



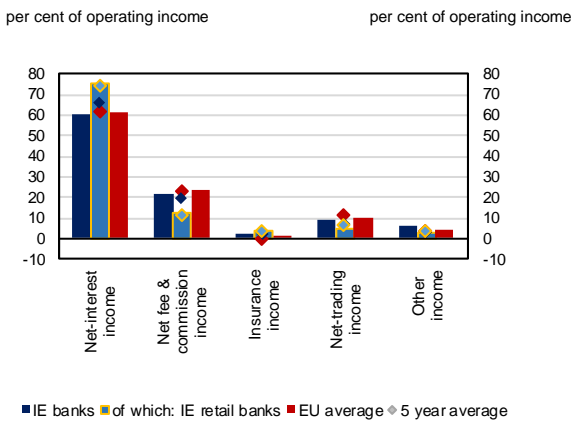
Source: Central Bank of Ireland, Resident statistics  
 Note: Adjusted for group structure and relate to assets held with Irish counterparts only. Credit unions are treated as a single entity. Last observation: December 2017.

**Chart 2: Irish private-sector deposits - share of 5 largest institutions**



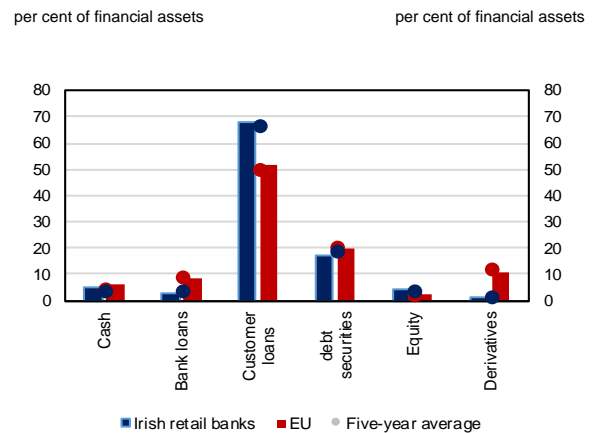
Source: Central Bank of Ireland, Resident statistics  
 Note: Adjusted for group structure and relate to liabilities held with Irish counterparts only. Credit unions are treated as a single entity. Last observation: December 2017.

**Chart 3: Breakdown of Irish banks' operating income**



Source: SNL Financial and Central Bank of Ireland calculations  
 Note: Sample of banks drawn from retail banks operating within the State as well as banks identified as O-SII banks across Europe and credit institutions that have participated in recent EBA stress-testing exercises. Last observation: 2016.

**Chart 4: International comparison of Irish retail banks' financial assets**



Source: SNL Financial and Central Bank of Ireland calculations  
 Note: Sample of banks drawn from retail banks operating within the State as well as banks identified as O-SII banks across Europe and credit institutions that have participated in recent EBA stress-testing exercises. Last observation: 2016.

*Whereas the operational activities of the Irish banking system are quite similar those of the wider European banking system, the Irish retail banks operate a more traditional banking model, with the majority of income derived from interest-related activities and a larger share of assets accounted for by customer loans.*

## Heatmap glossary<sup>5</sup>

### Objective 1

<b>Credit-to-GDP gap</b>	The credit-to-GDP gap is defined as the difference between the current level of the credit-to-GDP ratio and its estimated trend level. The trend level of the credit-to-GDP ratio is calculated using a recursive Hodrick-Prescott (HP) filter with a smoothing parameter of 400,000. In all cases, credit refers to private sector non-financial credit and excludes lending to governments and financial credit. The indicator is widely used in Countercyclical Capital Buffer (CCyB) setting for the identification of periods of excess credit growth.
<b>Standard credit-to-GDP gap</b>	The standard credit-to-GDP gap is calculated in line with ESRB Recommendation 2014/1. It uses a broad measure of credit, including credit from any source to resident households and NFCs. A standard GDP measure is used.
<b>National credit</b>	The national specific credit measure is discussed in <a href="#">Creedon and O'Brien (2016)</a> and uses credit from resident banks to resident non-financial corporations (NFCs) as a proxy for domestic NFC credit. This removes the substantial MNC driven component of the standard measure and produces one which is less volatile and more directly relevant to the domestic economy.
<b>GNI*</b>	GNI* is produced by the CSO to more accurately reflect activity in the domestic economy by excluding significant effects of globalisation that disproportionately affect GDP figures. The series used to construct the indicators in the heatmap is interpolated using Modified Domestic Demand (as calculated by the CSO) and extended back to 1980 using changes in the standard GDP measure. GNI* is used throughout the heatmap in place of Irish GDP. In calculating peer group averages, standard GDP measures are used for other countries.
<b>Private sector credit growth</b>	Private sector credit refers to credit to households and bank credit to NFCs.
<b>Ratio of total assets to total equity – European Comparison</b>	The ratio of total assets to total equity is a financial indicator of leverage that assesses the ability of a company to meet its financial obligations. This ratio is calculated as the value of total assets relative to the value of total equity. Total equity is the value left in the company after subtracting total liabilities from total assets. The data are sourced from the Consolidated Banking Data available on the European Central Bank Statistical Data Warehouse. The data are specific to domestic institutions whose ultimate parent entity is resident in the country specified.
<b>Ratio of total assets to total equity: Irish retail banks</b>	The ratio of total assets to total equity is a financial indicator of leverage that assesses the ability of a company to meet its financial obligations. This ratio is calculated as the value of total assets relative to the value of total equity. The sample of banks are the five main retail banks.
<b>Residential property price growth</b>	This indicator measures the annual growth rate in residential property prices as per the CSO's Residential property price indicator. Threshold as per the EU's Macroeconomic Imbalance Procedure ( <a href="#">see here for more information</a> ).
<b>Residential property price-to-rent ratio</b>	The house price-to-rent ratio is a common method of assessing residential property values. Typically, it is calculated as the ratio of average house prices to average annual rents for a given location. At a basic level, the house price-to-rent ratio indicates whether house prices are rising faster than rents or vice versa.
<b>Residential property price-to-income ratio</b>	The house price-to-income ratio is a basic measure of housing affordability in a given location. It is generally expressed as the ratio of average house prices to average annual disposable income of a purchasing couple. A rise in the ratio signifies a reduction in housing affordability and vice versa.
<b>Residential real estate misalignment measure</b>	This residential real estate price misalignment indicator is based on the average value of 3 econometric models used as part of a suite of indicators to gauge the extent of house price value misalignment. Estimates of misalignment are calculated using simple reduced form models from the empirical housing literature to identify a fundamental house price series against which actual developments can be benchmarked. Model 1 includes disposable income, the level of housing stock per capita and average mortgage interest rates, Model 2 includes data on employment, the share of the population in the household formation cohort and average mortgage

<sup>5</sup> Indicators appear in the glossary in the same order as they appear in the heatmaps. Indicators which appear twice in the heatmaps are included once under the first objective where they appear.

	interest rates and Model 3 is based on an annual measure of mortgage affordability and the level of housing stock per capita. See <a href="#">Kennedy, O'Brien &amp; Woods (2016)</a> for more detail.
<b>Residential property turnover</b>	The rate of residential property turnover is calculated by expressing the number of annual residential property transactions as a percentage of the total housing stock. It is a simple measure of housing market activity.
<b>Residential property stock / 1,000 adults</b>	This indicator monitors the number of properties in the country per 1,000 population and is another useful housing activity indicator, which provides information on whether the level of residential construction is adequate in light of population, migration and demographic trends.
<b>Residential property completions / stock</b>	The rate of residential property completions as a share of housing stock is an indicator of the level of residential building activity.
<b>Growth in residential mortgage drawdowns</b>	This indicator measures the annual change in the number of residential mortgages drawn down (on a rolling 4 quarter total basis) as per Banking and Payments Federation Ireland data. It is a simple measure of mortgage market activity.
<b>Commercial real estate price growth</b>	This indicator measures the annual growth rate in commercial property capital values as per MSCI/IPD's Irish commercial property capital value index.
<b>Commercial real estate price-to-rent index</b>	The commercial real estate (CRE) price-to-rent index is a relatively simplistic method of assessing commercial property values. In this case it is calculated as the ratio of the commercial property capital values index to the commercial property rental values index. At a basic level, this index indicates whether CRE capital values are rising faster than CRE rents.
<b>Commercial real estate price misalignment measure</b>	This indicator presents the average deviation of 5 commercial property ratio indices - CRE capital values to CRE rents, CRE yields, CRE capital values to GNI*, CRE capital values to consumption and CRE capital values to employment - from their individual long-run averages. See Box 6 in FSR, ECB, December 2011.
<b>ISEQ three-month moving average quarter-on-quarter growth rate</b>	This indicator is a measure of Irish equity returns. A three-month moving average is applied so that the indicator reflects developments across the full quarter as opposed to just its final day.
<b>Herfindahl index</b>	A Herfindahl index is a measure of concentration. In the context of sectoral lending, an increasing index suggests that credit exposures are becoming more concentrated in specific types of lending. An increase in lending concentration can increase the risk of a sector specific event propagating through the banking sector.
<b>Household/NFC gap</b>	The sectoral (household and domestic NFC) credit gaps are constructed in the same way as the national credit-to-GNI* gap. They examine the deviation of the ratio of credit to a given sector to GNI* from its estimated trend level.
<b>Property-related lending</b>	The indicator measures the share of property-related lending advanced to the non-financial private-sector Irish resident. Property-related credit includes construction, real estate, land and development activities and loans for house purchase. Data are taken from the Central Bank of Ireland's A.1 and A14 Credit and Banking Statistics. An increase in lending concentration can increase the risk of a sector specific event propagating through the banking sector.
<b>Residential fixed capital formation</b>	Gross fixed capital formation is a measure of gross net investment in fixed capital assets by enterprises, households and government in the domestic economy within a period. This element of GFCF tracks the construction of residential housing and is another indicator of housing market/residential construction activity
<b>Objective 2</b>	
<b>Loan-to-Deposit Ratio</b>	A Loan-to-Deposit ratio is used to assess a bank's liquidity by calculating the total outstanding loans relative to deposits received. An increasing ratio implies increased reliance on non-deposit funding, and this may lead to an increase in liquidity risk during a stressed event. The bank then may not have sufficient liquidity at hand to meet unforeseen requirements.
<b>Non-deposit funding</b>	Non-deposit funding is funding sourced from sources other than customer deposits. These generally include: debt-securities issued, Interbank borrowing (which may include central bank support) and other types of financial liabilities.

<b>Funding from ESCB</b>	ESCB or European system of central banks refers to the collection of central banks that along with the ECB form part of the Eurosystem. A higher share of funding from the ESCB suggests that banks' funding positions are strained.
<b>Overnight interbank borrowing</b>	Overnight interbank borrowing by Irish banks is examined using Irish payments system data (TARGET2-IE). Excess reliance on this more volatile type of funding may reduce banks' resilience to shocks. The heatmap provides the one-month average volume, interest rate and interest rate spreads over the ECB deposit facility rate for this type of lending. Limited borrowing is occurring at present so interest rates and spreads are provided for the most recent available observations.
<b>Liquidity coverage ratio</b>	The liquidity coverage ratio is a supervisory requirement for banks operating in the EU. It requires institutions to hold a minimum level of qualifying liquid assets in order to meet net-cash outflows in a stressed environment. By January 2018, EU banks are required to have an LCR in excess of 100 per cent. The higher the number the more resilient an institution is likely to be in the event of a stressed situation. As a result observations below the EU average will be coloured green in the heatmaps.
<b>Euribor OIS 3 month spread</b>	Is the spread between the Euro interbank offer rate (the benchmark rate of the large euro money market) and the euro overnight indexed swap. The spread between these two interest rates is considered a key measure of credit risk in the banking system.
<b>Irish Composite Stress Index (ICSI)</b>	The ICSI presents a coincident measure of systemic risk conditions in financial markets for Ireland. The indicator ranges from 0 to 1. See Box: 5 "Indicators of systemic stress and financial conditions" from <a href="#">MFR 2016:I</a> for further details.
<b>Euro composite indicator of systemic stress (CISS)</b>	Developed by <a href="#">Hollo et al (2012)</a> the indicator uses modern portfolio theory to summarise stress across five market-specific sub-indices into a contemporaneous measure of systemic stress. The indicator of systemic stress ranges from 0 to 1. Country-specific indices are available via the ECB's Statistical Data Warehouse.
<b>Euro NFC spreads</b>	This indicator (the Barclays Euro Aggregate Corporate Excluding Financials Average Option Adjusted Spread) measures the spread of NFC fixed income securities over the risk free rate (adjusted to take account of the embedded option) and can be used to measure stress in the market for these securities. A three-month moving average is applied so that the indicator reflects developments across the full quarter as opposed to just its final day.
<b>Euro financial spreads</b>	This indicator (the Barclays Euro Corporate Financials Senior Average Option Adjusted Spread), measures the spread of senior fixed income securities issued by financial institutions over the risk free rate (adjusted to take account of the embedded option) and can be used to measure stress in the market for these securities. A three-month moving average is applied so that the indicator reflects developments across the full quarter as opposed to just its final day.
<b>Euro government spreads</b>	This indicator (the Barclays EuroAgg Government Average Option Adjusted Spread), measures the spread of sovereign fixed income securities over the risk-free rate (adjusted to take account of the embedded option) and can be used to measure stress in the market for these securities. A three-month moving average is applied so that the indicator reflects developments across the full quarter as opposed to just its final day.

### Objective 3

<b>Large exposure (LE)</b>	A large exposure is defined as an exposure that is 10 per cent or more of a bank's eligible capital base. Banks whose parent institution is licenced in Ireland (Irish headquartered banks) also report any exposures that are greater than €300 million. These exposures consist largely of loans but also include derivatives, guarantees and debt or equity holdings. Large exposure indicators are used throughout the SRP to examine exposure concentration at an individual exposure level and to examine interlinkages between Irish retail banks.
<b>Own funds</b>	Own funds is a broad measure of bank capital calculated as the sum of Tier 1 and Tier 2 capital. It reflects an institution's ability to absorb losses in a going or in a gone concern situation.
<b>Retail banks</b>	Retail banks are i.e., Allied Irish Banks plc, KBC Bank Ireland plc, Permanent TSB plc, the Governor and Company of the Bank of Ireland and Ulster Bank Ireland Designated Activity Company.
<b>All banks</b>	Large exposure indicators aiming to examine both domestic and internationally focussed banks operating in Ireland use data from all institutions licenced in Ireland.
<b>Interbank lending</b>	Refers to loans advanced by one bank to another. An increase in interbank lending can increase interconnectedness and potentially strengthen the channel through which risks are transmitted.

<b>Interbank deposits</b>	Deposits sourced from financial institutions and in some instances central banks. Interbank deposits tend to be more volatile in nature than other forms of funding. A higher reliance on interbank deposits may lead to an increase in liquidity risk during a stressed event.
<b>Static Delta CoVar</b>	Delta CoVaR measures the percentage change in the 5% value-at-risk of the financial system (represented by the Stoxx 600 Banks Index) that takes place when the Irish banking system experiences a large financial shock. Thus, the systemic impact of a shock involving Irish banks is quantifiable at the European financial system level. The ISEQ Financial Index is treated as a single institution. A Delta CoVaR value of .07 is interpreted as representing a 7% shift to the left of the conditional value-at-risk (with 95% certainty) of the financial system when the Irish Financial Services sector has moved from experiencing median returns to a threshold breach of its own value-at-risk threshold measured over the course of the rolling window. Returns are calculated as weekly growth rates of the relevant indices based upon adjusted closing prices.
<b>Objective 4</b>	
<b>O-SII</b>	Other systemically important institutions (O-SIIs) are institutions that, due to their systemic importance, are more likely to create risks to financial stability. Whilst maximising private benefits through rational decisions, these institutions may bring negative externalities into the system and contribute to market distortions
<b>Domestic bank assets-to-GNI*</b>	This indicator highlights the importance of the 5 Irish domestic banks relative to the domestic economy. The higher the ratio, the greater the potential negative spillover effects to the domestic economy should an institution within this group fail. The ratio is calculated using GDP for countries other than Ireland.
<b>Total O-SII assets-to-GNI*</b>	This indicator highlights the importance of the O-SII institutions relative to the domestic economy. The higher the ratio, the greater the potential negative spillover effects to the domestic economy should an institution within this group fail. The ratio is calculated using GDP for countries other than Ireland.
<b>Market share top 5 institutions</b>	These indicators measure the level of concentration in certain lending and deposit categories. A higher number implies that the market is more concentrated. An increase in lending concentration can increase the sensitivity of the Irish economy to certain banking entities. The underlying data are taken from resident offices of banks operating in Ireland. Individual institutions are grouped according to their ultimate parent i.e., branches and subsidiaries are combined where they are part of a wider financial group. Credit unions are treated as a single group. The sectors examined are total-private sector lending to Irish resident, loans to Irish non-financial corporates (NFC), Loans to small and medium size enterprises (SME), loans to households (HH), loans to other financial institutions, insurance corporations and pension funds (OFI), as well as private-sector deposits from Irish residents.
<b>Share of five largest inst: total assets indicator</b>	This indicator provides a European comparison of banking sector concentration. A higher number implies that the market is more concentrated. The data are unconsolidated data collected by the ECB. Unlike the market share indicators, the international data does not control for banking group structures. However, Chart 1 of Objective 4 shows the impact of controlling for banking groups structures.
<b>Derivatives (notional value)</b>	The notional value of derivatives is the contract value, which are used to price payments on that derivative. A larger amount, all other things being equal, would suggest that traditional banking activities such as retail banking is a smaller share of banks business.
<b>Non-loan assets</b>	Non-loan assets refer to financial assets other than customer loans. These include holdings of debt securities, interbank lending and other types of financial assets banks may hold. A larger amount, all other things being equal, would suggest that traditional banking activities such as retail banking is a smaller share of banks business.
<b>Non-interest income</b>	Non-interest income refers to income generated from sources other than interest-earning assets. These may include fee and commission income, trading income and income sourced from other activities. A larger amount, all other things being equal, would suggest that traditional banking activities such as retail banking is a smaller share of banks business.

## Chart Metadata

Objective 1				
Indicator	Notes	Source	Threshold	Last Observation
<b>Ratio of total assets to total equity: Irish retail banks</b>	The ratio of total assets to total equity is a financial indicator of leverage that assesses the ability of a company to meet its financial obligations. This ratio is calculated as the value of total assets relative to the value of total equity.	Central Bank of Ireland calculations	Historical Average	2017Q3
<b>Annual change in number of mortgages drawn down, by buyer category</b>	This chart presents the year-on-year change in the rolling four-quarter total of the volume of mortgage draw-downs for housing transactions. The contribution of the main 3 buyer categories, first-time, buyers, movers and residential investment lettings, to the overall figure is also included.	Banking and Payments Federation Ireland	N/A	2017Q3
<b>Total domestic credit herfindahl index</b>	Latest observation - 2017Q3. The Herfindahl index is a measure of concentration and is calculated by squaring the share of total lending, (ex. financial intermediation), extended to the various subcategories then summing the results. A high or increasing number implies the aggregate Irish loan book is relatively more concentrated than previous reporting periods. An increase in lending concentration increases the risk of a sector specific event propagating through the banking sector. Ten categories of NFC and household lending are included in the calculations ( <i>specifically: "primary industries", "manufacturing", "electricity, gas &amp; water", "wholesale/retail, trade &amp; repairs", "hotels &amp; restaurants", "real estate &amp; construction", "business &amp; admin.", "education, community &amp; social work" "transport, storage &amp; communications" and "household" lending i.e. mortgage and consumer finance</i> ) - exposures to the financial sector are excluded. Data are taken from the Central Bank of Ireland's Table A. 1 and A. 14 credit and banking statistics. For the purpose of the indicator total domestic credit excludes credit advanced to other financial institutions.	Central Bank of Ireland calculations	Historical Average	2017Q3
<b>Property-related lending as a share of total lending</b>	Indicator is a measure of the share of total outstanding loans by Irish retail banks to the property sector (including lending for house purchases, commercial real estate and construction) on a quarterly basis.	Central Bank of Ireland calculations	Historical Average	2017Q3
Objective 2				
<b>Irish domestic market credit institution's banks' loan-to-deposit ratio</b>	Indicator is a measure of total loans to and deposits from Irish, Euro Area, and other Non-Residents. Data are available from Table A.4.1 of the Central Bank of Ireland Credit Money and Banking Statistics. The composition of credit institutions changes through the sample given the entry/exit of banks from the Irish market. Credit unions are included from January 2009. Prior to December 2010 loans were reported net of impairment provisions. After this date, loans are reported gross of impairment provisions.	Central Bank of Ireland calculations	Historical Average	Dec-17
<b>Share of Irish credit institutions' funding from ESCB</b>	ESCB or European system of central banks refers to the collection of central banks that along with the ECB form part of the Eurosystem. A higher share of funding from the ESCB suggests that banks' funding positions are strained.	Central Bank of Ireland calculations	Historical Average	Dec-17
<b>Quarterly change in Euro OIS 3 month spread</b>	Is the spread between the Euro interbank offer rate (the benchmark rate of the large euro money market) and the euro overnight indexed swap. The spread between these two interest rates is considered a key measure of credit risk in the banking system.	Bloomberg	Historical Average	Feb-18



Indicator	Notes	Source	Threshold	Last Observation
<b>Quarterly change in spreads of debt securities issued by financial institutions</b>	This indicator (the Barclays Euro Corporate Financials Senior Average Option Adjusted Spread), measures the spread of senior fixed income securities issued by financial institutions over the risk free rate (adjusted to take account of the embedded option) and can be used to measure stress in the market for these securities. A three month moving average is applied so that the indicator reflects developments across the full quarter as opposed to just its final day.	Bloomberg	Historical Average	Feb-18
<b>Objective 3</b>				
<b>Total large exposures - All Irish banks (incl. IFSC)</b>	A large exposure is defined as an exposure that is 10 per cent or more of a bank's eligible capital base. Banks whose parent institution is licenced in Ireland (Irish headquartered banks) also report any exposures that are greater than €300 million. These exposures consist largely of loans but also include derivatives, guarantees and debt or equity holdings.	Central Bank of Ireland calculations	Pooled European Average	2017Q3
<b>Total large exposures - Irish Retail Banks</b>	A large exposure is defined as an exposure that is 10 per cent or more of a bank's eligible capital base. Banks whose parent institution is licenced in Ireland (Irish headquartered banks) also report any exposures that are greater than €300 million. These exposures consist largely of loans but also include derivatives, guarantees and debt or equity holdings. This chart reflects data from Ireland's five retail banks only.	Central Bank of Ireland calculations	Pooled European Average	2017Q3
<b>Breakdown of Irish banks' credit exposures by geography</b>	This indicator presents a breakdown of Irish banks' credit exposures by location (Ireland, the UK and elsewhere) for a consistent sample of credit institutions that submit a geographical breakdown of loans and advances.	Central Bank of Ireland calculations	Historical Average	2017Q3
<b>Breakdown of Irish retail banks' credit exposures by geography</b>	This indicator presents a breakdown of Irish retail banks' credit exposures by location (Ireland, the UK and elsewhere) for a consistent sample of retail credit institutions that submit a geographical breakdown of loans and advances.	Central Bank of Ireland calculations	Historical Average	2017Q3
<b>Objective 4</b>				
<b>Irish private-sector loans - share of 5 largest institutions</b>	Data show the aggregate share of lending to the Irish private sector accounted for by the 5 largest credit institutions. Data are adjusted for group structure and relate to assets held with Irish counterparts only. Credit unions a treated as a single entity.	Central Bank of Ireland calculations	NA	Dec-17
<b>Irish private-sector deposits - share of 5 largest institutions</b>	Data show the aggregate share of Irish private sector deposits accounted for by the 5 largest credit institutions. Data are adjusted for group structure and relate to liabilities held with Irish counterparts only. Credit unions a treated as a single entity	Central Bank of Ireland calculations	NA	Dec-17
<b>Breakdown of Irish banks' operating income</b>	Chart shows the main components Irish and EU banks' operating income. Sample of banks drawn from retail banks operating within the State as well as banks identified as O-SII banks across Europe and credit institutions that have participated in recent EBA stress-testing exercises.	SNL Financial and Central Bank of Ireland calculations	NA	Dec-16

<b>International comparison of Irish retail banks' financial assets</b>	Chart compares the main categories of financial assets held by Irish and EU banks. Sample of banks drawn from retail banks operating within the State as well as banks identified as O-SII banks across Europe and credit institutions that have participated in recent EBA stress-testing exercises.	SNL Financial and Central Bank of Ireland calculations	NA	Dec-16
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