



Banc Ceannais na hÉireann
Central Bank of Ireland

Eurosystem



Quarterly Bulletin

QB3 – July 2017

Contents

Section 1

Forecast Summary Table	6
Comment	7
The Irish Economy	7
Box A: The International Economic Outlook	11
Box B: The 2016 National Income and Expenditure Accounts (NIE) and GNI*	13
Box C: New measure of Ireland's Current Account	18
Box D: Job Vacancy Rate and the Irish Labour Market	21
Box E: Assessing the Irish real rate from the recently issued inflation linked bond	26
Tráchttaireacht	33
Financing Developments in the Irish Economy	35
Box A: Competition in the Irish Mortgage Market	38
Box B: Recent Developments in Irish Resident Real Estate Funds	43

Section 2

Liquidity& Risk Management: Results of a Survey of Large Irish-Domiciled Funds	48
Pierce Daly & Kitty Moloney	
Consolidated Banking Data: Introducing Enhanced Statistics for Ireland	63
Kenneth Devine, Jennifer Dooley, Ciara Meehan and Aisling Menton	
Non-Standard Monetary Policy Measures and the Balance Sheets of Eurosystem Central Banks	79
Sharon Donnery, David Doran, Ruth Gleeson and Konstantina Carroll	

Section 3

Statistical Appendix

Notes

1. The permission of the Government has been obtained for the use in this Bulletin of certain material compiled by the Central Statistics Office and Government Departments. The Bulletin also contains material which has been made available by the courtesy of licensed banks and other financial institutions.
2. Unless otherwise stated, statistics refer to the State, i.e., Ireland exclusive of Northern Ireland.
3. In some cases, owing to the rounding of figures, components do not add to the totals shown.
4. The method of seasonal adjustment used in the Bank is that of the US Bureau of the Census X-11 variant.
5. Annual rates of change are annual extrapolations of specific period-to-period percentage changes.
6. The following symbols are used:

e estimated	n.a. not available
p provisional	. . no figure to be expected
r revised	– nil or negligible
q quarter	f forecast
7. Data on euro exchange rates are available on our website at www.centralbank.ie and by telephone at 353 1 2246380.

Designed by: Essentra plc.

Enquiries relating to this Bulletin should be addressed to:

Central Bank of Ireland (Publications),

P.O. Box No. 559, New Whapping Street, Dublin 1.

Phone 353 1 2246278; Fax 6716561

www.centralbank.ie

Email: Publications@centralbank.ie

ISSN 0332-2645

Forecast Summary Table

	2016	2017 ^f	2018 ^f
Real Economic Activity			
(% change)			
Personal consumer expenditure	3.3	3.1	2.7
Public consumption	5.3	2.0	1.5
Gross fixed capital formation	61.2	9.0	8.5
Modified Domestic Demand	4.7	4.5	4.0
Exports of goods and services	4.6	5.2	4.1
Imports of goods and services	16.4	6.0	5.3
Gross Domestic Product (GDP)	5.1	4.5	3.6
Gross National Product (GNP)	9.6	4.3	3.4
External Trade and Payments			
Balance-of-Payments Current Account (€ million)	9,196	13,312	10,163
Current Account (% of GNP)	3.3	4.4	3.2
Prices, Costs and Competitiveness			
(% change)			
Harmonised Index of Consumer Prices (HICP)	-0.2	0.3	1.0
of which: Goods	-3.1	-2.1	-1.0
Services	2.5	2.5	2.8
HICP excluding energy	0.4	0.0	1.0
Consumer Price Index (CPI)	0.0	0.7	1.3
Compensation per Employee	2.1	3.0	3.2
Labour Market			
(% change year-on-year)			
Total employment	2.9	3.0	2.0
Labour force	1.2	1.2	1.3
Unemployment rate (ILO)	7.9	6.2	5.6
Technical Assumptions²			
EUR/USD exchange rate	1.11	1.15	1.15
EUR/GBP exchange rate	0.82	0.88	0.88
Oil price (\$ per barrel)	43.68	47.42	47.42
Interbank market – Euribor ³ (3-month fixed)	-0.27	-0.33	-0.33

¹ Based upon the annual change in the average nominal HICL.

² The technical assumption made is that exchange rates remain unchanged at their average levels in mid-July. Oil prices and interest rates are assumed to move in line with the futures market.

³ Euribor is the rate at which euro interbank term deposits are offered by one prime bank to another, within the euro area. Daily data from 30 December 1998 are available from www.euribor.org.

Comment

The Irish economy continues to grow at a strong pace and prospects for sustained, solid growth remain positive, with the pace of expansion projected to moderate only slightly this year and in 2018. In the main, growth continues to be driven by the strength of activity on the domestic side of the economy, which grew robustly in 2016 and has maintained considerable positive momentum this year. Looking ahead, the outlook is favourable, though with downside risks and uncertainties attached.

Underpinning the quickening pace of recovery in recent years has been the growth of modified domestic demand, a measure of domestic spending which excludes the volatile components of investment in intangibles and aircraft leasing, and which grew by 4.7 per cent last year. The stronger performance of domestic activity has been supported by strong and broad-based growth in employment, which is growing at its fastest rate in almost a decade. The positive developments in the labour market have helped incomes to recover and supported solid growth in consumer spending in recent years. With regard to investment, the evidence suggests that the recovery in the domestic components, particularly both building and non-construction investment, continues to gather pace, although from a relatively low base.

Looking ahead, domestic demand is projected to provide the main impetus to growth over the forecast horizon and further gains in employment and incomes are expected to remain the main driver of growth. On the basis of evidence of continuing strength in the labour market, the projections for employment growth have been revised up since the last Bulletin, though, following a period of exceptionally strong increases, employment growth is expected to moderate next year. The more favourable labour market outlook supports an upward revision to the forecast for growth in modified domestic demand, which also partly reflects slightly stronger investment projections.

On the external side, with evidence of a pick-up in underlying export growth and upward revisions to growth forecasts in key trading

partner countries, abstracting from any volatility that might arise from contract manufacturing, forecasts for export growth have also been revised higher.

As a result, and allied to evidence of stronger momentum in the domestic economy, the projections for growth this year and for 2018 have been revised upwards. However, while the central forecast is favourable, risks to these forecasts are to the downside. As has been the case for some time now, the outlook is characterised by uncertainty about the external environment, both in relation to Brexit and risks related to the potential for changes to broader international taxation and trade arrangements. In the absence of any new information in relation to these risks, the Bank has not made any further adjustments to its forecasts at this time but, as noted in previous Bulletins, both in the short-term and in the longer-term, the economic impact of Brexit on Ireland is set to be negative and material.

With regard to the monitoring and measurement of domestic economic developments, in line with the recommendations of the Economic Statistics Review Group (ESRG), the CSO recently published a number of supplementary economic indicators to provide more information on the impact of globalisation on domestic economic activity. Among the new measures, annual initial results for modified GNI* and a quarterly underlying domestic demand measure (modified domestic demand) were published. GNI* is defined to exclude globalisation effects that distort the measurement of the size of the economy and, thus, the new measure provides an

appropriate adjusted level indicator of the size of the domestic economy and provides a more realistic benchmark in assessing indebtedness in both the public and private sectors.

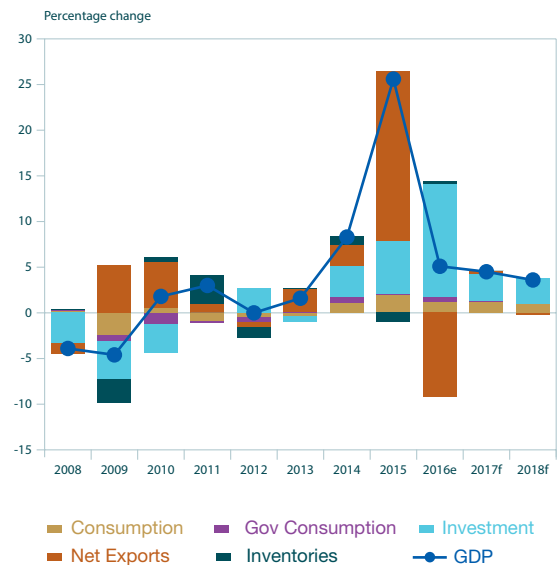
GNI* excludes the impact of redomiciled companies and the depreciation of intellectual property products and of leased aircraft from GNI. When this is done, the level of nominal GNI* is approximately two-thirds of the level of nominal GDP in 2016. As a consequence, General Government Deficit and Debt ratios calculated using GNI* as the denominator are notably higher than when using GDP as the base. General Government Debt as a percentage of GNI* was 106 per cent in 2016, more than 30 percentage points higher than the debt ratio of 73 per cent which results from using GDP as the denominator, although both ratios have fallen significantly since the peak reached in 2012. Similarly, ratios of the indebtedness of the private sector are also higher when using GNI* as the measure of the size of the economy. Overall, using GNI* as a measure of the size of the Irish economy, indicates that while both public and private debt have fallen in recent years, ratios remain elevated by both historical and international standards, continuing to emphasise the importance of ensuring that domestic economic policies remain firmly focused on underpinning stability and reducing uncertainty.

The Irish Economy

Overview

- The outlook for the Irish economy remains positive with the strong growth performance of recent years projected to continue this year and in 2018. The latest National Income and Expenditure (NIE) accounts from the CSO indicate that headline GDP growth last year was 5.1 per cent. This is a small downward revision from the preliminary estimate of 5.2 per cent, reflecting offsetting revisions to GDP components that increased the respective positive and negative contributions from domestic demand and net exports. Projected GDP growth of 4.5 per cent this year and 3.6 per cent in 2018, has been revised upwards reflecting evidence of more robust activity in the domestic economy together with improved prospects for external demand. On the assumption of a neutral impact from the activities of multinational enterprises (MNEs), this rate of growth should broadly reflect underlying developments.
- In line with the recommendations of the Economic Statistics Review Group (ESRG), the CSO published a number of supplementary economic indicators, which remove the distortions arising from the globalisation of the Irish economy to give a more accurate picture of both the level and rate of growth of National Income and its components. One such measure is modified total domestic demand, which gives a more accurate measure of activity in the domestic economy by excluding intellectual property (IP) investment and purchases of aircraft by leasing companies.¹ Modified total domestic demand accounted for 3 percentage points of overall GDP growth last year, with the remaining 2.1 percentage points accounted for by net exports adjusted for IP imports. This more balanced growth profile contrasts with the very unbalanced one in the unadjusted data where an oversized contribution from domestic demand offsets a very large negative contribution from net exports.

Chart 1: Contributions to GDP



Source: CSO and Central Bank of Ireland.

- The 2016 NIE also included a modified estimate of Gross National Income (GNI*), which removes the impact of globalisation through deducting the retained earnings of re-domiciled companies, depreciation on R&D related IP imports and depreciation on aircraft related to leasing. This provides a more accurate measure of the size of National Income that is available to the resident population (see Box B). GNI* was identical to GNI until 2000 and remained extremely similar in magnitude until 2009. After 2009, the divergence is accounted for by the net factor income of re-domiciled companies and, latterly, the sharp rise in depreciation on IP imports in 2015 and 2016. As a consequence, the level of nominal GNI* was approximately two thirds of the level of nominal GDP in 2016. GNI* gives a more accurate measure of the level of National Income and represents a more realistic benchmark in assessing indebtedness in both the public and private sectors. In the General Government Accounts, as an example, deficit and debt ratios are notably higher as a percentage of GNI* compared to GDP ratios.

¹ Modified total domestic demand removes the impact of globalisation from domestic demand to provide a more accurate measure of the level of activity in the domestic economy. The new indicator adjusts the investment component of total domestic demand by excluding trade in aircraft by aircraft leasing companies and imports of R&D related to intellectual property imports from additions to capital stocks.

- *Domestic demand components will continue to be the main growth driver over the forecast horizon with strength in both investment and consumer demand and moderate growth in government consumption. Consumer spending, buoyed by growth in employment and incomes is projected to increase by 3.1 per cent in 2017, moderating to growth of 2.7 per cent next year. Recovery in housing output, strong growth in other construction output and growth in core machinery and equipment investment broadly in line with export growth underpins the projected growth in investment of 9 per cent this year and 8.5 per cent in 2018.*
- *Export volumes grew by 4.6 per cent in 2016 reflecting contrasting performances from goods and services exports, which increased by 0.9 per cent and 10.5 per cent respectively. The muted performance of goods exports reflected weakness in contract manufacturing abroad by Irish based MNEs. Weakness in contract manufactured goods exports seems to have continued in the early part of this year masking strong underlying growth that reflects a pronounced pick-up in external demand, particularly in the euro area. Reflecting the pick-up in export growth this year and continued buoyancy in domestic demand, import growth will remain strong and in excess of export growth in 2017 and 2018. Nevertheless, due to a positive terms of trade effect, net exports are likely to make a small positive contribution to overall growth this year followed by a small negative contribution in 2018.*
- *The strong labour market performance last year has carried forward into 2017 with employment growth accelerating to 3.5 per cent annually in the first quarter. Unemployment declined to a rate of 6.3 per cent in June. For the year as whole employment growth is expected to average 3 per cent. In 2018, employment growth of 2 per cent would see numbers at work at over 2.1 million persons for the first time since 2008. With labour force growth expected to average 1.3 per cent over the next two years, the unemployment rate is projected to decline to an average rate of 6.2 per cent this year and 5.6 per cent in 2018.*
- *While the economy continues to expand at a robust pace, inflation remains subdued. This reflects the effect on goods prices of euro appreciation against sterling, weakness in energy prices and muted domestic inflationary pressures. Overall, headline HICP inflation is expected to increase by just 0.3 per cent in 2017, a downward revision from 0.7 per cent in the previous Quarterly Bulletin. HICP excluding energy is expected to remain flat in 2017. Based on current assumptions for oil prices, exchange rates and international commodity prices, and the outlook for earnings and the labour market, inflation is forecast to increase to 1 per cent in 2018.*
- *Reflecting the exceptionally open and globalised nature of the Irish economy, risks to the outlook are mainly external. Downside risks mainly reflect uncertainty regarding the terms of Brexit. These are offset to some extent by improving prospects for growth internationally, most notably in the EU.*

Box A: The International Economic Outlook*By International Relations Division*

The pick-up in euro area economic activity during the second half of 2016 has continued into 2017. Euro area GDP increased by 0.6 per cent during the first quarter of 2017, the fastest increase since the first quarter of 2015. Domestic demand accounted for most of this expansion. Changes in inventories and net exports also made positive, although more modest, contributions to first quarter growth.

Regarding the second quarter of 2017, latest sentiment indicators point to a similar pace of expansion. Although the Composite Purchasing Managers' Index (PMI) for the euro area decreased marginally from 56.8 in May to 56.3 in June, its average reading during the second quarter was higher than the average reading recorded for the first three months of 2017. Elsewhere, the European Commission's Economic Sentiment Indicator increased further in June and remains well above its long-run average of 100. In their latest projections, both the ECB and the IMF expect euro area GDP to increase by 1.9 per cent in 2017 and 1.7 and 1.8 per cent respectively in 2018.

Euro area inflation slowed to 1.3 per cent in June from 1.4 per cent in May and 1.9 per cent in April with lower energy prices acting as the main drag on headline inflation. At the same time, underlying inflation has been less volatile and remains sluggish. HICP excluding energy increased from 1.1 per cent in May to 1.2 per cent year-on-year in June and has averaged this rate during the second quarter of 2017.

As the euro area's recovery continues to strengthen, the Governing Council of the ECB modified their forward guidance at the June meeting. The ECB's Governing Council now expect that the ECB's key interest rates will remain at present levels for an extended period of time and well past the horizon of the Eurosystem's net asset purchases. At present, the asset purchase programme extends up until December 2017. Following the July Governing Council meeting, ECB president Mario Draghi re-iterated this message.

Looking ahead, a number of risks still overshadow the euro area's recovery. The high levels of non-performing loans across the euro area's banking sector continue to constrain bank lending. In addition, euro labour markets remain weak - evidenced by high levels of unemployment and tepid wage growth.

Turning to the UK, since the start of the year, economic activity has lost some momentum. GDP growth slowed to 0.2 per cent during the first quarter of 2017 and increased by just 0.3 per cent during the second quarter of 2017 according to the Office of National Statistics' preliminary estimates. The main risk to the UK economy continues to be uncertainty surrounding the new trade and financial linkages that will emerge between the UK and the European Union when the Article 50 negotiations conclude. Article 50 negotiations commenced on 19 June with a completion date currently set for end-March 2019, although the EU 27 member states may extend this deadline by unanimous agreement.

At its June meeting, the Bank of England's Monetary Policy Committee left policy unchanged. Inflation has been running in excess of the bank's target of 2 per cent since February and increased by 2.6 per cent in June. In addition, the Bank of England expects inflation to increase further in the second half of 2017. The increase in inflation since the start of 2017 reflects the pass through to consumer prices of the pound's depreciation in the second half of 2016. In contrast, wage growth remains muted even though headline unemployment is very low.

In the United States, GDP increased by an annualised rate of 1.2 per cent during the first quarter of 2017, down from 2.1 per cent in the fourth quarter of 2016. A number of one-off factors including different seasonality patterns, and changes in inventory adjustment, account for the slowdown in first quarter growth with some pick up expected during the second quarter.

The US administration has signalled a shift towards more expansionary fiscal policy and some proposals have emerged. The measures proposed involve a reduction in the headline corporate income tax rate, as well as reductions in the number of personal tax brackets and in personal deductions.

Box A: The International Economic Outlook
By International Relations Division

In June, the Federal Reserve's Federal Open Market Committee (FOMC) increased its target for the federal funds policy rate to between 1.0 per cent and 1.25 per cent as economic activity continues to expand and labour markets strengthen. Looking ahead, the FOMC's latest dot plot shows that the median response of FOMC participants corresponds to one additional increase in the federal funds rate during 2017.

The global economy continues to recover and the IMF project global GDP to expand by 3.5 percent in 2017 and 3.6 per cent in 2018. Activity has held up better than expected across several developed economies most notably the euro area. At the same time, many of the world's emerging market economies are dependent on commodity markets and remain vulnerable to a deterioration in their terms of trade. Finally, many of the world's emerging economies have incurred significant dollar liabilities in recent years and remain vulnerable to a normalisation of monetary policy, particularly in the United States.

Table 1: Expenditure on Gross National Product 2015, 2016ⁱ and 2017ⁱ

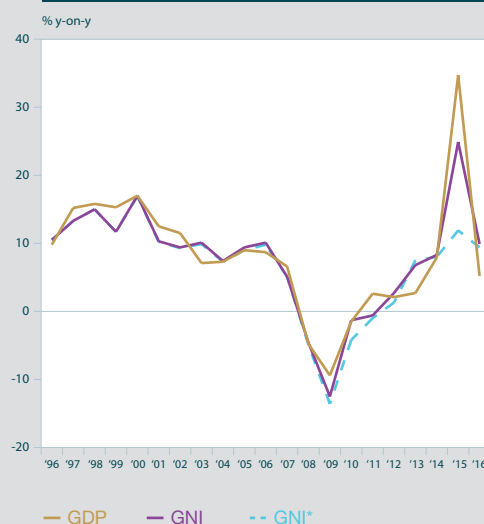
	2016 % change in			2017 ⁱ % change in			2018 ⁱ
	EUR millions	volume	price	EUR millions	volume	price	EUR millions
Personal Consumption Expenditure	96,613	3.1	0.6	100,206	2.7	0.9	103,837
Public Net Current Expenditure	28,354	2.0	3.0	29,780	1.5	2.0	30,828
Gross Domestic Fixed Capital Formation	87,662	9.0	2.2	97,658	8.5	2.2	108,339
<i>Building and Construction</i>	17,694	15.9	3.7	21,265	13.0	3.7	24,916
<i>Machinery and Equipment</i>	20,533	5.5	1.3	21,934	5.5	1.3	23,431
<i>Intangibles</i>	49,436	8.0	2.0	54,459	8.0	2.0	59,992
Value of Physical Changes in Stocks	2,383			2,383			2,283
TOTAL DOMESTIC DEMAND	215,012	5.3	1.6	230,027	5.0	1.6	245,288
<i>of which: modified Domestic Demand</i>	172,245	4.5	1.8	183,151	4.0	1.8	193,903
Exports of Goods & Services	335,042	5.2	2.4	361,055	4.1	1.3	380,808
FINAL DEMAND	550,054	5.3	2.1	591,082	4.5	1.4	626,096
Imports of Goods & Services	-274,398	6.0	0.1	-291,108	5.3	1.3	-310,772
<i>Statistical Discrepancy</i>	-89			-89			-89
GROSS DOMESTIC PRODUCT	275,567	4.5	4.1	299,885	3.6	1.5	315,234
Net Factor Income from Rest of the World	-48,818	5.7	2.4	-52,845	4.8	1.3	-56,096
GROSS NATIONAL PRODUCT	226,749	4.3	4.5	247,040	3.4	1.5	259,138
EU subsidies less taxes	993			1,950			2,045
GROSS NATIONAL INCOME	227,742	4.3	4.9	248,990	3.3	1.5	261,184

Box B: The 2016 National Income and Expenditure Accounts (NIE) and GNI**By Paul Reddan and Diarmaid Smyth¹*

The Economic Statistics Review Group (ESRG), set up in response to last year's exceptional National Income and Expenditure Accounts (NIE), made a number of recommendations last December.² Central to their recommendations was a proposal to compile an adjusted level indicator of the size of the domestic economy, GNI*, a modified measure of Gross National Income.³ This series would remove large and volatile items affecting the standard measures of national income such as the depreciation on foreign-owned domestic capital assets and the retained earnings of re-domiciled companies. This year's NIE included for the first time a time series for GNI* from 1995 to 2016 as well as modifications to the Balance of Payments (See Box C). This Box examines some of the central features of these releases.

Derivation of Modified Gross National Income (GNI*) 1995-2016

GNI* is derived by subtracting the post-tax net operating surplus of foreign investors and the depreciation of domestic capital owned by foreign investors from GDP.⁴ In the NIE, factor income of re-domiciled companies, depreciation on research and development related intellectual property (IP) imports and depreciation on aircraft leasing were subtracted from the existing measure of GNI. The NIE show that GNI* was identical to GNI until 2000 and remained extremely similar in magnitude up to 2009; the difference between these measures was equivalent to 0.9 per cent of GNI on average over this period. The main reasons for the divergence post-2009 are increases in the factor income of re-domiciled companies and a sharp rise in depreciation on IP imports in 2015 and 2016 (see Table 1). Depreciation on IP imports accounts for over 70 per cent of the gap between GNI and GNI* in both 2015 and 2016. Figure A shows the nominal growth rate of GNI* compared to other measures of national income.

Box B Figure 1: Nominal Growth Rates

Source: CSO.

Table 1: GNI* Derivation (Current Prices in Euro Millions)

	2010	2011	2012	2013	2014	2015	2016
GNI	140,391	139,610	143,402	153,193	165,866	207,234	227,742
Factor income of re-domiciled companies	-5,260	-5,548	-7,102	-6,477	-6,855	-4,666	-5,786
Depreciation on IP Imports	-339	-379	-586	-705	-771	-25,047	-27,793
Depreciation on aircraft leasing	-2,163	-2,366	-2,653	-3,006	-3,782	-4,642	-5,001
<i>Difference between GNI & GNI*</i>	7,762	8,294	10,342	10,188	11,409	34,356	38,579
GNI*	132,629	131,316	133,060	143,005	154,457	172,878	189,163

¹ Irish Economic Analysis Division.

² See [Report of the Economic Statistics Review Group \(ESRG\)](#), December 2016. The key development behind the 2015 growth rates was a €300 billion increase in the capital stock. This showed up in the International Investment Position (IIP) data as an equivalent increase in the level of external liabilities associated.

³ See [Box B: GNI* - A better measure of domestic economic activity](#), Quarterly Bulletin No.2 2017.

⁴ See "The Treatment of Global Firms in National Accounts," Lane (2017)

Box B: The 2016 National Income and Expenditure Accounts (NIE) and GNI**By Paul Reddan and Diarmaid Smyth***Implications from GNI***

The lower level of GNI* compared to GDP has significant implications in terms of measures of indebtedness, both public and private. Figure 2 shows that household and non-financial corporate (NFC) debt fell to 47.3 per cent as a share of GDP in 2016.⁵ However, when expressed as a share of GNI*, household and NFC debt is significantly higher; at 68.9 per cent. General Government deficit and debt ratios are also notably higher relative to a GDP base. Debt as a percentage of GNI* measured 106 per cent in 2016, more than 30 percentage points higher than the debt-to-GDP ratio of 73 per cent. Both debt-to-GDP and debt-to-GNI* have fallen significantly since their peak in 2012, by 46.8 and 51.8 percentage points respectively.

Box B Figure 2: Household and NFC Debt Ratios

Source: Central Bank of Ireland and CSO.

Table 2: Key ratios, % year-on-year

	2015		2016	
	% GNI*	% GDP	% GNI*	% GDP
General Government Metrics				
Budget Balance	-2.9	-1.9	-1.0	-0.7
Gross Debt	116.5	76.9	106.0	72.8

Overall, using GNI* as a measure of the size of the Irish economy indicates that both public and private debt has fallen since the crisis, but remains elevated by historic and international standards. Ensuring a reduction in debt to safer levels over the coming years should remain a policy priority.

⁵ Household and NFC debt debt sourced from the Central Bank of Ireland's Credit and Banking Statistics.

Demand**Domestic Demand Overview**

The outlook for domestic expenditure remains robust with modified domestic demand projected to grow by 4.5 and 4 per cent in 2017 and 2018, respectively. This follows growth of 4.8 per cent in 2016.

Consumption

Personal consumption expenditure is expected to grow by 3.1 per cent this year and by 2.7 per cent in 2018. This forecast contains a small upward revision since the last Bulletin reflecting a combination of positive developments: a stronger consumption outturn for 2016 compared to the initial CSO estimate; the favourable outlook for the labour market; and considerable momentum in consumer spending

in the early part of the year, as evidenced by both the *Quarterly National Accounts (QNA)* and retail sales data. In terms of the latter, core retail sales (i.e. sales excluding motor trades) were up 6.4 per cent in the first 5 months of the year, with overall sales up 2.7 per cent. The QNA data pointed to annual growth of 1.8 per cent in personal consumption in the first quarter of the year.

The 2016 *National Income and Expenditure Accounts (NIE)* reported that personal consumption grew by 3.3 per cent last year, compared to an initial estimate of 3 per cent. Within this, goods related consumption was particularly buoyant – up by 4.1 per cent with services related consumption growing by 2.4 per cent.

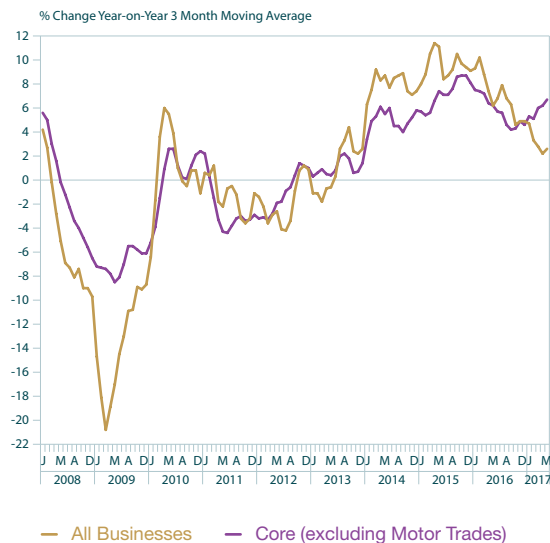
This follows a pattern of upward revisions to consumption data, something that was signalled in previous *Quarterly Bulletins*.⁶ The increases recorded in economy-wide compensation levels – up 5.4 per cent in 2016 according to the NIE – have helped to underpin the recovery in consumer spending. Further increases in the disposable incomes of households are expected to support consumer spending in 2017 and 2018.

Investment

Associated with the development of GNI*, the QNA for Q1 2017 included a new measure of investment – Modified Gross Domestic Fixed Capital Formation, which attempts to abstract from some of the investment activities of multinational corporations that have limited effects on the domestic economy. In particular, the new modified investment measure excludes the investment expenditures relating to aircraft leasing and R&D related intellectual property.

The new data reveal that while headline investment grew by 61.2 per cent in 2016,⁷ modified investment grew by a more moderate

Chart 2: Index of Volume of Retail Sales



Source: CSO.

7.5 per cent. Buoyant growth continued into Q1 2017 with modified investment increasing by 19.1 per cent year-on-year. Housing investment increased by 30.3 per cent year-on-year in Q1 2017, although this is coming from a relatively low base. Following approximately 15,000 house completions in 2016,⁸ the latest forecasts project approximately 19,500 new additions to the housing stock in 2017 followed by 23,500 in 2018. This is still below typical estimates of the number of new housing units required to meet demand over the forecast horizon. Non-residential building and construction investment also increased rapidly, by 27 per cent in Q1 following an increase of 21.2 per cent in 2016; a significant upward revision compared to previously published estimates. The high pace of activity in the construction sector is also corroborated by survey data from the Ulster Bank Construction PMI, which registered values of 69 and 65 in May 2017 for residential and commercial construction respectively.⁹

⁶ See for example, *Quarterly Bulletin No. 1 2017, Box A: Recent Trends in Personal Consumption Expenditure*.

⁷ There were significant upward revisions to the historical investment series, particularly for 2016 where investment was €10 billion higher than previously estimated.

⁸ These figures are based on the Department of Housing, Planning, Community and Local Government's house completions figures which are calculated from connections to the electricity grid. There are a number of widely acknowledged shortcomings with these figures but they are at present the best available measure of new housing output.

⁹ A value over 50 indicates expansion.

Estimates for machinery and equipment (M&E) investment for 2016 also saw substantial upward revisions; M&E investment increased by 27.9 per cent while M&E expenditure excluding aircraft leasing increased by 23.6 per cent.

Modified investment is forecast to increase by 11.9 and 10.3 per cent in 2017 and 2018. However, there is some downside risk to these forecasts particularly in 2018 relating to uncertainty about Brexit.

Government Consumption

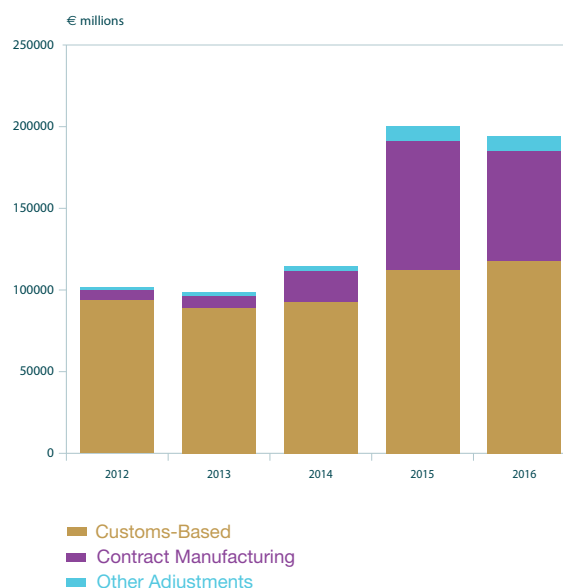
Government consumption expenditure increased in volume terms by 5.3 per cent in 2016 according to the *NIE 2016* with a nominal increase of 5.7 per cent. In the first quarter of 2017, government consumption increased in volume terms by 3 per cent. For the year as a whole (and for 2018), government consumption growth is expected to average around 1.7 per cent.

External Demand and the Balance of Payments

Exports and Imports

A noticeable feature of Ireland's trade performance during 2016 was the contrast between the 10.5 per cent average annual increase in services export volumes and the more modest 0.9 per cent growth in goods exports. It is, however, important to note that the outturn on the goods side reflected, to a significant extent, reduced levels of contract manufacturing – while dramatically boosting goods exports in 2015, contract manufacturing contracted last year, declining by 14 per cent (See Chart 3). A similar picture appears to be emerging from trade data for the first quarter of 2017 – a 4.0 per cent fall in goods export volumes according to the QNAs contrasts sharply with a low double-digit increase in goods exports on a cross-border basis (i.e.

Chart 3: Goods Exports (Values)



Source: CSO.

excluding contract manufacturing)¹⁰ in the External Trade Statistics.¹¹ Such a combination of developments, together with the 15.0 per cent year-on-year rise in services export volumes in the first quarter, point to a robust underlying Irish export performance during the early part of 2017.

In terms of the outlook for 2017 as a whole, some improvement in the performance of exports is projected as Irish exporters seem set to benefit from strengthening external demand. The latest available sentiment indicators point to robust goods export growth in the near term – the new export orders index of the Manufacturing Purchasing Managers Index (PMI) averaged 57.6 during the second quarter of 2017, considerably exceeding both its first quarter outturn and its long-run average. The assumptions for weighted external demand for 2017 are also consistent with noticeably stronger export growth relative to previous estimates; the outlook for 2018 is, however, broadly unchanged. Moreover, Irish export growth is projected to somewhat exceed that of external demand owing to ongoing shifts in

¹⁰ The inclusion of contract manufacturing is the main adjustment made in transforming goods export data from a cross border basis in the External Trade Statistics to an ownership basis in the QNAs.

¹¹ Given recent price developments, the External Trade Statistics suggests a low double-digit increase in volume terms.

Table 2: Goods and Services Trade 2016, 2017^f, 2018^f

	2016	% change in		2017 ^f	% change in		2018 ^f
	EUR millions	volume	price	EUR millions	volume	price	EUR millions
Exports	335,042	5.2	2.4	361,055	4.1	1.3	380,808
Goods	194,071	4.1	3.0	208,089	3.5	0.3	216,018
Services	140,971	6.8	1.6	152,966	5.0	2.6	164,790
Imports	274,398	6.0	0.1	291,108	5.3	1.3	310,772
Goods	88,219	6.3	-3.0	90,968	5.3	1.0	96,715
Services	186,179	5.8	1.6	200,139	5.4	1.5	214,057

its composition, most notably, the increased prominence of the more dynamic services side. Goods exports are expected to be outpaced by services throughout the projection period. A key determinant of the short-term outlook for Irish goods exports seems set to be the level of contract manufacturing; a neutral contribution is currently assumed in 2017 and 2018. Reflecting such a combination of developments, some improvement in the performance of exports seems to be in prospect during 2017 - export volumes are expected to rise by 5.2 per cent this year; this represents an upward revision of 0.8 percentage points relative to the previous Quarterly Bulletin, which is largely concentrated on the services side. The export outlook for 2018 is broadly unchanged at 4.1 per cent. The risks surrounding such an outlook remain tilted to the downside given the uncertainty surrounding the international outlook and in particular, Brexit.

Following dramatic growth last year, import growth moderated in the first quarter of 2017 primarily as a result of a moderation in services imports. Nevertheless, services import volumes rose by 5.5 per cent year-on-year in the first quarter of 2017, which may be largely attributed to the business services sector and specifically research and development owing to further growth in the import of intellectual property assets. Conversely, the weak goods import performance, with an annual decline of 8.2 per cent, may relate to recent subdued levels of contract manufacturing. Against a

backdrop of robust domestic demand and buoyant export growth, overall import volumes are expected to increase by 6.0 per cent annually in 2017. Looking ahead to 2018, a corresponding increase of around 5.3 per cent is currently envisaged. The forecasts for exports and imports imply a small positive contribution to growth this year from net trade of 0.4 percentage points largely as a result of a terms of trade improvement, falling to -0.2 percentage points in 2018.

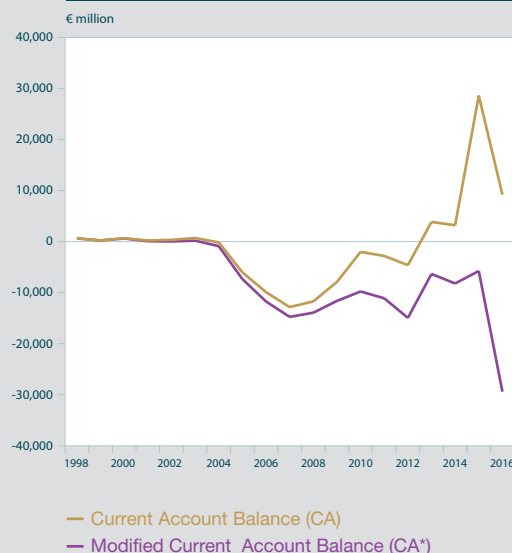
Box C: A modified measure of Ireland's Current Account*By Stephen Byrne and Suzanne Linehan¹²*

As is the case with national accounts aggregates, the international income flows associated with re-domiciled firms together with the transfer of foreign-owned capital assets in the relocated balance sheets has presented a number of challenges in terms of developments in Ireland's Balance of Payments statistics. Accordingly, and in addition to the development of GNI*, a corresponding modified current account balance measure, known as the Current Account*, has been published recently by the CSO. This box provides a brief overview of the newly developed current account measure and its implications for analysing developments in an Irish context.

In line with the adjustment made to the national accounts aggregates (discussed in Box B), the adjustment to the current account balance focusses on the treatment of the factor income of re-domiciled companies and depreciation of foreign owned domestic capital (such as IP and aircraft leasing). In the unadjusted measure of the current account, the retained income of redomiciled plcs is recorded as a direct investment inflow. It is only when a dividend is paid to the foreign shareholders that the corresponding outflow is recorded, resulting in a decline in the current account balance at that time. In the modified current account balance, the incomes of these redomiciled plcs are treated as factor income outflows regardless of whether they are distributed as dividends or retained. Such an approach is adopted to correct for the difference in treatment between the net income of directly-owned foreign Multinational Enterprises (MNEs) and redomiciled plcs.¹³ Making this adjustment, which amounted to €5.8 billion in 2016, reduces the current account surplus in 2016 to 1.2 per cent of GDP (1.8 per cent of GNI*), compared with the surplus before adjustment of 3.3 per cent of GDP (4.9 per cent of GNI*).

Box C Figure 1: Current Account Excluding Redomiciled PLC Income

Source: CSO and authors' calculations.

Box C Figure 2: Modified Current Account Balance

Source: CSO.

In the unadjusted measure of the current account, the profits of multinational enterprises are recorded net of depreciation. In the modified current account balance, the depreciation of foreign-owned domestic capital (specifically, IP and aircraft leasing) is excluded on the basis that this is borne by foreign investors. Reflecting the growing relocation of IP and aircraft leasing related assets to Ireland, the scale of depreciation linked to these (predominantly IP) assets has grown significantly and amounted to almost €33 billion in 2016

¹² Irish Economic Analysis Division.¹³ For more detail see: Lane, PR. The Treatment of Global Firms in National Accounts. Central Bank Economic Letter Series, 2017.1.

Box C: A modified measure of Ireland's Current Account*By Stephen Byrne and Suzanne Linehan*

Combining these two adjustments in the form of current account* presents a significantly different picture to that of the unadjusted current account in 2015 and 2016 (see Figure 2). At face value, the sizable current account* deficit implies a significant excess of investment over domestic savings financed by foreign borrowing. In practice, however, the foreign borrowing relates to the purchase by large multinationals of intellectual property assets from their foreign parents and the cost of aircraft purchases. Profits from the purchase of these IP and aircraft assets will flow over time and will increase future factor income inflows. Moreover, the increase in large depreciation costs contributing to the modified current account deficit are offset by a corresponding decline in external liabilities in the Net International Investment Position. However, in the current period, the scale of these depreciation charges results in a substantial deterioration in the modified measure of the current account. Taking account of all the above considerations, however, the current account* deficit in 2016 is not suggestive of sizable domestic imbalances.

Net Trade, Factor Incomes and International Transfers

In the first quarter of 2017, the overall current account balance moved back in line with levels recorded in 2015, with a surplus of €8.6 billion or 12.4 per cent of GDP. The salient feature of year-on-year changes for the first quarter of 2017 was the narrowing of the services deficit owing largely to the buoyancy of the services export outturn. The reduction in the services deficit was partly offset by a narrowing of the merchandise trade surplus while net investment income outflows were broadly unchanged over the same period. A more in-depth analysis of recent current account developments and, in particular, the CSO's new modified current account measure is provided in Box C.

Taking account of the trade forecasts outlined above, the trade balance is forecast to rise to 23 per cent of GDP in 2017 followed by a modest decline to 22 per cent in 2018. Net factor income outflows are expected to rise in both 2017 and 2018. Reflecting the prospective trends across the various components, a current account surplus of around 4.4 per cent of GDP is expected for 2017 as a whole followed by a decline to 3.2 per cent in 2018.

Supply

On the output side, the NIE confirm a strong performance for 2016. On the services side, the professional, administration and support services sector grew by 14.4 per cent, with the information and communications sector and financial and insurance activities up 9.8 and 3.4 per cent, respectively. Agriculture, forestry and fishing grew by a robust 13 per cent with construction growth also strong, up 15.1 per cent. Industry excluding construction increased by a more moderate 2.6 per cent. However, it should be noted that this sector is influenced by the activities of multinationals, which led to extraordinary gains in 2015.

Data from the monthly industrial production and turnover series shows that overall output for the manufacturing series was down by an average of 3 per cent from January to May in comparison to the same period last year. The modern sector plays a large role in overall manufacturing and this series contracted by 3.1 per cent on average. However, these series are volatile and heavily influenced by the activities of multinational corporations. In contrast, the traditional sector grew by 1.6 per cent on average from January to May.

Table 3: Balance of Payments 2016, 2017ⁱ, 2018^f

€ million	2016	2017 ⁱ	2018 ^f
Trade Balance	60,644	69,947	70,036
Goods	105,852	117,120	119,303
Services	-45,208	-47,173	-49,267
Net Factor Income from the Rest of the World	-47,647	-52,845	-56,096
Current International Transfers	-3,801	-3,801	-3,801
Balance on Current Account	9,196	13,301	10,139
(% of GDP)	3.3	4.4	3.2

The Investec manufacturing PMI suggests that growth was strong in recent months, with readings of 56 and 55.9 for May and June, respectively (values above 50 signifying expansion). The new exports order component had a positive reading of 57.4 with the employment indicator also signifying expansion with a value of 54.9. The CSO's monthly services index showed average growth of 3.4 per cent in activity levels for the January to May period. All components of the Investec services PMI showed expansion for June with the overall index at 57.6.

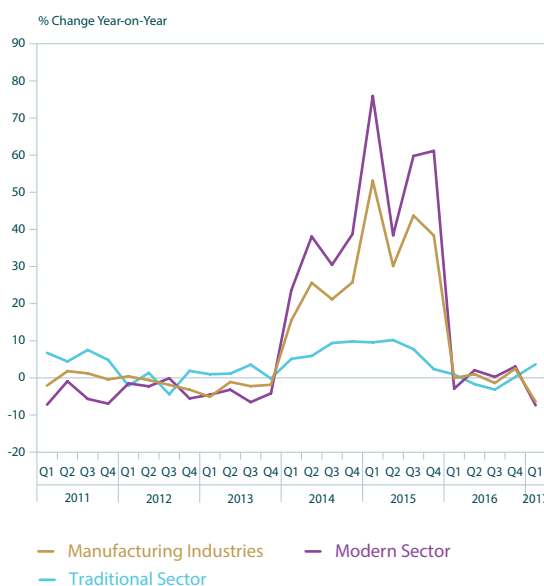
The Labour Market

The labour market remains strong with employment growth expected to average 3 per cent this year. This translates into an additional 60,000 jobs in 2017. In 2018, employment growth of 2.0 per cent is envisaged. This should bring numbers at work to over 2.1 million persons (for the first time since 2008). With annual labour force growth expected to average 1.3 per cent, the unemployment rate is projected to decline further, to 6.2 per cent this year and 5.6 per cent in 2018.

The labour market outlook follows a very strong outturn in 2016 and significant momentum in the first quarter of the year with numbers at work up 3.5 per cent. Once again, these employment gains were broad-based although there were particularly strong increases in industry including construction. In seasonally adjusted terms, employment was up nearly 1 per cent in the quarter compared with a 0.5 per cent rise in the labour force. More recent data from the monthly

unemployment release pointed to an estimated unemployment rate of 6.3 per cent in June (down two full percentage points in the year).

The speed of decline in unemployment inevitably raises questions about the degree of spare capacity within the economy. In this context, labour market vacancy data (published as part of the Earnings and Labour Cost survey) offers some insights (see Box D for details). In particular, it points to a sustained rise in vacancies across the economy and particularly in certain sub-sectors – notably, financial, insurance and real estate, construction and transportation and storage. These trends could point to tighter labour market conditions and potentially skills mismatch in key subsectors.

Chart 4: Volume of Industrial Production

Source: CSO.

Table 4: Employment, Labour Force and Unemployment 2014, 2015, 2016^f and 2017^f

	2016	2017 ^f	2018 ^f
Agriculture	113	113	113
Industry (including construction)	394	413	428
Services	1,513	1,555	1,581
Total Employment	2,020	2,081	2,123
Unemployment	173	138	125
Labour Force	2,193	2,219	2,248
Unemployment Rate (%)	7.9	6.2	5.6

Note: Figures may not sum due to rounding

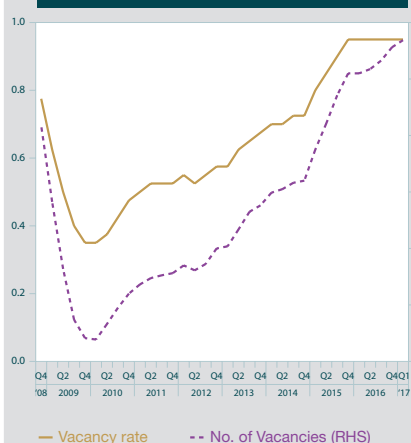
Box D: Job Vacancy Rate and the Irish Labour Market

Suzanne Linehan, Tara McIndoe-Calder and Diarmaid Smyth¹⁴

The labour market has yielded the most tangible evidence of recovery following the economic and financial crisis. Since the nadir of 2012, numbers at work have increased by approximately 225,000, with the unemployment rate more than halving from over 15 per cent to 6.8 per cent in the first quarter of 2017 according to the *Quarterly National Household Survey (QNHS)*.¹⁵ Given the speed and magnitude of this fall in unemployment, a key issue going forward will be the capacity of the labour market to continue adding jobs in the years to come. This Box analyses data on the number and sources of job vacancies¹⁶ and considers its usefulness as an indicator of both labour demand and potential skills mismatch in a Beveridge curve setting.

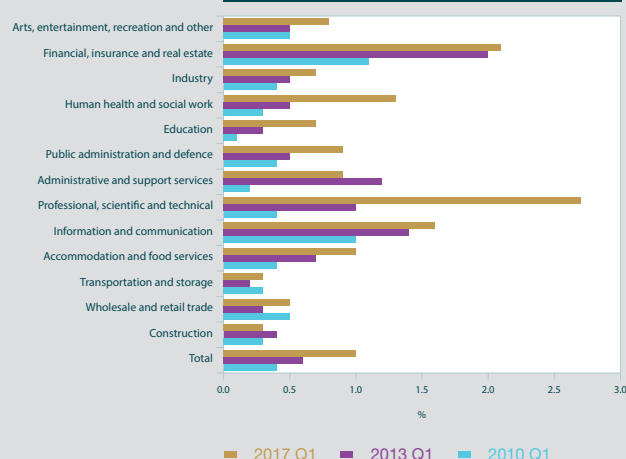
Following a pronounced decline throughout 2008/2009, a clear and consistent upward path has been evident in both the number and rate of job vacancies¹⁷ since early 2010, as illustrated in Figure 1 using data from the *Quarterly Earnings and Hours Worked Survey*. It can be difficult to observe significant movements in the vacancy rate series, as changes in the actual number of vacancies tends to be small relative to the total number of occupied jobs. For instance, the number of vacant jobs rose by 6.4 per cent year-on-year in the first quarter of 2017 yet the vacancy rate was unchanged over the period.

Box D Figure 1: Job vacancy data, 4-quarter moving average



Source: CSO.

Box D Figure 2: Vacancy rate by sector



Source: CSO.

¹⁴ Irish Economic Analysis Division.

¹⁵ The CSO estimated that the seasonally adjusted monthly unemployment rate declined further to 6.3 per cent in June of this year.

¹⁶ A job vacancy is defined as a newly created, unoccupied, or about to become vacant post on a specific reference date. A post open to internal candidates only is not considered a job vacancy.

¹⁷ The job vacancy rate is defined as the ratio of job vacancies to vacancies and occupied positions.

Box D: Job Vacancy Rate and the Irish Labour Market
Suzanne Linehan, Tara McIndoe-Calder and Diarmaid Smyth

A breakdown of the vacancy data by sector points to considerable heterogeneity (Figure 2). Four sectors – the professional and scientific services, health and social work, financial, insurance and real estate and the accommodation and food activities sectors – account for nearly half of economy-wide vacancies. Furthermore, these sectors have had consistently high vacancy rates as highlighted in the Figure for three selected sub-periods. This could suggest the existence of skills mismatches and pressures within these sectors. Of particular concern is the professional, scientific and technical activities sector, which recorded a vacancy rate of 2.5 per cent in the first quarter of 2017, more than double that of the economy-wide average.

Labour Demand Indicator

Trends in the number of job vacancies are a potentially useful leading indicator of how employment might evolve in the short-term. There is a strong positive correlation between the growth in the number of job vacancies and in the number of people starting new jobs in subsequent quarters based on micro data from the *QNHS*, as illustrated in Figure 3. Exploring the relationship more formally suggests that a 10 per cent increase in the number of job vacancies corresponds to a 4 per cent increase in the total number of jobs created in the subsequent quarter (Table 1, Column 1). This relationship is strongest for job-to-job transitions confirming the adage that it is easier to get a new job if you already have a job. Lagged changes in vacancies are also useful in explaining net employment change (i.e. job creation less job destruction) (Table 1, Column 3), albeit to a lesser extent.

Table 1: Relationship between New Job Creation and the Number of Vacancies

	(1)	(2)	(3)
	% Δ NJ (New jobs created)	% Δ NJ (job-to-job flows)	% Δ E _t (net employment change)
% Δ NV _{t-1}	0.399*** (12.54)	0.658*** (8.305)	0.0782*** (7.171)
Observations	35	35	35
R ²	0.827	0.676	0.609

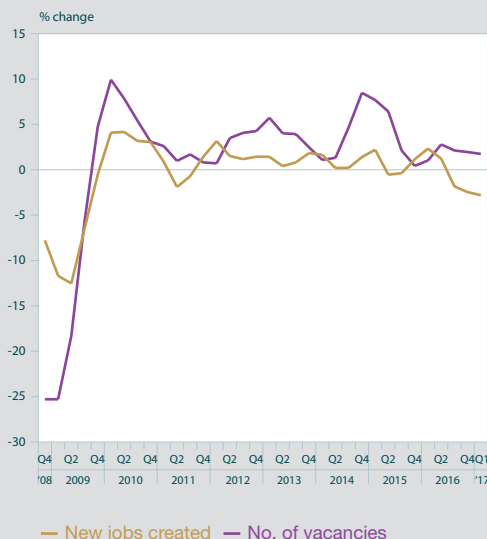
Note: t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

NJ_t represents the number of number of people in employment who started a new job in the last three months and NV_{t-1} is the number of vacancies (seasonally adjusted) at time t-1.

To explore the usefulness of the vacancy series further, we included vacancies in a standard employment equation. In Figure 4, we show actual and fitted employment series (in log form and seasonally adjusted) over the period end-2008 to 2017Q1. The fit of the lagged employment equation improves noticeably with the inclusion of the vacancy data. This suggests that the job vacancy series contains some potentially useful information for anticipating movements in employment.

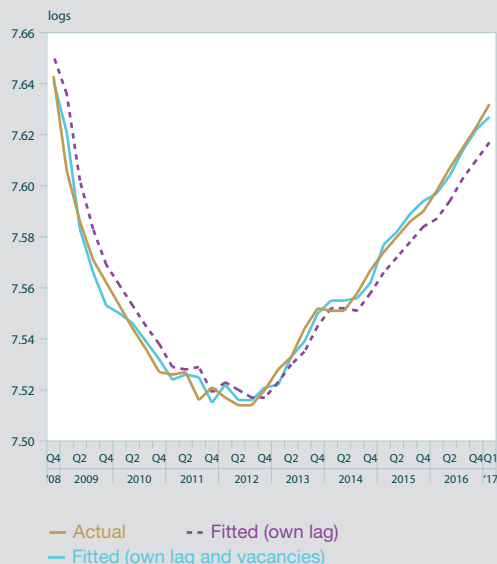
Box D: Job Vacancy Rate and the Irish Labour Market
Suzanne Linehan, Tara McIndoe-Calder and Diarmaid Smyth

Box D Figure 3: New jobs created and the number of job vacancies, growth rates



Source: CSO.

Box D Figure 4: Actual and fitted employment with and without vacancies



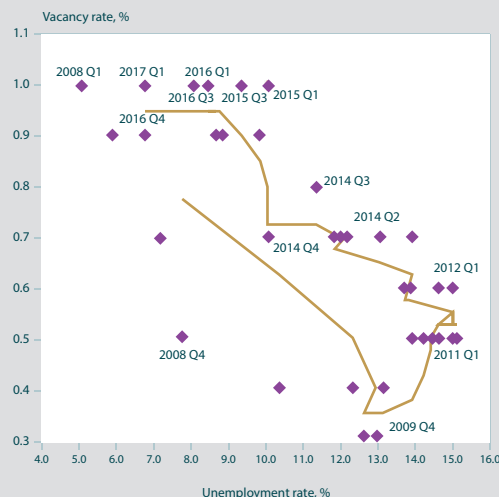
Source: Authors' Calculations.

Skills Mismatch

A Beveridge curve plots vacancies against unemployment and can be used to highlight potential skills mismatches. In simple terms, when the job matching process is functioning well, the curve shows a negative relationship between the unemployment rate and the vacancy rate. If, for instance, the number of vacancies rises and the unemployment rate does not fall, it may be an indication of problems of mismatch due, for instance, to periods of uneven growth by geographic location, skill or by sector. Typically, cyclical fluctuations in economic activity tend to generate movements along the curve - vacancies are low and unemployment high during contractionary phases of the cycle and vice versa during expansions. In contrast, shifts in the curve can point to structural changes in the economy.

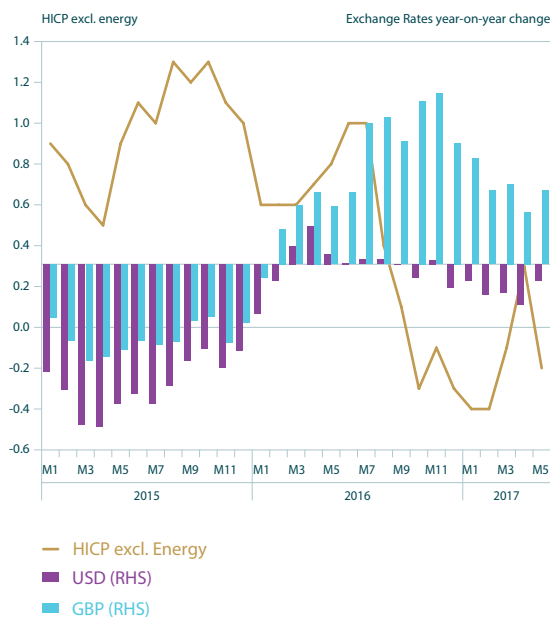
Ireland's Beveridge curve is shown in Figure 5 from the first quarter of 2008 to the first quarter of 2017. As the economic and financial crisis took hold during 2008/2009, the vacancy rate fell sharply while the unemployment rate rose significantly, as evidenced by the pronounced move downwards and outwards in the curve. Despite a modest pickup in the vacancy rate from its trough in the final quarter of 2009, the unemployment rate continued to rise until the first quarter of 2012, producing a further, albeit less sharp, outward movement of the curve, consistent with an increase in the level of structural unemployment. Since employment began to recover in the final quarter of 2012, a pattern of declining unemployment with a gradual rise in the vacancy rate has been evident. The latest observations points to potentially quite tight labour market conditions as the curve is at its highest point since the 2008 construction boom era.

Box D Figure 5: Beveridge curve



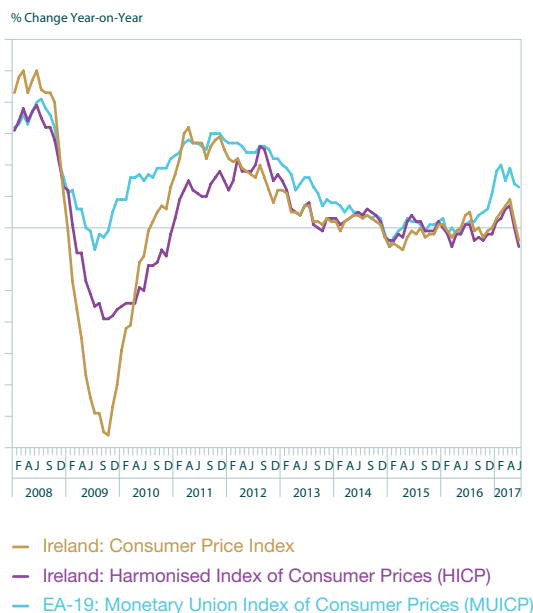
Source: CSO, Authors' Calculations.

Chart 5: Irish Inflation and Exchange Rate Changes



Source: Eurostat.

Chart 6: Consumer Prices



Source: CSO.

Pay

Reflecting strong employment growth and some increase in wage rates, the pay bill is expected to increase over the forecast horizon, by 6.2 and 5.3 per cent in 2017 and 2018, respectively. This builds on an annual increase of 5.4 per cent in 2016 according to the NIE. Furthermore, the current momentum and prospects for the labour market, as outlined above, will provide further support to income growth over the forecast horizon. It is envisaged that wage growth will average 3.1 per cent per annum in 2017 and 2018.

Inflation

Consumer Prices

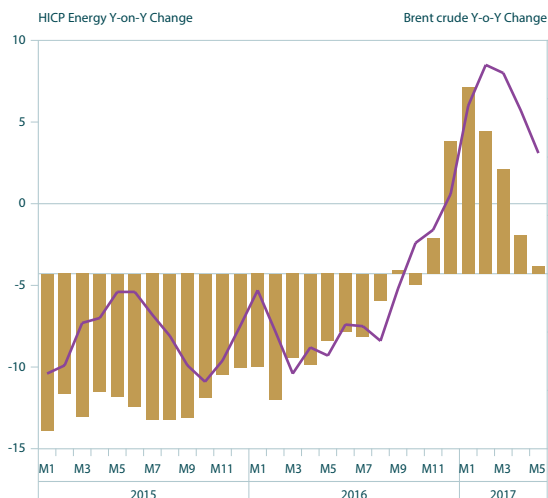
Inflation in Ireland remains subdued as domestic services price pressures are offset by price declines in imported goods. The Harmonised Index of Consumer Prices (HICP) registered an increase of just 0.2 per cent year-on-year in the January to June period, registering a month-on-month decline of 0.6 per cent in June 2017. Headline HICP

returns to negative territory when the energy component is excluded, as in Chart 5. For the January to June period, HICP excluding energy recorded a decline of 0.3 per cent. Weakness in sterling is likely contributing to downward pressure on consumer prices in Ireland as imports from the UK become less expensive.¹⁸ All else being equal, a rise in the value of the euro relative to sterling (a decline in sterling) serves to decrease the euro price that foreign producers selling in Ireland need to charge to maintain profits in their own currency.

In line with the trend for the last number of years, negative goods price inflation almost offset positive services price inflation (Chart 8). For the January to June period, negative goods price inflation measured 2.4 per cent with positive services inflation of 2.6 per cent, leaving the overall HICP rate slightly positive. The price of food, clothing and industrial goods all contributed to the negative trend in the goods side, down 1.6, 4.1 and 6.3 per cent respectively. On the services side, continued increases in residential rents, financial services and insurance prices are the driving factors behind recent increases. Energy prices for

¹⁸ See "Exchange Rate Pass-Through to Domestic Prices," Reddan and Rice (2017).

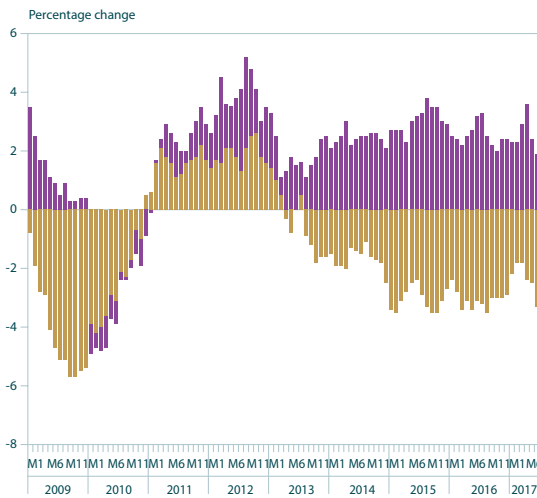
Chart 7: HICP Energy and Oil Prices



— HICP Energy
■ Oil Prices \$ (RHS)

Source: Eurostat and Bloomberg.

Chart 8: HICP Inflation



■ Goods ■ Services

Source: Eurostat.

consumers, while still positive year-on-year at 5.2 per cent, have softened in the last number of months and recent oil prices decreases are the main factor behind this (Chart 7).

Over the coming year, the negative price impetus coming from the goods side of consumer prices is expected to continue, although the rate of decline is likely to moderate as food and commodity prices recover on the international front. Goods prices are forecast to decline by 2.1 per cent in 2017, following a decline of 3.1 per cent in 2016. With improving labour market conditions, domestic cost pressures are likely to increase. Services prices, are expected to increase by 2.5 per cent this year following an increase of 2.5 per cent in 2016.

Overall, headline HICP inflation is expected to increase by just 0.3 per cent in 2017, a downward revision from 0.7 per cent in the previous *Quarterly Bulletin*. HICP excluding energy is expected to remain flat in 2017. Based on current assumptions for oil prices, exchange rates and international commodity prices, and the outlook for earnings and the labour market, inflation is forecast to increase to 1 per cent in 2018.

Residential Property

Residential property prices increased by 11.9 per cent in May on an annual basis. Prices excluding Dublin increased by 12.8 per cent, while prices in the capital grew by 11.2 per cent over the period. While year on year growth rates may be affected by changes that occurred in the market at the end of 2016/early 2017, growth rates have remained strong in the first half of the year. Prices grew by 3.1 per cent in the 3 months to May.

On the rental side, the year-on-year growth rate in the HICP rent index was 7.6 per cent in May. The series is now at its highest level since 2003. The PRTB/ESRI rent index for the first quarter of 2017 showed that rents grew by 7.4 per cent in annual terms nationally. However, rents in Dublin fell by 1.5 per cent on a quarterly basis in Q1 2017, driven mainly by a fall in the rental price of Dublin apartments.

On the supply side, latest data suggests there were 3,896 units completed in the first three months of the year, 23 per cent more than in the same period in 2016.²⁶ In 2016, planning permission was granted for 21,099 units.

Table 5: Inflation Measures - Annual Averages, Per Cent

Measure	HICP	HICP excluding Energy	Services ^a	Goods ^a	CPI
2012	1.9	0.9	1.9	1.9	1.7
2013	0.5	0.6	1.6	-0.4	0.5
2014	0.3	0.5	2.5	-1.7	0.2
2015	0.0	1.0	3.0	-3.1	-0.3
2016	-0.2	0.4	2.5	-3.1	0.0
2017 ⁱ	0.3	0.0	2.5	-2.1	0.7
2018 ⁱ	1.0	1.0	2.8	-1.0	1.3

^a Goods and services inflation refers to the HICP goods and services components

Box E: Assessing the Irish real rate from the recently issued inflation linked bond

By Thomas Brophy¹⁹

Inflation-linked bonds (ILBs) have principal repayment and interest payments linked to an inflation index, typically with the principal protected at the maturity date. On 20 April, the National Treasury Management Agency (NTMA) announced the issuance of Ireland's first ILB for an amount of €609.5 million. This was a private placement, with the interest and principal repayments linked to the Eurostat Harmonised Index of Consumer Prices (HICP) for Ireland, excluding tobacco. The bond will redeem in April 2040 and the real yield at issue was 0.25 per cent. This box aims to decompose the real yield at issue into the Irish real interest rate and a liquidity premium from the recently issued Irish ILB.

Overview of Inflation-Linked Bond rates

One can define the nominal yield on a conventional bond as being comprised of a real yield, inflation expectations, a liquidity premium in addition to a risk premium (for factors such as credit risk and inflation uncertainty). Equation 1) below highlights this relationship:

- 1) $\text{Nominal yield} = \text{real yield} + \text{inflation expectation to maturity} + \text{liquidity premium} + \text{other risk premia}$

In bond markets, break-even inflation rates are calculated from the spread between the yield on nominal bonds and the real yield of ILBs with a similar maturity and credit quality. Break-even inflation rates provide an indication of inflation expectations priced by the market.²⁰ However, ILBs are typically less liquid than their nominal peers, and therefore can yield a liquidity premium above their nominal counterparts. This in turn can lower the break-even inflation rate estimated from bond markets.

Inflation swaps can mitigate the issue of a liquidity premium and provide a somewhat cleaner market price for future inflation. In a typical inflation (zero-coupon) swap, investors swap a fixed rate (the inflation swap rate) versus the actual accrued inflation rate occurring over the life of the swap. Due to this design, the quoted fixed rate represents the average annual inflation expected over the term of the swap.

Using inflation swaps rates, the real yields on ILBs can be adjusted for the liquidity premium in three steps:

- i) the relevant sovereign nominal yield is selected in the market;
- ii) the inflation rates based on inflation linked swap rates are obtained;
- iii) the real yield is calculated as the difference between the nominal yield and the inflation swap rate.

¹⁹ Financial Markets Division.

²⁰ For example, if the actual inflation over the life of the bond is higher than the break-even inflation rate as of the date of purchase, investors would earn a higher return holding ILBs relative to nominal bonds while having a lower inflation risk.

Box E: Assessing the Irish real rate from the recently issued inflation linked bond
By Thomas Brophy

Analysis of Irish and selected euro area rates

A liquidity premium is likely to be embedded in the real yield on the Irish ILB as it was a private placement and it was also the first ILB issued by the Irish sovereign. Comparisons with other markets are based on yields as of the date of the Irish ILB issue (20 April). Table 1 below illustrates the Irish 2040 (interpolated) nominal yield and the ILB yield on 20 April (rows 1 and 2), and a comparison with the equivalent French bonds.²¹ The table also illustrates the break-even inflation rate (row 3), calculated as the difference between the nominal yield and the equivalent ILB rate (row 1 minus row 2).

Table 1: Estimate of selected euro area break-even inflation rates (20 April 2017)²²

Row	Calculation	Country	Ireland	France
		Year	2040	2040
1		Nominal yield (%)	1.83	1.63
2		ILB (real) rate (%)	0.25	0.12
3	1 minus 2	Inflation breakeven rate (%)	1.58	1.51

On the basis of estimates from sovereign bonds, Ireland and France have break-even inflation rates of 1.58 per cent and 1.51 per cent respectively (per row 3 of Table 1). The break-even inflation rates outlined in Table 1 can be compared to inflation swap rates for the equivalent maturity (which can be obtained through interpolation of the relevant rates). However, as there is no swap market for the index underlying the Irish ILB, other euro area swap markets are used as a proxy. Table 2 below illustrates the (interpolated) inflation swap rates for the year 2040 for certain inflation indices. French inflation swaps are used in the estimate owing to the significant liquidity of this market. Euro area inflation swaps are included for a broader representation of longer-term inflation expectations.

Table 2: Inflation swap rates for selected euro area indices (2040)

	Eurozone HICP (excl. tobacco)	French HICP (excl. tobacco)
Inflation swap rate (%)	1.76	1.99

By estimating the liquidity premium using the inflation swap rates outlined in Table 2 and the inflation breakeven rate in Table 1, one can provide an estimate of real rates adjusted for the liquidity premium inherent in ILBs.

Table 3 below provides estimates of the real rate in Ireland adjusted for the liquidity premium on the basis of the inflation rate swaps outlined in Table 2 (see columns 1 and 2 below).²³ For France (column 3), the inflation swap rate for the French HICP index (excluding tobacco) has been used. The adjusted real interest rate is given by subtracting the liquidity premium from the rate on the ILB.

Table 3: Estimates of real rates adjusted for the liquidity premium

		Column	1	2	3
Calculation	Rows	Category	Ireland (Adjusted with French HICP swap) (%)	Ireland (Adjusted with Euro HICP swap) (%)	France (%)
	1	Nominal yields	1.83	1.83	1.63
	2	Inflation swap rate	1.99	1.76	1.99
	3	Break-even inflation rate (estimated from bond markets)	1.58	1.58	1.51
Row 2 minus Row 3	4	Estimated liquidity premium	0.41	0.17	0.48
	5	Inflation linked bond rate (20 April)	0.25	0.25	0.12
Row 5 minus Row 4	6	Estimated real rate (adjusted for liquidity premium)	-0.16	0.08	-0.36

²¹ Given that there is no nominal Irish bond with a maturity equivalent to the recently issued ILB (23-years), this is the implied yield when the Irish 2037 and 2045 bond yields are linearly interpolated.

²² The French ILB real rate has been adjusted to take seasonal adjustments into account.

²³ Since there is no Irish inflation swap market, Eurozone and French inflation swaps are used as a proxy as it is assumed that future Irish inflation will be in this range.

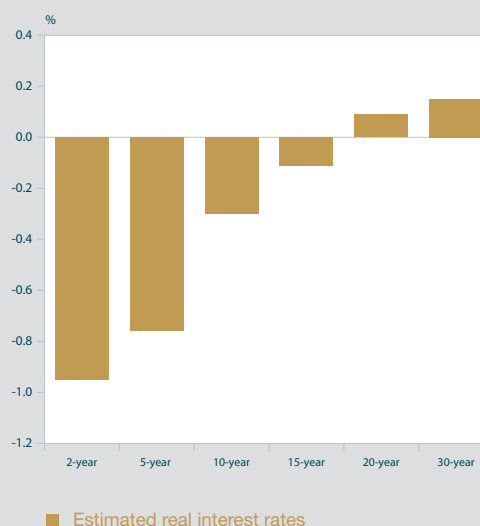
Box E: Assessing the Irish real rate from the recently issued inflation linked bond*By Thomas Brophy*

The liquidity premia in Table 3 are estimated as the difference between the relevant inflation swap rates in row 2 and the break-even inflation rates estimated from bond markets in row 3. The result is illustrated in row 4. This liquidity premium is then subtracted from the inflation linked bond rate in row 5. The estimated real rate adjusted for the liquidity premium is illustrated in row 6. For Ireland, this gives an estimate in the range of minus 0.16 per cent (column 1) to positive 0.08 per cent (column 2).²⁴ This real yield can vary depending on sovereign supply and investor demand, in addition to risk premia prevailing in the market.

The estimate of the Irish real rate in Table 3 is based on available market information on 20 April 2017. An average of the real interest rate over a period of time can provide a more representative estimate. Separate estimates can also be taken from various points on the yield curve to illustrate the term structure of Irish real interest rates. Chart 1 below illustrates the estimated average term structure of Irish real interest rates since the beginning of 2015, with the liquidity premium adjusted for Eurozone inflation swaps (similar to the calculation in column 2 of Table 3). This period is in line with the start of the Eurosystem's expanded asset purchase programme.²⁵

The chart illustrates that the real interest rate is highly negative at the short end of the curve, which is driven by negative Irish nominal sovereign yields. Real rates are observed to increase along the curve as nominal interest rates trade in positive territory. While these average real rates have the advantage of smoothing volatility, more recent observations show that real interest rates have continued to decline. The estimated range for the Irish real interest rate (outlined in Table 3) is observed to be consistent with the average real rate at the 20-year segment of the yield curve (at 0.09 per cent) illustrated in Chart 1.

Box E Chart 1: Irish Term Structure of Real Interest Rates based on Eurozone Inflation Swaps (%) - Average (2015 - present)



Source: Bloomberg, own calculations.

²⁴ Certain nominal yields and inflation swap rates have been calculated based on an interpolation of bond yields and inflation swaps across the curve, which can reduce the precision of the estimate.

²⁵ It should also be noted that a 20-year benchmark nominal bond was issued by the NTMA on 4 January 2017, before which there was no such bond outstanding for the period under review.

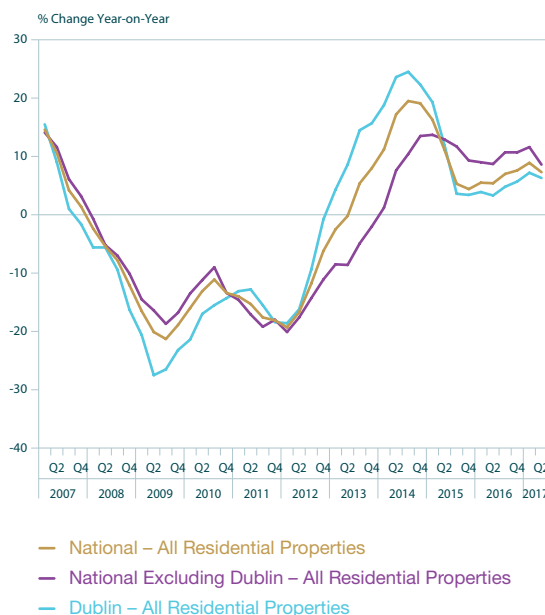
Commercial Property

The latest data from the MSCI/IPD database show that the pace of growth in commercial property prices has moderated in recent quarters. Overall, commercial property prices grew by 6.2 per cent year on year in the first quarter of 2017. On an annual basis the office,

retail and industrial sectors grew by 6.2, 6.3 and 9.2 per cent respectively. The Bank's *Macro Financial Review* conducts a detailed review of developments in the commercial property sector.

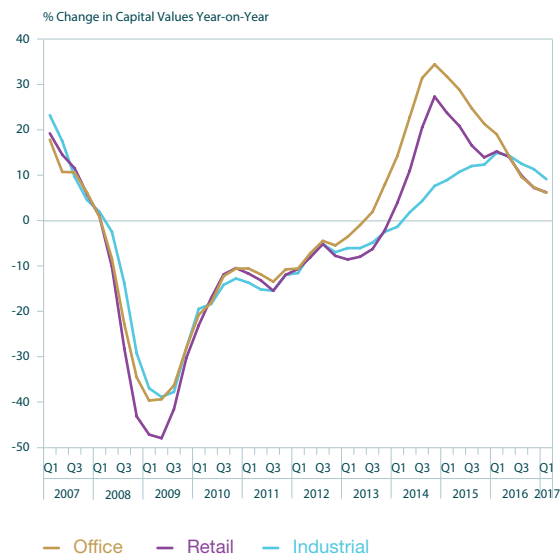
²⁶ Housing completions are measured using the number of electricity connections. It is likely that the published figure represents an upper bound on the estimate of completions.

Chart 9: Residential Property Price Indices



Source: CSO.

Chart 10: MSCI/IPD Irish Commercial Property Index



Source: MSCI/IPD.

Competitiveness

Sterling has remained weak in relation to the euro through 2017 to date. The euro averaged £0.86 from January to mid-July and has fluctuated higher at times, peaking at £0.89. The euro opened 2017 at \$1.05 but has appreciated in recent months, averaging \$1.13 from the start of June to mid-July. On an annual basis to mid-July, the euro was 2.6 per cent stronger in relation to the dollar and 5.7 per cent stronger in relation to sterling.

The latest Harmonised Competitiveness Index (HCI) data for June 2017 show that the nominal HCI increased by 1.8 per cent on an annual basis. In real terms, the HCI fell by 0.6 per cent when deflated with consumer prices and rose by 2.9 per cent when deflated with producer prices. These developments suggest some decline in competitiveness in Ireland, likely linked to the exchange rate movements outlined above, although weakness in consumer price inflation may be offsetting some of this fall.

The Public Finances

2016 Deficit and Debt Outturns

The latest Government Finance Statistics reported a general government deficit of 0.7 per cent of GDP in 2016, down from 1.9 per cent in 2015. This continued the run of strong deficit reductions that started in 2010 when the underlying balance improved from -10.8 to -9 per cent of GDP in 2011. The 2016 outturn was somewhat stronger than expected, following Eurostat's ruling that a €555 million EFSF rebate be treated as once off capital transfer revenue in that year.²⁷ The pace of deficit improvement last year also benefited from a 2015 capital transfer to AIB falling out of the base. Accordingly, the change in the underlying balance was a more modest 0.7 per cent of GDP (see Chart 11). In the case of public debt, the general government debt-to-GDP ratio continued its improving trend last year, declining from 76.9 to 72.8 per cent. The debt ratio has declined rapidly in recent years, although it should be stressed that it remains very high relative to its pre-crisis

²⁷ For a more detailed explanation of this transactions see the Background Notes of the CSO's April 2017 annual GFS release <http://www.cso.ie/en/releasesandpublications/er/gfsa/governmentfinancestatisticsapril2017/>

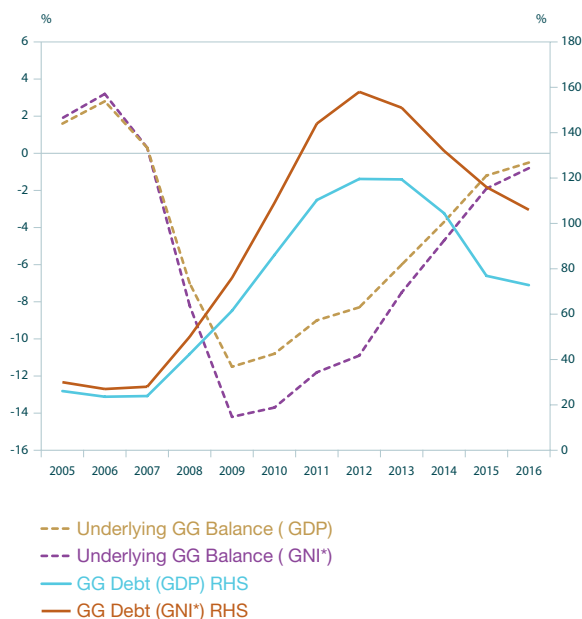
trough. Furthermore, the pace of improvement has been overstated in recent years by the use of GDP as the denominator. Using the new measure of GNI* as an alternative base shows a much higher debt ratio of 106 per cent in 2016, emphasising its elevated level (see Box B for more details). The general government balance as a percentage of GNI*, meanwhile, was -1 per cent in 2016.

Exchequer Returns

While the Exchequer ran a large surplus in the first six months of the year, this was driven by once off AIB share sale receipts. Excluding this revenue - and other transactions that do not have an impact on the general government balance - the Exchequer ran a deficit of €2 billion in the year to June (see Table 6).²⁸ This outturn was €500 million (20.1 per cent) better than expected as lower than anticipated government expenditure offset below profile revenue.

Although revenue grew by a solid 2.8 per cent in the first six months of the year, this was some €118 million (0.4 per cent) below the profile underpinning the Budget. This primarily reflected developments on the tax side, where robust growth of 4 per cent was nevertheless below expectations. Quite mixed developments occurred across tax heads. Income tax, excise and stamp duties were all weaker than anticipated; the former was a notable 2.3 per cent below its target despite being underpinned by positive labour market developments. Developments in VAT, on the other hand, surpassed expectations by some 3 per cent, while corporation tax - a key driver of revenue over-performance in recent years - was on target after a weak start to the year. The evolution of the other revenue components was broadly as expected, with strong growth in PRSI receipts a highlight (5.5 per cent annual growth). Government expenditure, by comparison, was significantly lower than forecast at the halfway point of the year. Spending was 3 per cent higher in annual terms, with annual increases in both

Chart 11: GG Balance and GG Debt Ratios



Source: CSO.

current and capital spending – led in nominal terms by developments in housing, education and health - offsetting a strong decline in interest payments. Expenditure in all three of the categories was below expectations, however, and in the case of current spending considerably so (by €489 million or 1.8 per cent). This partly reflects timing factors related to payment of the EU Budget Contribution which will unwind in the second half of 2017. It should also be noted that spending was below profile at this stage of both 2015 and 2016 before ending the year considerably above target following mid-year supplementary spending. Nevertheless, the overall Exchequer position at the mid-point of the year is a favourable one and suggests the Government is on target to achieve the projections it made at Budget time.

Funding and Other Developments

The Government has begun the process of divesting its stake in Allied Irish Bank, selling 29 per cent of its holding at an initial public offering (IPO) in June. The IPO generated

²⁸ The Government reports this figure – the Exchequer balance excluding transactions with no general government impact – in its Analytical Exchequer Statement, to provide a closer approximation to the general government balance (GGB). Given the importance of the general government measure from an international and fiscal governance perspective, the figures in the remainder of this section are reported on this basis. In other words, they exclude transactions that do not affect the GGB.

Table 6: Analytical Exchequer Statement for June 2016 (€ millions)

	Jan-June 2017 €m	Jan-June 2016 €m	Annual Change (%)	Outturn vs Profile (%)
Revenue	30,356	29,516	2.8	-118
– Tax revenue	23,415	22,523	4.0	-110
– Appropriations-in-aid	5,619	5,505	2.1	-7
– Other Revenue	1,322	1,458	-11.1	0
Expenditure	32,400	31,460	3.0	-632
– Current Primary Expenditure	27,240	27,728	4.5	-489
– Capital Expenditure	1,523	1,219	24.9	-57
– Interest on National Debt	3,637	4,182	-13.0	-86
Balance	-2044	-1944	-5.1	514

Source: Department of Finance

Note: The figures in the Table exclude transactions with no general government impact, giving a closer approximation to the General Government balance.

€3.4 billion for the Exchequer and valued the Government's remaining stake at €8.6 billion. The funds raised are being used to pay down the national debt, an appropriate decision given the role of bank support measures in increasing general government debt during the crisis.

The State's funding requirements for 2017 are relatively modest, with €6.3 billion of bonds set to mature over the course of the year and an Exchequer deficit of just over €2 billion projected in April's Stability Programme Update (SPU). Against this backdrop, the National Treasury Management Agency (NTMA) set an issuance target of €9 to €13 billion for the year and had already surpassed the lower bound of that target in July, having issued €9.5 billion of benchmark bonds in the first seven months of the year. Recent months also saw a further €1 billion of floating rate treasury bonds cancelled. As a result €7.5 billion of these long dated bonds – issued in connection with the liquidation of Irish Bank Resolution Corporation – have now been cancelled, with €17.5 billion still outstanding.

Tráchttaireacht

Tá borradh maith i gcónaí faoi gheilleagar na hÉireann agus táthar ag tuar go leanfaidh an fás tréan leanúnach ar aghaidh agus is cosúil nach dtiocfaidh ach maolú beag ar an mborradh sin i mbliana agus sa bhliain 2018. Is é atá ag cur dlúis faoin mborradh, den chuid is mó, a fheabhas atá an ghníomhaíocht intíre sa gheilleagar, ar tháinig borradh mór air in 2016 agus a raibh dlús tréan faoi i mbliana. Tá cuma mhaith ar chúrsaí agus sinn ag féachaint romhainn amach, cé go bhfuil roinnt baol agus éiginnteachtaí ag baint leis.

Chuir fás ar an éileamh intíre dlús faoin mborradh le roinnt blianta anuas, arb é atá ann tomhas an chaithimh intíre gan gnéithe luaineacha infheistíochta i nithe doláimhsithe agus i léasú aerárthaí san áireamh, agus tháinig fás 4.7 faoin gcéad air anuraidh. Chuir fás láidir agus leathan san fhostaíocht, atá ag fás ag an ráta is tapúla le deich mbliana anuas, lena fheabhas a bhí an ghníomhaíocht sa ghné intíre den gheilleagar. Chuidigh forbairtí dearfacha sa mhargadh saothair le téarnamh ó thaobh ioncaim de agus thacaigh siad le fás láidir ar chaiteachas tomhaltóirí le blianta beaga anuas. Maidir le cúrsaí infheistíochta, tugann an fhianaise le tuiscint go bhfuil dlús i gcónaí faoin téarnamh ó thaobh gnéithe intíre de, go háirithe infheistíocht san fhoirgníocht agus infheistíocht neamhthógála, cé gur tosaíodh ó bhonn sách íseal.

Agus sinn ag féachaint chun cinn, táthar ag tuar go leanfaidh an t-éileamh intíre ar aghaidh ag cur dlúis faoin bhfás don tréimhse intomhaiste agus meastar go gcuirfidh feabhsú breise fostaíochta agus ioncaim a thuilleadh dlúis faoin bhfás sin. Bunaithe ar fhianaise de láidreacht leanúnach sa mhargadh saothair, rinneadh na teilgin maidir le fás fostaíochta a ardú ón Bulletin deiridh, ach, tar éis tréimhse de mhéaduithe an-mhór, meastar go maolóidh an fás san fhostaíocht an bhliain seo chugainn. Tugann an teilgean is dearfaí ó thaobh an mhargaidh shaothair de leasú chun méadaithe ar an teilgean le haghaidh fáis sa bhonnéileamh intíre le fios, rud a léiríonn teilgin infheistíochta beagán níos airde freisin.

Maidir leis an taobh seachtrach den gheilleagar, tá fianaise ann go bhfuil fás easpórtála ag dul chun bisigh agus leasaíodh teilgin um fhás sna tíortha príomha comhpháirtíochta trádála chun bisigh, cé is moite d'aon luaineacht a d'eascródh as monaraíocht ar conradh, agus dá réir sin leasaíodh na teilgin ó thaobh fás easpórtála chun bisigh freisin.

Dá thoradh sin, leasaíodh na teilgin um fhás i mbliana agus do 2018 chun bisigh, rud a léiríonn móiminteam láidir sa gheilleagar intíre agus ionchais níos fearr ó thaobh éilimh sheachtraigh. Cé go bhfuil cuma mhaith ar an lárteilgean, áfach, tá baol ag baint leis na teilgin sin. Faoi mar is amhlaidh le tamall anois, tá éiginnteacht ann ó thaobh na timpeallachta seachtraí de, idir Bhreathimeacht agus rioscaí a bhaineann leis an mbaol go n-athrófaí cánachas idirnáisiúnta teorann agus comhshocraíochtaí trádála. De cheal aon eolais bhreise a bhaineann leis na rioscaí sin, ní dhearna an Banc aon leasú eile ar a chuid teilgean faoi láthair ach, mar a luadh in Bulletins roimhe seo, is cosúil go mbeidh iarmhairt ábharach agus dhiúltach gheilleagrach ag an mBreathimeacht ar Éirinn, sa ghearrthréimhse agus san fhadtréimhse araon.

Maidir le forbairtí geilleagracha intíre a fhaire agus a thomhas, faoi réir mholtaí Ghrúpa Athbheithnithe na Staitisticí Geilleagracha (ESRG), d'fhoilsigh an Phríomh-Oifig Staidrimh (CSO) roinnt táscairí forlíontacha geilleagracha le déanaí d'fhonn a thuilleadh eolais a chur ar fáil faoi iarmhairt an domhandúcháin ar ghníomhaíocht gheilleagrach intíre. I measc na mbeart nua, foilsíodh torthaí tosaigh bliantúla do GNI* leasaithe mar aon le beart ráithiúil bonnéilimh intíre (éileamh intíre leasaithe). Sa sainmhíniú a dhéantar ar GNI* fágтар ar lár iarmhairtí an domhandúcháin a chuireann tomhas mhéid an gheilleagair as riocht agus, dá bhrí sin, tugann an beart nua táscaire cuí leasaithe leibhéil i dtaca le méid an gheilleagair intíre agus cuireann sé slat tomhais níos réalaíche ar fáil chun féichiúnas a mheas san earnáil phríobháideach agus an earnáil phoiblí araon.

Fágann GNI* iarmhairt comhlachtaí ath-shainchónaithe agus dímhéas táirgí maoiné intleachtúla agus léasú aerárthaí ar lár ó GNI. Ach a ndéantar amhlaidh, is ionann an leibhéal

ainmniúil GNI* agus um dhá thrían den leibhéal ainmniúil GDP in 2016. Dá thoradh sin, bíonn cóimheasanna Fiachais agus Easnaimh Ghinearálta Rialtais a ríomhtar agus GNI* á úsáid mar ainmneoir i bhfad níos airde ná mar a bheadh dá n-úsáidí GDP mar bhonn. B'ionann Fiachas Ginearálta Rialtais mar chéatadán de GNI* agus 106 faoin gcéad in 2016, figiúr atá breis is 30 pointe céatadán ní b'airde ná an cóimheas fiachais 73 faoin gcéad a bheadh ann dá n-úsáidí GDP mar ainmneoir, cé gur thit an dá chóimheas go mór ó bhain siad buaicphointe amach in 2012. Ar an gcaoi chéanna, tá fiachas theaghlaigh na hÉireann níos airde nuair a úsáidtear GNI* chun méid an gheilleagair a thomhas. Tríd is tríd, ach a n-úsáidtear GNI* chun méid gheilleagar na hÉireann a thomhas, tugtar le fios, in ainneoin gur tháinig ísliú ar an bhfiachas poiblí agus príobháideach araon le blianta beaga anuas, go bhfuil cóimheasanna fós ard de réir caighdeán stairiúil agus idirnáisiúnta, rud a leagann béim ar a thábhachtaí atá sé a chinntiú go mbíonn beartais um an ngeilleagar intíre dírithe go daingean ar thaca a chur faoin gcobhsaíocht agus an éiginnteacht a laghdú.

Financing Developments in the Irish Economy

Overview

Household debt sustainability metrics have improved in recent months, continuing a trend which has been evident since 2012. Irish households reduced debt as a proportion of disposable income more than any country in the European Union (EU) over the past year. This reduced debt combined with increases in asset values, resulted in household net wealth increasing by 1.1 per cent in Q4 2016. Outstanding mortgage loans decreased in net terms, although new lending exhibits strong growth. Mortgage arrears continue to decline and now account for 7.2 per cent of the number of outstanding loans. Indicators of household debt sustainability have continued to improve and Irish household debt has continued to fall at a faster rate than that observed for the euro area as a whole.

Private sector debt as a proportion of GDP increased by 7.6 percentage points over Q4 2016 to stand at 293.9 per cent. The increase in private sector debt is predominantly due to an increase in the stock of non-financial corporations (NFCs) loans of €21.9 billion. Household debt decreased over the period, albeit to a much lesser extent. The increase in private sector debt was partly offset by the continuing increase in GDP over the period, as annualised GDP increased by a further 1.1 per cent. On a year-on-year basis, private sector debt as a proportion of GDP has fallen by 28.7 percentage points. It should be noted that private sector debt in Ireland is significantly influenced by large multinational corporations (MNCs), and that restructuring by these entities has resulted in extremely large movements in Irish private sector debt, particularly from 2014 onwards. In spite of a significant fall relative to its peak in Q1 2015, Irish-resident NFCs continued to be the second most indebted in the EU.

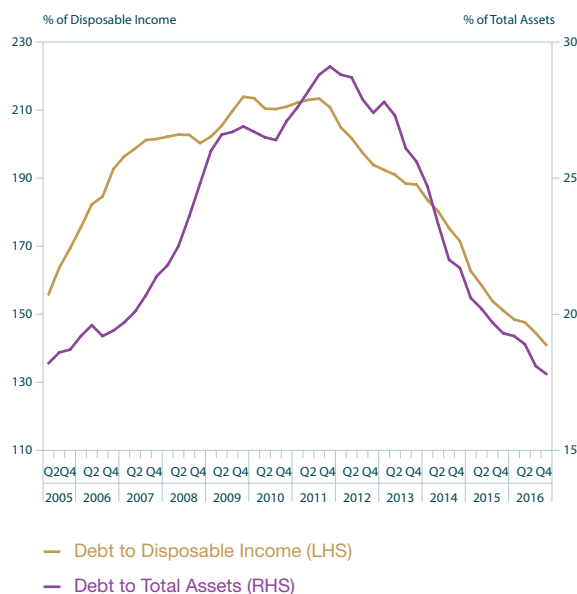
Growth of the non-bank financial industry continues with the number of financial vehicle corporations (FVCs) registered in Ireland reaching the highest level on record by Q1 2017. The net asset value (NAV) of both investment funds (IFs) and money market funds (MMFs) resident in Ireland increased over Q1 2017. In the case of the former, equity holdings experienced large positive revaluations between Q4 2016 and Q1 2017. This was primarily attributable to NFCs' equities.

Household Sector

Irish household debt as a proportion of disposable income has fallen more than any other EU country in recent years. Despite this, Irish households remain the fourth most indebted in the EU. Indicators of household debt sustainability have continued to improve (Charts 1 and 2). The ratio of debt to

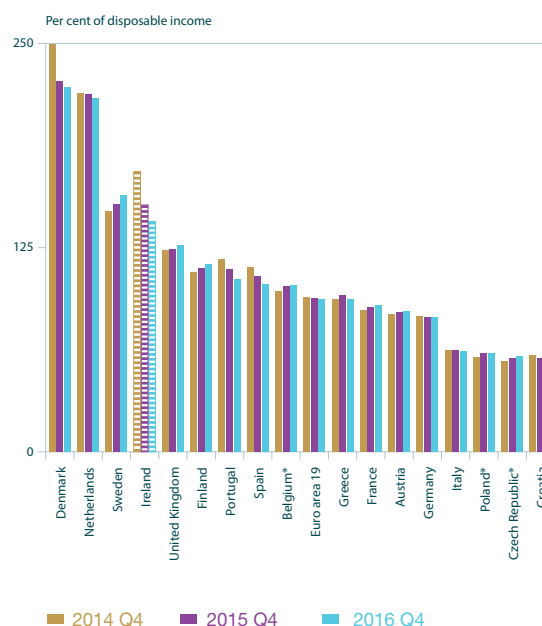
disposable income continued to decline and was 140.9 per cent in Q4 2016, compared to a peak of 213.9 per cent in Q4 2009. The decline of 10.2 percentage points since Q4 2015 exceeds the 0.5 percentage point reduction for the euro area as a whole. The decline in the Irish household debt ratio of 52.9 percentage points was significantly larger than

Chart 1: Household Debt Sustainability



Sources: Quarterly Financial Accounts, Central Bank of Ireland; Quarterly National Accounts, CSO.

Chart 2: Changes in the Ratio of Debt to Disposable Income by Country



Sources: Quarterly Financial Accounts, Central Bank of Ireland; Quarterly National Accounts, CSO.

Note: * Refers to Q3 data for 2016.

the decline in the euro area over this period (3.3 percentage points).

Household net worth¹ rose by €7.2 billion during Q4 2016 to stand at €653.7 billion (or €137,286 per capita). This represented an increase of 1.1 per cent over the period. The increase in net worth largely reflected increases in housing assets (€4.2 billion) and financial assets (€1.5 billion) whilst liabilities declined by €1.5 billion. Household debt continued to fall during Q4 2016, declining by €1.5 billion to €143.8 billion or €30,199 per capita. This was the largest decline since Q3 2015. The decrease in debt reflected both negative net transactions (€0.7 billion), as well as revaluations and other changes (€0.8 billion).

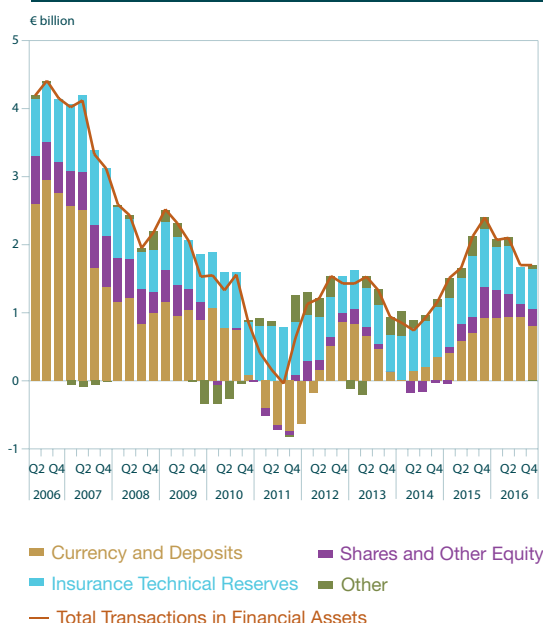
Household investment in financial assets rose to €1.7 billion in Q4 2016, an increase of €0.5 billion over the quarter. Household investment in currency and deposits fell €0.1 billion to €0.8 billion, but remain the largest category of household investment. This

decline was more than offset by an increase in transactions in shares and other equity, and insurance technical reserves (Chart 3).

In line with improving economic trends, the first quarter of 2017 marked the 15th consecutive quarterly decline in the number of mortgages on Principal Dwelling Houses (PDH) in arrears. At end-March 2017, 76,422 mortgages were in arrears, a decline of 1.4 per cent relative to the previous quarter. The majority of arrears categories, including the over 720 days category, declined in Q1. The fall in arrears over 720 days was 1.5 per cent. The number of accounts in arrears over 720 days has now declined by more than 13 per cent since the peak in mid-2015. Nevertheless, arrears remain a significant issue for households and their creditors, with the outstanding value of PDH mortgage accounts in arrears over 720 days more than €7.4 billion at the end of 2016. Accounts in arrears over 720 days now constitute 43 per cent of all accounts

¹ Household net worth is defined as the sum of housing and financial assets minus liabilities.

Chart 3: Household Transactions in Financial Assets - Four Quarter Moving Average



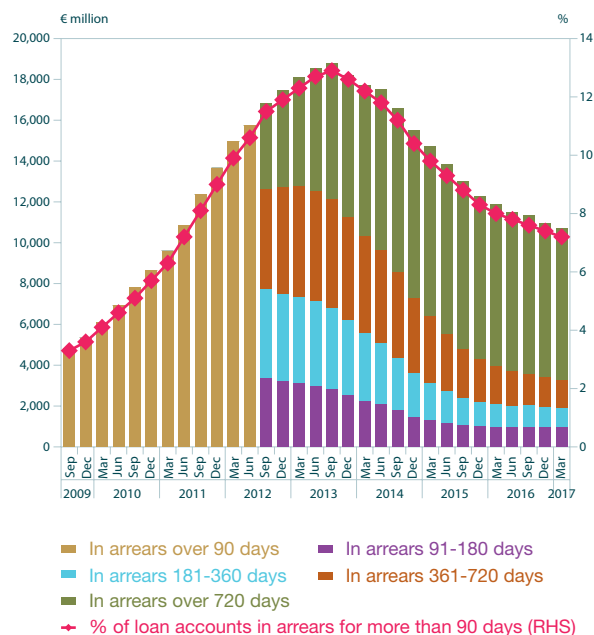
Sources: Quarterly Financial Accounts, Central Bank of Ireland; Quarterly National Accounts, CSO.

in arrears, and approximately 90 per cent of arrears balances outstanding.

Although the economy is growing and the number of non-performing loans have fallen, households continue to repay more than they borrow. Loans to households² from Irish-resident banks declined by 2 per cent in May 2017 compared with the same period in 2016. Total mortgage loans, which account for 83 per cent of total on-balance sheet loans, decreased in net terms by €96 million in May. This follows a decrease of €105 million in April. In year-on-year terms, net mortgage lending declined by €458 million or 0.6 per cent. Non-housing loans increased by 1.9 per cent in annual terms to end-May, representing seven consecutive months of annual growth.

PDH mortgages recorded net positive inflows of €93 million over the first quarter of 2017. This marked the fourth consecutive quarter of growth. Within this increase, PDH fixed-rate loans recorded a net increase of €615 million over the quarter, in contrast to floating rate

Chart 4: PDH Accounts in Arrears over 90 Days



Source: Residential Mortgage Arrears and Repossessions Statistics, Central Bank of Ireland.

loans, which recorded a fall of €522 million. This continues to reflect an increasing number of borrowers entering into fixed-rate contracts in the current lower interest rate environment.

The latest available interest rate data indicate that borrowing costs for households have increased slightly. The weighted average interest rate on new variable rate mortgage agreements (excluding renegotiations) stood at 3.45 per cent in April, compared to 3.36 per cent at end-January 2017. The rate on all new agreements, fixed and variable, stood at 3.38 per cent. Quarterly data show a fall in PDH mortgage rates was observed for standard variable rate mortgages, which fell by 19 basis points to 3.38 per cent over the year to Q1 2017. Fixed rate PDH mortgage rates also declined, with rates fixed for 1-3 years falling by 26 basis points over the same period. New lending in the mortgage market has become increasingly concentrated in recent years. This is further elaborated in Box A.

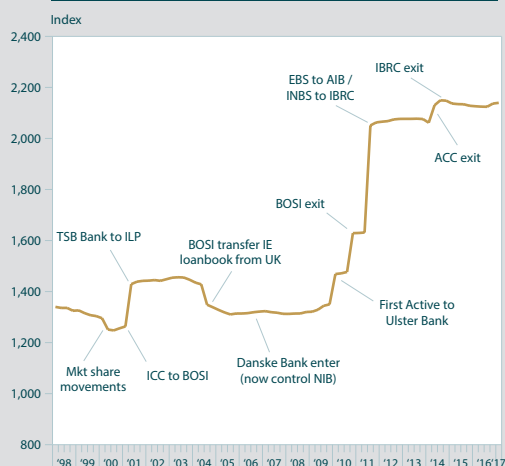
² Adjusted for loan sales and securitisations.

Box A: Competition in the Irish Mortgage Marketby Martina Sherman³

In recent years there has been considerable debate surrounding the level of competition and lack of new entrants in the Irish mortgage market.⁴ Indeed, given the number of mergers, acquisitions and exits from the Irish banking system since the financial crisis, the number of banking entities has significantly reduced. Using the Central Bank's Credit and Banking Statistics, this Box provides information on the degree of concentration in the Irish mortgage market. The data will be further developed by the introduction of new competition indicators from Q3 2017.

One of the most widely used statistical measures of market competitiveness, or more accurately, market concentration, is the Herfindahl-Hirschman Index (HHI).⁵ The HHI is a measure of the level and trend of concentration in a particular market, which empirical literature suggests is an important determinant of market competition.⁶ Increases in the HHI indicate an increase in market concentration and a potential increase in the market power of firms. A decrease indicates the opposite. International practice denotes a HHI score over 1,800 as indicative of a highly concentrated market, while the Irish Competition and Consumer Protection Commission (CCPC) considers a market highly concentrated when the HHI surpasses 2,000.⁷ The CCPC guidelines state that a HHI below 1,000 is unlikely to cause concern, while a HHI greater than 1,000 may be regarded as concentrated.

Box A Chart 1: Herfindahl-Hirschman Index (HHI) for Outstanding Irish Mortgage Credit



Source: Credit and Banking Statistics, Tables A.18.1 and A.18.2, author's calculations.

Note: Lending to Irish residents by Irish resident banking entities. Analysis includes other housing finance and service securitised house purchase loans.

Box A Chart 1 presents a quarterly HHI for the outstanding stock of Irish mortgages. For context, key market developments are presented alongside the series. Calculating a market concentration indicator based on the outstanding loan book is a proxy indicator of competition, which is influenced by banks joining or leaving the market, thereby increasing or decreasing competition.

It is evident that the long-term trend has seen a marked increase in market concentration. This is driven by the consolidation of the number of mortgage providers, and the withdrawal of some providers from the market following the financial crisis. It is important to note that a new entrant to the market that purchases an existing mortgage book in full, or merges with a bank, will not have any impact on market concentration. It is only if the entrant changes the market share that the HHI changes. These crisis-related mergers and exits caused an increase in the HHI from a pre-crisis level of 1,500 to over 2,100 at the latest observation. This measure surpasses both the Irish and internationally accepted value denoting a concentrated market.

³ Statistics Division, Central Bank of Ireland.

⁴ The most recent being the CCPC's report on '[Options for Ireland's Mortgage Market](#)', published on 15 June 2017.

⁵ The HHI is calculated by squaring each entity's market share (relative to the total market), and summing the values attained. A higher share represents a more concentrated, or less competitive lending market.

⁶ See McCann and McIndoe Calder (2012) '[Bank Competition through the Credit Cycle: Implications for SME Financing](#)', Central Bank of Ireland; and Goggin et al. (2012), '[Variable Mortgage Rate Pricing in Ireland](#)', Central Bank of Ireland.

⁷ See [Guidelines for Merger Analysis](#) (2014), CCPC.

Box A: Competition in the Irish Mortgage Market
by Martina Sherman

The above measure is based on the outstanding mortgage book of banks, and it therefore fails to capture the varying level of activity of mortgage-providing banks. For example, some banks hold portfolios of mortgages but are no longer 'competing' for new business in the market. These banks nevertheless remain part of the HHI measure. Box A Chart 2 presents an overview of the number of banks in the mortgage market, separately identifying those that are actively lending, as distinct from those merely holding loan portfolios. The chart compares the outstanding mortgage book dataset, and the dataset on agreed new and renegotiated mortgages. 'Market' banks refer to licensed banks who have held housing loans over the reference period, even though they may now be inactive in the market for new loans or no longer hold mortgage loans. 'Active' banks refer to any bank that was actively lending at the reference date.

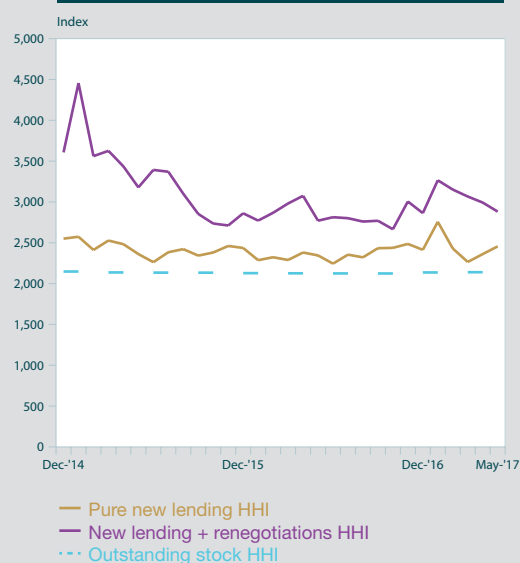
The chart illustrates the decline in the number of mortgage providers in the Irish mortgage market. Unsurprisingly, the variables shown in Box A Charts 1 and 2 are negatively correlated, as bank exits and mergers drive much of the increase in the HHI. It is worth noting that a number of participants in the early years of the series had very low volumes of activity.

Box A Chart 2: Number of Banks Present and Active in the Irish Mortgage Market



Source: Credit and Banking Statistics, Tables A.18.1, A.18.2, and B.2.1, author's calculations.

Box A Chart 3: Herfindahl-Hirschman Index (HHI) for New Mortgage Credit



Source: Credit and Banking Statistics, Tables B.2.1 and B.2.2, author's calculations.

Note: Euro-denominated lending to euro-area residents by Irish resident banking entities. Break in series in December 2014, due to an increase in the reporting population sample. Switching between banks is included in 'pure new lending'.

Using the dataset underlying the 'active' banks category of Box A Chart 2, we can construct an indicator based on the market share of new mortgage lending. Where the HHI in Box A Chart 1 uses the market share of all banks based on outstanding mortgages, a HHI measure based on new lending would exclude inactive banks, and conceptually show a more accurate picture of concentration levels in the market for new mortgage lending.

Box A Chart 3 presents the HHI on new mortgage lending from December 2014, as reported by Irish resident banks. The chart includes a HHI series on new mortgage agreements, entitled 'pure new lending', which excludes renegotiated credit where a customer has switched products, negotiated a better rate, changed term, etc. Similar to the HHI calculated for outstanding stock, both measures in Box A Chart 3 are above the CPCC threshold value of a highly concentrated market. The data also indicate a higher level of concentration compared to that recorded for outstanding stock. This reflects the exit of a number of players from new lending activity and/or reduced lending by some remaining banks.

Box A: Competition in the Irish Mortgage Market
by Martina Sherman

Interestingly, the HHI measure calculated on 'new lending plus renegotiated' contracts is higher than that on pure new lending. The reason for this variance is that renegotiations are concentrated in a couple of banks, while new lending is more diversified.

The HHI should be considered as only one element in the analysis of market competition. The relative ease of its calculation and empirical literature link as an indicator of competition, however, provides an efficient and timely indicator of market concentration.

Non-Financial Corporation Sector

Net lending to NFCs by Irish banks declined by €1.7 billion over the year to May 2017 (3.7 per cent). Following an increase in April, there was a €182 million decrease in net NFC lending during May. Positive annual flows were recorded under medium-term loans since 2015 and this is the only category recording growth. During May 2017, drawdowns of these loans exceeded repayments by €90 million, albeit that this represents the lowest annual rate of increase for a number of months.

NFC debt increased by €29.5 billion over the quarter. This was driven primarily by exchange rate movements which increased the value of loans owed by Irish resident NFCs to foreign counterparts by €27 billion in Q4 2016. In contrast, NFCs loan liabilities financed domestically decreased by €2.3 billion, reflecting continued deleveraging with regard to Irish MFIs. The indebtedness of Irish NFCs remains high in an international context. Ireland's NFC debt-to-GDP ratio was 239.7 per cent in Q4 2016 compared to the euro area average of 104.2 per cent. Ireland was ranked second amongst EU countries, while Luxembourg and Cyprus, both of which also have very large MNCs relative to the size of their economies, were the most indebted and third most indebted, respectively.

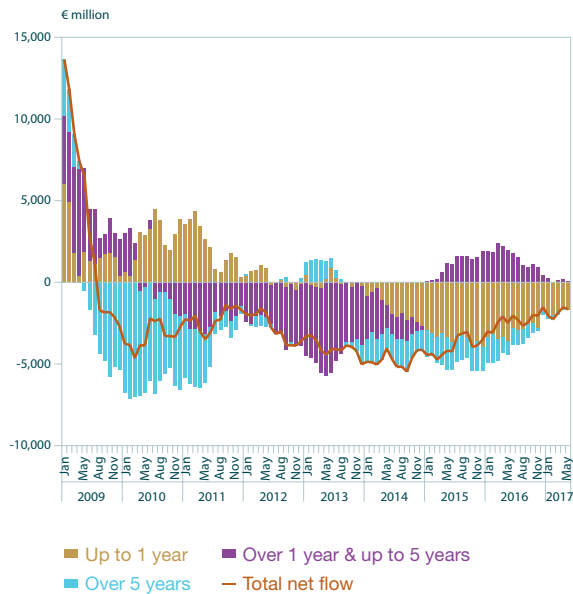
Irish statistics on NFCs continue to be significantly impacted by the activities of large resident MNCs. NFC debt as a percentage of GDP increased during Q4 2016, rising from 231 per cent to 239.7 per cent. While annualised GDP increased by 1.1 per cent, this was outstripped by an increase in the

stock of NFC debt of 4.9 per cent. Relative to its peak of 327.8 per cent in Q1 2015, NFC debt as a percentage of GDP has decreased substantially. When analysing Irish NFC debt trends, it is important to note that Ireland has substantial MNC activities, which can cause volatility in debt from quarter to quarter.

Investment by foreign-owned MNCs in their Irish operations (FDI inflows) increased by approximately 30 per cent quarter-on-quarter, from €6.7 billion in Q4 2016 to €8.6 billion in Q1 2017. This reflected increases in equity and reinvested earnings of €24.3 billion and €11.4 billion, respectively which was offset by a decrease in other capital of €27 billion. Investment by Irish-owned MNCs abroad (FDI outflows) increased by €6.6 billion during the quarter, to stand at €4.6 billion in Q1 2017. Despite this increase, direct investment income earned abroad by this sector eased back to €4.3 billion in the quarter. This primarily comprises of income on equity related to the MNCs who have established headquarters in Ireland.

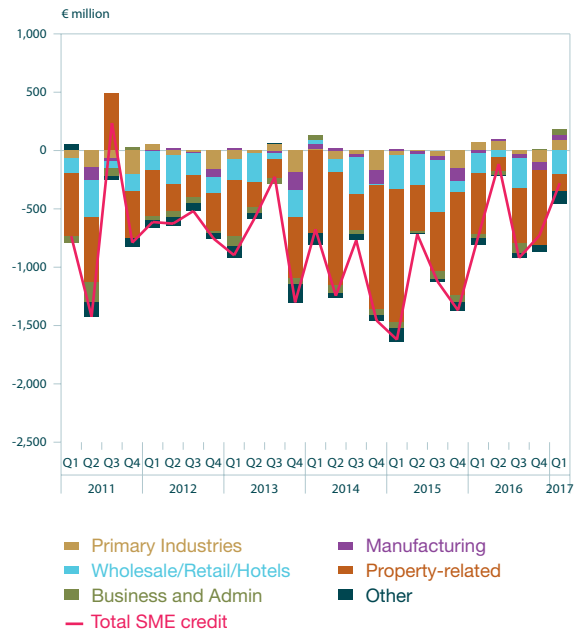
Gross new lending to Irish SMEs totalled €1.2 billion in Q1 2017, albeit repayments continue to exceed new loan drawdowns. Gross new lending to non-financial, non-property related SMEs was €902 million in Q1 2017, an increase of €245 million in comparison to the same quarter in 2016. Drawdowns for wholesale/retail trade & repairs, and agricultural purposes dominated in Q1, despite consistently attracting higher than average interest rates. Property-related lending constituted 42 per cent of outstanding credit to SMEs, and 24 per cent of new drawdowns in Q1. There remain significant differences

Chart 5: Loans to NFCs: Net Flows (12-month sum) by Original Maturity Category



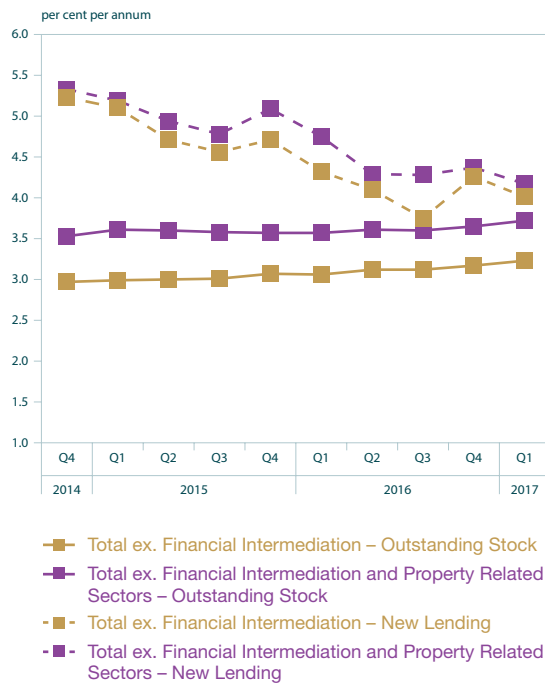
Source: Credit and Banking Statistics, Central Bank of Ireland.

Chart 6: Net Lending/Repayment Position of Non-Financial SMEs



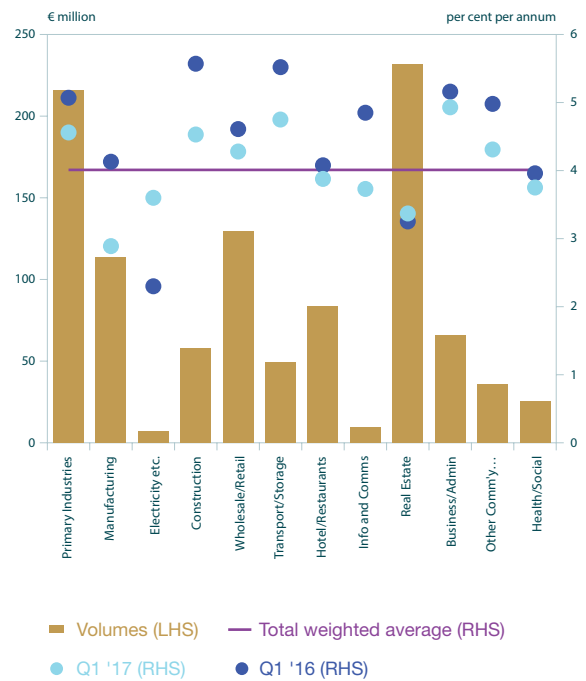
Source: Business Credit and Deposits Statistics, Central Bank of Ireland.

Chart 7: Interest Rates on New and Outstanding SME Loans



Source: Business Credit and Deposits Statistics, Central Bank of Ireland.

Chart 8: SME New Lending Interest Rates and Corresponding New Lending Drawdowns (Q1 2017)



Source: Business Credit and Deposits Statistics, Central Bank of Ireland.

in interest rates charged to property-related lending, where lower than average rates apply to new SME lending for real estate, with the reverse being true for construction. Four SME sectors registered increases in net lending during Q1 (drawdowns exceeded repayments); primary industries recorded a positive net flow of €93 million, while business and administration, construction, and manufacturing registered a combined positive net flow of €114 million (Chart 6). Overall, SME credit declined €280 million in Q1; the smallest decline since Q3 2013.

The weighted average interest rate on new non-financial SME loan drawdowns during the first quarter of 2017 was 4.01 per cent (Chart 7). This represents a decline of 32 basis points over the year. Rates on new lending are higher than the rates applied to the existing stock of Irish non-financial SME loans, which was recorded at 3.23 per cent at end-Q1 2017. New lending rates have declined for SMEs in most economic sectors over the previous four quarters (Chart 8). Of note were interest rate declines to SMEs engaged in manufacturing (124 basis points), and primary industries (51 basis points). Construction SMEs experienced an average weighted decline of 104 basis points over the same period, albeit continuing to attract one of the highest interest rates on new drawdowns.

Government Sector

Government debt stood at approximately €230 billion by end-2016, virtually unchanged when compared with the same period a year earlier. Over this period, there was a minor reduction in amount outstanding of debt securities issued by the government but this was offset by increases elsewhere.

Yields on Ireland's 10-year benchmark government bonds moved above 1.1 per cent during early-March 2017 but began to fall back thereafter. This pattern was broadly similar to that observed for German bunds, albeit that the spread of Ireland's bonds over their German equivalent stood at close to 70 basis

points at this time. In the case of Ireland, these yields continued to ease back throughout much of Q2 2017 before reaching a low of 0.63 per cent in late-June. This, however, was followed by an increase in the final days of the quarter but these yields still stood 11 basis points lower than three months previously. The spread between Irish and German 10-year bonds had fallen to less than 40 basis points by the end of Q2 2017. This represented a significant narrowing of this spread over a three-month period.

Financial Sector

The funding position of Irish-resident credit institutions remained positive in recent months, with deposits from the Irish-resident private sector increasing by 2 per cent over the year to May 2017. While NFCs continued to record strong annual deposit inflows with an increase of 4.3 per cent in the year to May, this growth rate has moderated and is the lowest seen in more than six months. The growth rate in household deposits stood at 3 per cent over the same period. The large outflows from other financial intermediaries (OFIs) and insurance corporations & pension funds (ICPFs) that occurred during 2016 have continued to show signs of stabilising. Banks held €8.8 billion more household deposits than loans at end-May. By contrast, in May 2008 household loans exceeded deposits by €72.6 billion. Bank funding from the Central Bank of Ireland has remained low with the outstanding amount of said borrowings at €8 billion in May. Domestic market banks accounted for 95 per cent of this.

The NAV of IFs resident in Ireland increased by 7 per cent (€115 billion) over Q1 2017, reaching €1,721 billion. This was due to revaluations of €49 billion and inflows of €64 billion during the quarter. Inflows were more than twice the amount registered in Q4 2016. Bond funds had the largest transaction inflows, amounting to €34 billion, while equity funds saw the largest revaluation, amounting to €34 billion. The total value of assets held by IFs increased by €157 billion to €2,096 billion, with bond and equity funds registering the

Box B: Recent Developments in Irish Resident Real Estate Funds

by Barra McCarthy⁸

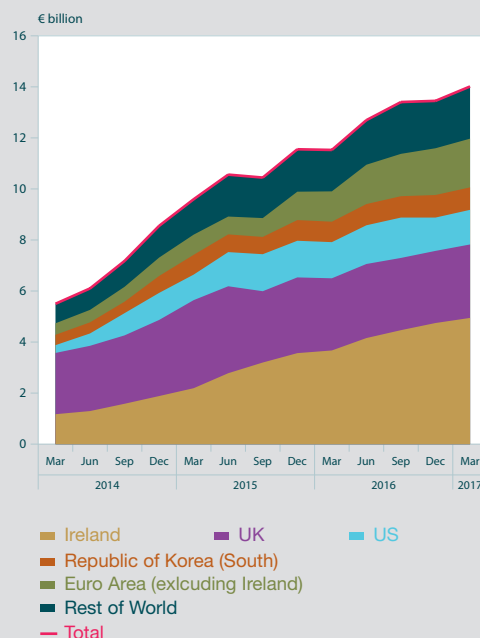
The number of Irish resident real estate (RE) funds in May 2017 stood at 165, growing from 31 at end-December 2012. The net asset value (NAV) of RE funds has experienced a similarly steep rise over the period growing from €2.3 billion at end-December 2012 to €13.9 billion at end-May 2017. Growth was fastest in 2014, with 33 per cent of cumulative growth in NAV over the whole period occurring in that year.

The investment fund data includes information on the ownership of funds' equity on a first counterparty basis. These data show that Irish investors hold the largest amount of RE fund equity, accounting for 35 per cent, or €4.9 billion, of the total outstanding. Ireland has held this status since Q3 2015 prior to which the United Kingdom held the largest share of Irish RE fund equity (see Box B Chart 1).

Of the €4.9 billion held by Irish entities, other financial intermediaries (OFIs) hold €2.2 billion. Given that the data are collected on a first counterparty basis, it is possible that a portion of this OFI holding may relate to non-resident entities. Therefore, on an ultimate ownership basis, the holding of RE fund equity by Irish entities may be lower. However, it is reasonable to assume that the equity held by Irish pension funds (€1.3 billion) and Irish non-financial corporations (€0.4 billion) is, in fact, held by Irish entities.

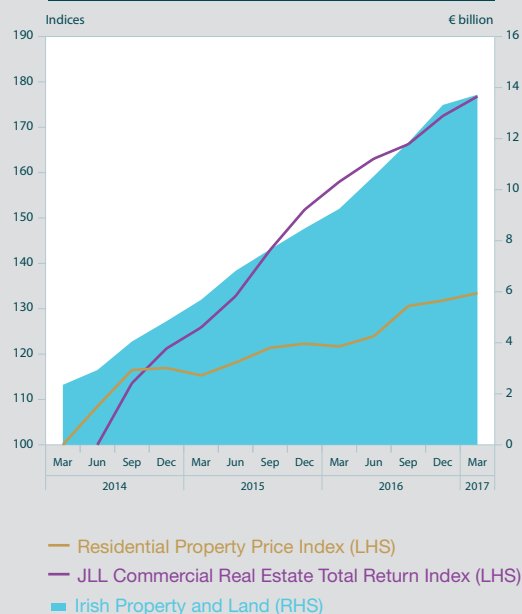
Following Ireland, the UK, US, euro area (excluding Ireland) and Korea are the countries and regions that hold the largest share of Irish resident RE fund equity (see Box B Chart 1).

Box B Chart 1: Real Estate Fund Equity by Nationality of First Counterparty



Source: Investment Funds Statistics, Central Bank of Ireland.

Box B Chart 2: Holdings of Irish Property and Land by RE Funds



Sources: Investment Funds Statistics, Central Bank of Ireland; House Prices Statistics, CSO; Irish Property Index, Jones Lang LaSalle.

Total assets for RE funds amounted to €20.3 billion at end-March 2017. A notable characteristic of the industry is the prevalence of relatively small funds: out of the 165 funds in existence at end March 2017, 121 had assets of less than €110 million. At the other end of the distribution, there are only three funds with assets greater than €1 billion, with the largest having assets of €2.2 billion. The top five funds account for €7 billion, or 34 per cent, of total assets.

Box B: Recent Developments in Irish Resident Real Estate Funds*by Barra McCarthy*

Property and land made up approximately €15.5 billion, or 76 per cent, of the total assets of RE funds. Property and land holdings are concentrated in only two countries: Ireland and the UK. Irish property and land holdings amounted to €13.7 billion in Q1 2017, while property with value of €1.8 billion is held in the UK. Holdings in Irish RE funds have closely mirrored growth in the JLL Commercial Real Estate Returns index. Residential property prices have also grown over this period, albeit at a lower rate (see Box B Chart 2).

Net investment in Irish property and land by RE funds amounted to €3.6 billion in 2016. Determining RE funds' share of Irish property investment is challenging, because different types of data are available for Commercial Real Estate (CRE) and residential property investment. Lambert Smith Hampton provide an estimate of €4.5 billion for investment in Irish property in 2016, covering CRE and multi-family developments.⁹ The main source of data for residential property investment is the CSO's series on Residential Dwelling Property Transactions, which records transactions of €10.9 billion in 2016. There may be some overlap between the two series, but combining the two figures we can estimate that, at a lower bound, Irish RE funds accounted for approximately 23 per cent of total investment in Irish property in 2016.

During Q1 2017 investment was split evenly between new property, which amounted to €114 million, and existing property of €103 million. Since the series began at end-March 2014, investment by RE funds has tended to be mainly concentrated in new property. However, investment in new property has been steadily declining while investment in existing property has been increasing. Between Q2-Q4 2016 investment in existing property actually exceeded investment in new property. This was most acute in Q4 2016 where investments of €1.03 billion in existing property greatly exceeded investment of €0.24 billion in new property.

Unlike other fund types, RE funds tend to make greater use of debt to fund their investments. Loans to RE funds constituted €5.6 billion, or 28 per cent, of total liabilities at end-March 2017. Of this €5.6 billion, €5 billion was lent by Irish banks. Conversely, all other fund types have loans that account for less than 5 per cent of total liabilities, with most having loans of less than 1 per cent.

⁹ See: <http://www.lsh.ie/commercial-property-news/2017/march/property-investment-in-ireland-exceeds-expectations>

largest absolute increases in total assets. Recent developments in real estate funds are summarised in Box B.

IFs' equity holdings experienced large positive revaluations of €35 billion between Q4 2016 and Q1 2017. Of this €35 billion, €31 billion is attributable to NFCs' equities, which amounts to a 6 per cent growth in the value of NFC equities from end-December 2016. The positive revaluation was a global trend, with the euro area and the US seeing the largest revaluations of €6 billion and €10 billion, respectively. Exchange traded funds (ETFs) continued to grow at a strong pace, adding €27 billion to their NAV between end-December 2016 and end-March 2017. The NAV of ETFs now accounts for €315

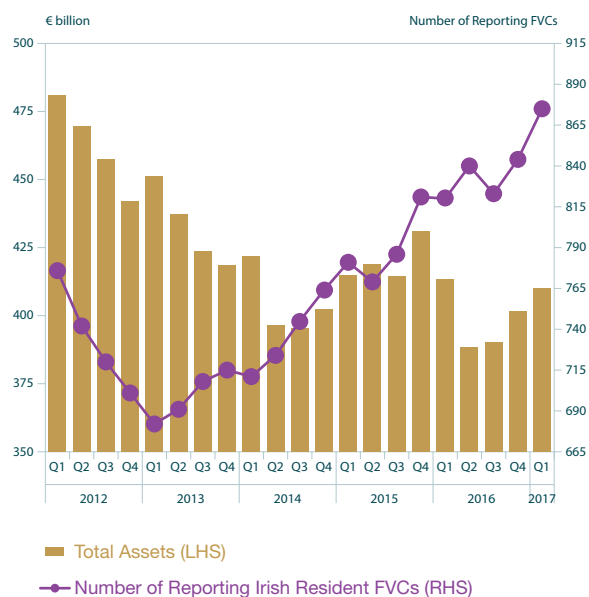
billion, or 18 per cent of the total NAV of resident IFs.

The NAV of MMFs resident in Ireland at end-March 2017 was €483 billion, registering a small rise of €5 billion from end-December 2016. Total debt securities held by MMFs at end-March amounted to €383 billion, increasing by €11 billion from the previous quarter. The increase was concentrated in holdings of euro area, UK and Asian debt (Singapore, UAE and China), which rose by €2 billion, €4 billion and €6 billion, respectively. Irish MMF debt security holdings were characterised by a reduction in the amount of government debt securities held, and an increase in the amount of bank debt securities held. This compositional shift was observed

for all regions except the euro area, where the reverse was seen.

The total Irish FVC asset value stood at €410 billion in Q1 2017, representing an increase of 3.1 per cent from Q4 2016. The number of reporting Irish resident FVCs rose by 30 to hit a historical high of 875 vehicles in Q1 2017 (Chart 9). Net transactions of FVCs remained positive in Q1 2017, registering a €14.7 billion increase.

Chart 9: FVC Total Assets and Number of Reporting Irish Resident FVCs



Source: Financial Vehicle Corporations Statistics, Central Bank of Ireland.

Signed Articles

The articles in this section are in the series of signed articles on monetary and general economic topics introduced in the autumn 1969 issue of the Bank's Bulletin. Any views expressed in these articles are not necessarily those held by the Bank and are the personal responsibility of the author.

Liquidity & Risk Management: Results of a Survey of Large Irish-Domiciled Funds

by Pierce Daly and Kitty Moloney¹

Abstract

This article examines the liquidity and risk management practices of large Irish-domiciled bond, mixed and money market funds. These funds are an important part of the credit intermediation chain. The 2008 crisis highlights the role of this sector as a transmission mechanism for systemic risk. Consequently, liquidity remains a concern for Central Banks and regulators. We find some evidence that regulation has reduced market liquidity. Considering run-risk, we highlight that large funds generally consist of institutional investors, not retail, and offer daily redemptions. We also analyse the types of liquidity management tools implemented, and find those used are pre-emptive in nature.

¹ The views expressed in this article are those of the authors and do not necessarily reflect those of the Central Bank of Ireland or the Eurosystem. The authors would like to thank Philip Lane, Gabriel Fagan, Naoise Metadger, Oisín Kenny, Jim Leen, David McCabe, Evin O'Reilly, Joe McNeill, Eduardo Maqui and Cian Murphy for comments on earlier drafts.

1. Introduction

In this paper, we present a survey of liquidity in large Irish-domiciled bond, mixed and money market funds. According to ECB data, Ireland represents 41 per cent of money market fund (MMF) total euro area assets and 17 per cent of investment fund (IF) assets as at end-2016.² MMFs, mixed and bond funds are an integral activity within credit intermediation. The 2008 crisis illustrates that large redemption requests in funds coupled with insufficient liquidity can lead to a fire sales of assets, increased risk premia and reduced supply of market-based finance (this can affect banks and sovereigns). This contagion channel increases the impact on the real economy as it amplifies the effects of a financial crisis (Ansidei, et al., 2012). In the case of Ireland, there is limited concern for domestic financial stability as funds' exposures are mainly international (Central Bank of Ireland, 2017). Financial stability concerns mainly relate to the sector's exposure to the global financial system.

Recent research highlights an increase in the weighted average life of debt portfolios of bond, mixed and other fund categories over recent quarters (Central Bank of Ireland, 2017, ESRB, 2017). Maturity transformation occurs when long-term assets are financed by short-term liabilities. This maturity mismatch may lead to redemption runs on investment funds. Equally, liquidity transformation/mismatch between assets and liabilities can also lead to runs and financial instability.

Since the crisis, there has been an increasing emphasis by regulators and central banks on the monitoring and analysis of liquidity and liquidity practices within funds. The International Monetary Fund (IMF), the Financial Stability Board (FSB), the European Systemic Risk Board (ESRB) and the European Securities and Markets Authority (ESMA) amongst others have begun to assess the need for and the potential design of regulatory liquidity stress tests in this sector. Many

challenges are inherent to this analysis. Is regulation affecting liquidity? What are the most useful models and tools to use when analysing liquidity? How do we define liquidity? And how do we recreate the dynamics of a financial crisis?

This paper informs this research by presenting reported levels of liquidity within a sample of large Irish-domiciled funds as well as presenting industry liquidity-management tools and practices. Many regulators do not have security-level data for this sector so this paper gives examples of what type of securities funds are investing in and to what extent. It also highlights some of the practices that are used to manage that liquidity, for example stress test models and liquidity management tools.

We present new data based on Irish submissions to an ESRB survey on liquidity and liquidity practices.³ The survey focuses on European bond, mixed and money market funds with a large (greater than €500m) total Net Asset Value (NAV) as of Q2 2015.⁴ In this survey asset managers were asked specifically about the liquidity of their portfolios, the ways in which they assess liquidity risks and how they manage large redemption requests. The survey also asks for their views on the aggregate levels of liquidity in the market and the impact of regulatory changes.

The remainder of the paper is structured as follows: Section 2 reviews previous research and market intelligence. The core methodology of the questionnaire and the data analysis process are outlined in Section 3. Section 4 presents the results of the questionnaire. This is split into two subsections: a qualitative section and a quantitative section. Section 5 provides the key conclusions and recommendations for future work.

² See ECB Statistical Data Warehouse for the balance sheet statistics of MMFs here: <http://sdw.ecb.europa.eu/browse.do?node=9691317>; and IFs (all investment funds excluding MMFs) here: <http://sdw.ecb.europa.eu/browse.do?node=9691348>.

³ In total, asset managers from six jurisdictions (Ireland, France, Luxembourg, Germany, Italy and the United Kingdom) took part in the questionnaire.

⁴ Data on asset holdings and liquidity is requested and reported as a value (euro) of "total fund assets" rather than NAV; as such, this paper refers to AUM throughout.

2. Regulatory perspective and previous research

As highlighted in the introduction, the 2008 crisis exposed significant vulnerabilities in the funds sector. For example, directly after Lehman's collapse in September 2008, the Reserve Primary Money Market Fund "broke the buck" i.e. became technically insolvent. This led to large-scale redemptions of MMFs, which in turn lead to forced asset sales, increased risk premia and dysfunctional markets. One of the markets affected was bank credit (Dwyer & Tkac, 2009). Funding became more limited and expensive, thereby amplifying the crisis.

Since then a number of international standard setters have highlighted the interlinkages between IFs and MMFs and other sectors of the economy as a potential threat to financial stability. The FSB (2017a) highlights that potential triggers of instability include liquidity and maturity mismatch and high leverage.

A number of principles and regulations have been put in place to guide asset managers on liquidity management practices. The International Organisation of Securities Commissions (IOSCO) advise that a fund manager should be able to demonstrate that effective and appropriate liquidity risk management policies and procedures are in place (IOSCO, 2015). In accordance with the Undertakings for Collective Investment in Transferable Securities (UCITS) Directive and Alternative Investment Fund Managers (AIFM) Directive, funds must (where appropriate) conduct stress tests, in addition to implementing risk management procedures and risk limits.⁵ In particular, the liquidity assessment of the fund should take into account factors such as trading frequency, number of transactions, volume, availability at certain market prices, and whether selling affects the market.

Looking at specific jurisdictions, the Ontario Securities Commission (OSC) assessed the risk management procedures and portfolio

liquidity of mutual funds in Canada (OSC, 2015). Furthermore, Ramirez, Sierra Jimenez & Witmer (2015) noted the potential risks to the Canadian economy as a result of a growing investment funds industry. Such analyses have allowed national regulators and supervisors to improve both their understanding of the sector and the potential policy responses.

Research by the French Asset Management Association (AFG) emphasise that requirements for performing stress tests remain varied and imprecise, and note the lack of transparency in the details of stress test techniques (AFG, 2015). Likewise, in Ireland, industry bilateral meetings between the Central Bank and investment managers find no current standard, market-wide methodology to monitor and manage liquidity risk.

The recent International Monetary Fund (IMF) Financial Sector Assessment Program (2016) of the Irish financial system recommends increased monitoring of liquidity risk in MMFs and IFs. The IMF also recommend the development of frequent stress testing of MMFs and IFs, and the analysis of investor profiles. Previous research on investor characteristics (whether investors are retail or institutional) has shown that profile can influence redemption pressures under stressed market conditions. For example, Li, Tiwari & Tong (2016) find that when higher ambiguity exists regarding fund performance measures, retail investors are more sensitive to performance than institutional investors. Chen, Goldstein & Jiang (2010) also note that retail investors in illiquid funds exhibit a stronger sensitivity of outflows to bad past performance than those in liquid funds.

Investors may also be subject to 'first mover advantage' (FSB, 2017b). That is, under stressed conditions there may be incentives for investors to redeem early to avoid any readjustment in the value of a fund's assets due to heightened illiquidity. Consequently, written redemption policies and the availability of (both ongoing and exceptional) liquidity risk management practices and tools are

⁵ See Directive 2011/61/EU of the European Parliament and of the Council on Alternative Investment Fund Managers and amending Directives 2003/41/EC and 2009/65/EC and Regulations (EC) No 1060/2009 and (EU) No 1095/2010 (AIFMD) [2011] OJ L 174, arts 15-16; and Commission Directive 2010/43/EU implementing Directive 2009/65/EC (UCITS) of the European Parliament and of the Council as regards organisational requirements, conflicts of interest, conduct of business, risk management and content of the agreement between a depositary and a management company [2010] OJ L 176, arts 38-45.

encouraged by regulators to reduce this early redemption incentive.

Looking specifically at liquidity management tools, IOSCO find that all major liquidity management tools are available to Irish domiciled UCITS and AIFs (IOSCO, 2015, p. 15). These include side pockets, redemption fees, anti-dilution levies, redemption gates, redemptions in kind and suspension of redemptions (see Chart 5 for definitions). One limitation of the questionnaire is that evidence regarding tool effectiveness was not requested. Cipriani et al. (2014) suggest that the existence of gates and fees may actually cause a pre-emptive run rather than prevent one.

European authorities such as the ESRB (2017) and ESMA (2017) are also actively engaging in the review of risks in this sector and the analysis of stress testing techniques. The role of many of these variables are referred to in the ESRB questionnaire responses herewith and give empirical evidence of the implementation of the IOSCO recommendations.

3. Data overview and cleaning

3.1 Overview of Questionnaire Data

In this section, we provide an overview of the data collected for Irish-domiciled investment and money market funds as part of the ESRB questionnaire.⁶ Answers are populated as of the 30 June 2015. The requests went to asset managers of at least one Irish domiciled investment fund that:

- (a) Is authorised under Directive 2014/91/EU of the European Parliament and of the Council (UCITS Directive) or Directive 2011/61/EU of the European Parliament and of the Council (AIFM Directive);
- (b) Is authorised for distribution in the Union;
- (c) Is an open-ended bond fund, mixed fund or money market fund;

- (d) Holds net assets of €500 million or more as of 30 June 2015.

For the purpose of analysis, we have divided the results of the questionnaire into qualitative and quantitative subsections as follows:

Qualitative section:

- Liquidity risk management policies and practices
- Risk profile and liquidity buffers
- Market trends, disruptions and regulation
- Current liquidity stress testing practices

Quantitative section:

- Descriptive Statistics
- Asset holdings
- Funds of funds
- Asset liquidity
- Investor concentration
- Redemption policy
- Liquidity management tools

The total data sample consists of responses from 72 asset managers, representing 311 Irish-domiciled funds. The majority of the asset managers are located outside of Ireland. The main activities in Ireland are fund administration, fund management and depositary services. The reported assets under management (AUM) of the raw sample amount to €772bn as of 30 June 2015. MMFs are the largest subgroup with €348.6bn in AUM, followed by bond funds (€341.5bn) and mixed funds (€66bn). We suggest that the sample is representative of large funds rather than all funds. This is particularly so when looking at the mixed fund results.

3.2 Data Cleaning

Prior to the analysis of the survey responses, the data is subject to a rigorous cleaning process. Funds which report a Net Asset Value (NAV) below the questionnaires €500m threshold are omitted. Using the Central Bank of Ireland's regulatory Investment Fund (MMIF) and Money Market Fund (MMM) Returns, the reported AUM of funds in the questionnaire are validated, and where inconsistencies arise, data is omitted.⁷ Moreover, we reduce our sample

⁶ We note that in this paper "funds" refers to stand-alone funds and sub-funds of umbrellas.

⁷ MMIF and MMM return data is collected by the Statistics Division at the Central Bank of Ireland on a quarterly and monthly basis respectively, to fulfil ECB reporting requirements (Central Bank of Ireland, 2017a, 2017b).

Table 1: Final Sample Sizes

Section	Asset Managers
Qualitative Section	Asset Managers
Liquidity Risk Management Policies & Practices	72
Risk Profile & Liquidity Buffers	72
Market Trends, Disruptions & Regulation	72
Current Liquidity Stress Testing Practices	67
Quantitative Section	Investment Funds
Descriptive Statistics	153
Asset Holdings	153
Funds of funds	61
Investor Concentration	243
Redemption Policy	225
Liquidity Management Tools	283

Source: Central Bank of Ireland, ESRB.

where questionnaire submissions are only partially completed. To maximise the use of available data, for any given fund, we only omit data for incorrectly completed subsections of the questionnaire, while including correctly completed data for other subsections.

Applying the above cleaning methods, we obtain a varying sample size for subsections in the analysis. Table 1 summarises the post-cleaning sample sizes.

4. Results

4.1 Qualitative results

The following subsections reflect responses provided by the asset managers of the total fund sample. The responses given by asset managers refer in general to all the funds they manage. The qualitative section of the paper highlights models, tools and techniques currently available to industry and is particularly useful to central bankers and regulators looking to develop liquidity stress tests for this sector. It also provides a description of industry's views on market liquidity and the impact of regulation.

4.1.1 Liquidity risk management policies and practices

All responding asset managers confirm that defined liquidity policies and procedures are in place in their sub-funds. These practices are ex-ante and on-going and can act as a buffer to the build-up, and impact of risk. In general, we note risk limits require monthly review/ approval by the company's chief investment officer or manager or board of directors, and in some cases internal audit.

To ensure that a fund does not exceed specific risk limits, pre and post-trade monitoring is employed. Pre-trade monitoring is designed to prevent the portfolio manager or trader entering ineligible trades (beyond a fund's investment limits for specific asset classes or illiquid assets). Likewise, post-trade monitoring of trades highlights where risk limits or policies are breached. The majority of funds have a predefined escalation process.

In the event of a breach, a validation of its occurrence and severity are performed by a risk management team/portfolio management team/compliance department. This is subsequently reported to the portfolio manager or dedicated internal risk committee (consisting of senior management) and board of directors. The fund undertakes immediate action to correct the breach.

For most of the respondents (94 per cent), formal contingency plans are present for periods of severe illiquidity. Liquidity management tools and credit lines are also available but generally not required.⁸

4.1.2 Risk profile and liquidity buffers

Respondents generally state that should the risk profile of the fund change, the redemption policy and liquidity management tools may be adjusted in accordance with its prospectus, necessary regulation, board approval and/or shareholder vote. Moreover, we find that the main factors determining fund-exposure limits to different assets include regulatory requirements, investment objectives, intended risk profile and rating agency practice. The majority of respondents state they regularly review limits, although review periods vary from manager to manager.

A fund's investment objectives and associated investment guidelines can set a general framework for a sufficient cash or liquidity buffer. The size of these buffers tends to be determined by market liquidity and/or the potential risk of significant redemptions. Approximately 50 per cent of asset managers report that their funds have no strict predefined approach to liquidity or cash buffers. According to asset managers, this is due to the liquid nature of their portfolios. The remaining asset managers specify they either take a dynamic approach to buffers (i.e. they may be increased during stressed market conditions) or a minority have strictly defined limits.

In general, when setting buffers, asset managers are balancing the trade-off between maintaining sufficient liquidity and maximising fund performance. Many view larger than normal cash balances as an opportunity to exploit potential market dislocations. Moreover, funds may need to satisfy certain regulatory and credit rating requirements (for example,

to achieve an AAA credit rating, MMFs must satisfy certain liquidity requirements).⁹ A minority of managers report that their funds increased buffers since 2008 or in response to increased market volatility.¹⁰ The majority of asset managers report no amendments to their liquidity and cash buffer strategy in response to recent trends in market liquidity.

4.1.3 Market trends, disruptions and regulation

There is some evidence of increased market illiquidity and volatility since the crisis. Approximately 50 per cent of asset managers report that they have witnessed no decline in market liquidity in recent years, while the remaining 50 per cent state they have seen either market-specific or a general decline in market liquidity. Many asset managers indicate liquidity fell from 2006 onwards and stabilised in 2012, albeit at a materially lower level.

Individual asset managers report declining market liquidity since the financial crisis in some and/or all of the EU markets highlighted in the questionnaire. That is asset backed securities (ABS), covered bonds, investment grade corporate bonds, high yield corporate bonds and sovereign bonds. Across these asset classes, asset managers note declines in overall trading volumes, the number of daily transactions, average transaction size and an increase in bid-ask spreads. Likewise, asset managers report a reduction in large-volume traders, decrease in the number of market-makers and highlight the need to split transactions between several counterparties. Looking at sovereign bonds, a number of asset managers also note diverging liquidity in the bonds of different EU member states.

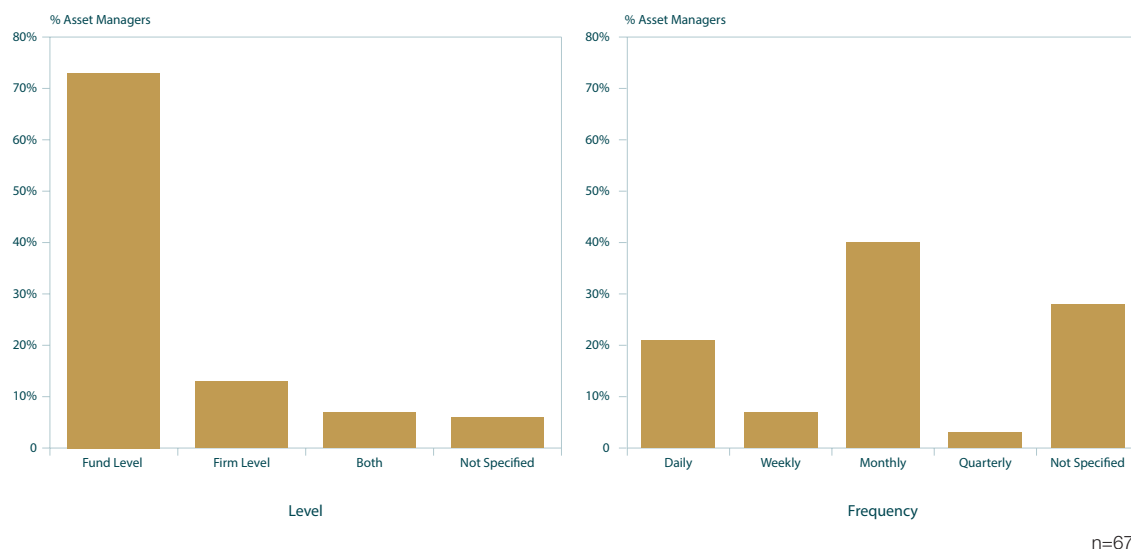
A small number of asset managers indicate that declines in liquidity and increases in volatility have somewhat affected portfolio construction.¹¹ In the case of both hypothetical

⁸ Credit lines can include subordinated loans from a parent company or a custodian overdraft. A custodian overdraft is not a guaranteed credit line; this is at the discretion of the custodian and is short-term only.

⁹ As one asset manager states, in the case of Moody's, at least 20 per cent of the NAV must be held in overnight instruments, reverse repo and unsecured deposits. Funds must hold overnight assets such that it satisfies a minimum 76 per cent of the amount invested by the top 3 investors.

¹⁰ For example, since the financial market collapse in 2008, one asset manager notes its sub funds cash buffers have been increased from 5 to 15 per cent. However, there has been no requirement to further increase these buffers. For another manager, adjustments involved an increase in cash exposure for one of its funds to 10 per cent, because of high yield market.

¹¹ Of these, one asset manager noted their funds attempt to mitigate increased volatility by working in partnership with counterparties to source liquidity and achieve as tight bid/offer spreads as possible. Another rewrote liquidity risk controls for their MMFs.

Chart 1: Stress Testing: Level & Frequency

Source: Central Bank of Ireland, ESRB.

Note: 'Not specified' refers to those funds which do not provide details of the level or frequency of stress testing.

and observed disruptions, asset managers state that they reduce exposure in asset classes that experience amplified stress. They will also increase cash balances and diversify the portfolio composition.

Only one respondent states they have been forced to withdraw from specific market activities since the crisis. They report "soft closing" one of their funds following a reduction in liquidity and also withdrawing from the commercial paper (CP) market. Soft closing is a process by which an open-ended fund ceases to accept money from new investors; however, existing shareholders can still buy shares of the fund.

According to a number of asset managers, regulations such as Solvency II and Capital Requirements Regulation/ Capital Requirements Directive IV (which impose tougher capital requirements on insurance companies and banks) have affected the risk appetite of such financial institutions, reducing the amount of capital available to commit to trading, thereby reducing market liquidity.¹² For example, one respondent states the reduced liquidity/capital provided by investment banks was a catalyst for the cessation of one of their funds (not included in the questionnaire).

Another asset manager outlines that recent regulatory changes have seen a reduction in liquidity in overnight reverse repos and short-term credit default swaps (CDS). As a result, they have replaced these with government T-Bills and other short-term investments. Thus, there is some evidence that regulatory change has reduced market liquidity.

4.1.4 Current liquidity stress testing practices

Stress testing of funds based on historical and hypothetical scenarios is important to analyse a funds capacity to deal with large-scale redemption shocks. Chart 1 presents details on the level and frequency of stress testing as provided in the survey.

We find that 73 per cent of asset managers report stress tests are performed per fund portfolio (fund level), 13 per cent conduct tests for the fund manager as a whole (firm level), and 7 per cent at both levels. The most common frequency of stress testing is monthly (40 per cent). Over 50 per cent of asset managers also specify that they undertake ad-hoc stress tests in response to changes in market conditions and redemption pressures.

¹² Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) [2009] OJ L 335, 17.12.2009; and Regulation 2013/575/EU on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No. 648/2012 [2013] OJ L 176, 27.6.2013.

Table 2: AUM, Mean, Median & Standard Deviation

Fund Type	n	AUM	% Total Pop. AUM*	Sample Mean	Sample Median	Sample Standard Deviation	Sample Std. dev. as % Median
Mixed	24	€34.2bn	15%	€1.4bn	€0.9bn	1.1bn	122%
Bond	98	€145.8bn	22%	€1.5bn	€1.1bn	1.1bn	100%
MMF	31	€242.6bn	52%	€7.8bn	€3.1bn	9.9bn	319%
All funds	153	€422.5bn	31%	€2.8bn	€1.2bn	5.2bn	433%

*: % of Total Pop. AUM refers to the sample size as a percentage of the total Irish funds' population AUM for this category of funds. This outlines the representativeness of the sample for the total Irish funds sector.

In general, the design of stress tests varies. A combination of normal and stressed scenarios (historical and hypothetical) are applied to stress liquidity risk. The scenarios include increased interest rate and credit spreads, enlarged redemptions, displacement of liquidity to a higher bucket and downgrading of the largest issuers. The tests integrate key market events and the external environment (emerging markets behaviour) into their assessment.

Models applied include Value at Risk (VaR), a Liquidity Cost Score (LCS)¹³, Monte Carlo simulations for scenario analysis at a macro or security level, covariance matrices with sigma shocks¹⁴, and a wide range of third party instruments (including matrices determined by credit rating agencies and generic price impact functions). These results concur with the AFG when they suggest that the methods and instruments used in stress testing of funds vary substantially from one asset manager to another (AFG, 2015).

Stress tests are used as flags to influence limits or thresholds. In general, asset managers state that they use stress tests where vulnerabilities are discovered to review the funds risk profile and limits, and to influence the fund's investment decisions. Accordingly, stress tests are critical to determining the appetite for risk-taking in a fund.

4.2 Quantitative results

The following subsections describe the asset holdings, liquidity, investor concentration, redemption policy and liquidity management tools of different fund categories. We analyse funds according to their reported fund category in the questionnaire. The criteria for classifying funds into such categories are derived from the public prospectus, fund rules, instruments of incorporation, established statutes or by-laws, subscription documents or investment contracts, marketing documents, or any other statement with similar effect. The definition of fund categories analysed in this article is as follows:

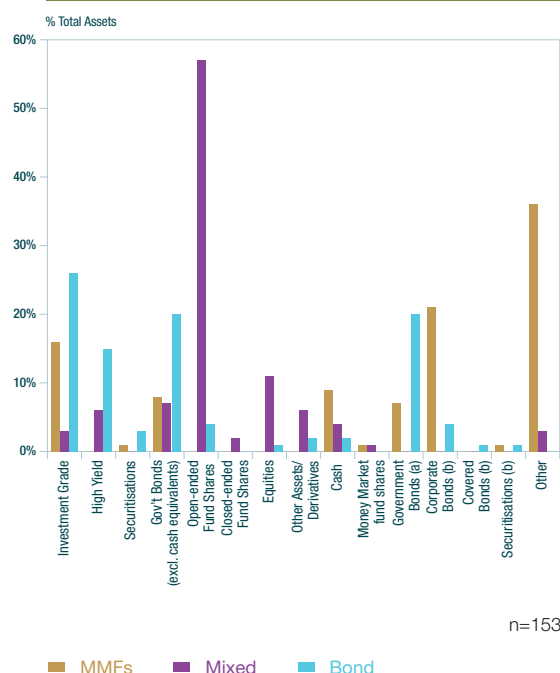
- **Bond funds:** these are funds primarily investing in securities other than shares.¹⁵
- **Mixed funds:** these are funds, which invest in both equity and bonds with no prevalent policy in favour of one or the other instrument.¹⁵
- **Money Market funds:** these are funds which invest primarily in money market fund shares/units, short-term debt securities and/or deposits.¹⁶

¹³ LCS measures the cost of buying and selling a bond. It is computed at the instrument level and is based on the bid ask spread and the spread duration. It allows portfolio managers, traders and risk management a quantifiable measurement of liquidity at the security level that can then be aggregated into a comprehensive view of liquidity at the sector and portfolio levels.

¹⁴ The degrees of the sigma shocks are informed by historical market volatility and losses resulting from events like the global financial crisis in 2008. The tests assume correlations between the different risk positions in the fund based generally on historical correlation levels. Strategies that allow for daily redemptions monitor their asset liquidity profiles.

¹⁵ See MMIF guidance notes (Central Bank of Ireland, 2017b) for the definition of a Bond fund and a Mixed fund (see annex 2, page 66-67): [http://www.centralbank.ie/docs/default-source/statistics/statistical-reporting-requirements/fund-administrators/money-market-and-investment-funds-return-\(mmif\)/mmif-notes-on-compilation.pdf?sfvrsn=](http://www.centralbank.ie/docs/default-source/statistics/statistical-reporting-requirements/fund-administrators/money-market-and-investment-funds-return-(mmif)/mmif-notes-on-compilation.pdf?sfvrsn=)

¹⁶ For a definition of MMFs see Regulation (EU) No. 1071/2013 of the European Central Bank concerning the balance sheet of the monetary financial institutions sector [2013] OJ L297, 7.11.2013, art 2.: <https://www.ecb.europa.eu/ecb/legal/pdf/02013r1071-20131127-en.pdf>

Chart 2: Weighted Average Asset Portfolio Composition

Source: Central Bank of Ireland, ESRB.

Note: weighted average as a percentage of AUM for each fund category. Respondents self report their fund category. Asset classes are defined in the ESRB Questionnaire as follows:

Non-Cash Equivalents:

Cash is defined as all deposits held at banks.

Open-ended and closed-ended fund shares exclude those held in MMFs. All other non-cash equivalent assets are not defined in the questionnaire, however are assumed to follow ratings criteria.

Cash equivalents:

Money Market fund shares refer to fund shares/units held in MMFs.

(a) All sovereign and sovereign-guaranteed debt of any remaining maturity rated Aa3/AA- or above by at least one of Moody's, S&P or Fitch or via an equivalent rating approach.

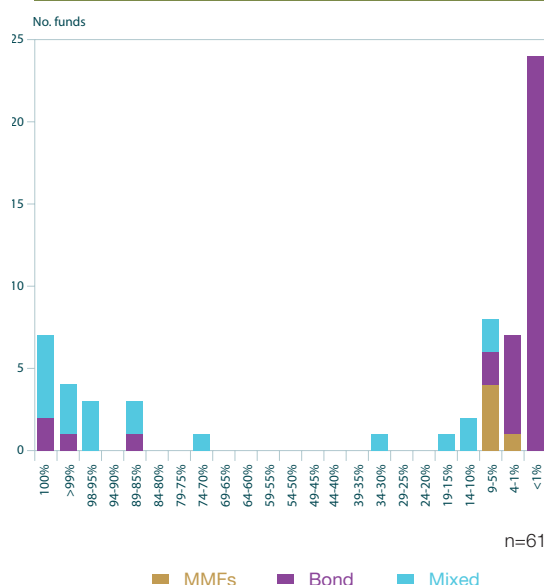
(b) Securities of any maturity rated Aa3/AA- or above by at least one of Moody's, S&P or Fitch or via an equivalent rating approach.

'Other' assets are not defined but are expected to include short-term repurchase agreements and money market securities.

4.2.1 Descriptive Statistics

Table 2 outlines the descriptive statistics for each fund category. In terms of AUM, we find the largest group is MMFs followed by bond funds and then mixed funds. We note that the sample size for this section of the survey is considerably smaller than other sections (see Table 1). This is due to reporting errors in the sample, which were removed as part of the cleaning process.

We note in Table 2 that the sample size for this section of the survey has reduced and now represents 31 per cent of the total population AUM. MMFs remain the most representative, at 52 per cent of the total population for this category followed by bond funds at 22 per cent and mixed funds at 15 per cent.

Chart 3: Percentage of total assets held in other funds, by holding fund category

Source: Central Bank of Ireland, ESRB.

In all cases, the mean is greater than the median indicating that we are looking at an asymmetrical distribution that is skewed to the right (due to a small number of funds with large AUM). Thus when describing funds, the median is a better indicator of the average fund AUM than the mean. We also note the spread around the median (the standard deviation) is largest in percentage terms for MMFs, followed by mixed funds and then bond funds. This suggests that there is more variability in MMF size than in the other two categories, with a small number of large AUM funds influencing descriptive statistics. In addition, we suggest using weighted average measures when analysing the average holdings of funds to remove the impact of larger funds on average figures. For example, the weighted average is calculated in Chart 2. This information should be useful to supervisors and analysts of the sector in ensuring benchmarks are representative.

4.2.2 Asset Holdings

Chart 2 illustrates the varying asset holdings across fund types. Asset holdings are categorised into two groups based on their liquidity (cash and non-cash equivalent assets). On the chart, all assets to the right of cash are

cash equivalents. The distinction is based on ratings. Cash equivalents are defined by the ESRB as being assets rated Aa3/AA- or above. We note that this definition of liquid assets is quite broad. MMFs' top two holdings are "cash equivalent" corporate bonds and "other" cash equivalent securities. From looking at Central Bank data, we suggest the "other" cash equivalent securities are mainly short-term repurchase agreements and money market instruments. From a liquidity perspective, we suggest that the "cash equivalent" corporate bond holdings may suffer some liquidity constraints during a fire sale. For example, Basel III's High Quality Liquid Assets measure places a 15 per cent haircut on corporate debt equivalent to (b) in Chart 2 (BCBS, 2013). With respect to repurchase agreements and money market instruments, these are traditionally liquid. However, there may be longer maturity securities in here and we would caveat that further analysis is required. Overall MMFs report holding more liquid assets than bond funds and mixed funds.

Bond funds report investing in mainly cash-equivalent government bonds, non cash-equivalent government bonds and investment grade bonds. Mixed funds top constituents are open-ended fund shares and equities.

4.2.3 Funds of Funds

Within the bond and mixed fund categories, we also identify 'Fund of Funds' (FoFs). 'Fund of Funds' is an investment strategy in which funds invests in other funds rather than investing directly in assets such as stocks, bonds or other debt securities. Within our 153 fund sample, we identify 61 entities who report holding fund shares. Of these, we find two categories of funds that invest in other IFs and MMFs. These present diverging investment strategies, that is fund of funds and funds with small holdings in other funds (particularly in MMFs). It appears that a minority of funds hold other funds shares and within that, a smaller cohort are funds of funds.

As illustrated in Chart 3, 17 funds (13 mixed and 4 bond funds) hold 85 per cent or more of their assets in other funds. The 17 funds hold 97.6 per cent of these assets in other open-ended IFs, 2.1 per cent in closed-ended IFs and 0.3 per cent in MMFs. Of these 17 entities we note 14 appear to be funds of funds with the remaining 3 identified as master/feeder funds.¹⁷ We caveat this result by noting the small sample size; however, we suggest that this may be indicative of an overall pattern within the funds sector.

In contrast, funds which invest less than 15 per cent of their assets in other funds hold approximately 64 per cent of these assets in MMFs (which may be seen as cash equivalent investments (see Chart 2)) and 36 per cent in other open-ended IFs. Thus, we can see that a lack of liquidity in MMFs may have a knock-on effect on other funds which invest in MMFs as part of their liquidity strategy.

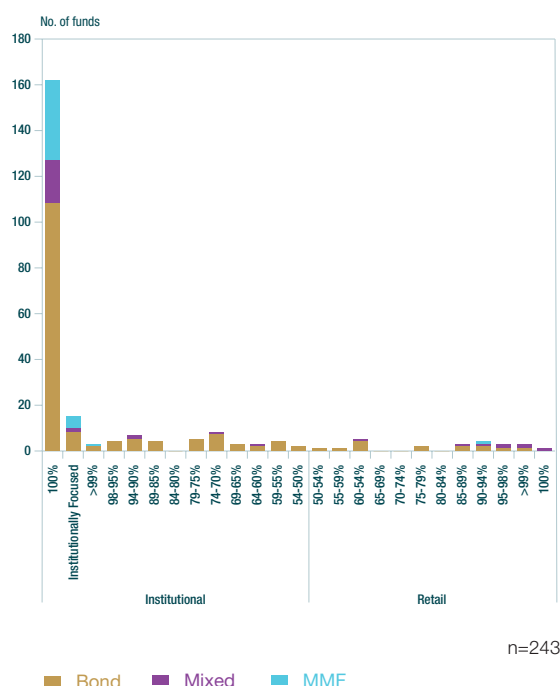
The characteristics of both groups are important in understanding potential channels of contagion under periods of market stress. The IMF note that cross shareholdings are important as redemption shocks in a fund of funds may transmit stress to other entities, due to the investment structure (IMF, 2016, p. 16).

4.2.4 Asset Liquidity

Sufficient liquidity is essential to a fund's ability to meet redemption requests. As part of the survey, fund managers were requested to split their portfolios into liquidity buckets. The buckets represent how long it will take a fund to liquidate the portfolio. Liquidity buckets could be a useful tool for regulators in the assessment of liquidity (and stress testing) as they allow a quick review of the liquidity of the entity. Upon analysis of data reported in the questionnaire, we find the results do not align with the asset splits outlined in Chart 2. In addition, these do not align with liquidity buckets reported for the same entities to the Central Bank as part of MMM/MMIF reporting. Thus, we do not include the results in the

¹⁷ Under the master-feeder fund structure investors place their money into feeder funds that then invests into a master fund. The master fund then invests directly in the market. The purpose of the feeder fund is to 'feed' investor funds into the master fund. The feeder fund then receives the flow of P&L, which is subsequently fed to its investors. See (ECB, 2009) below for more details (page 14):

<https://www.ecb.europa.eu/pub/pdf/other/manualinvestmentfundstatistics200905en.pdf>

Chart 4: Investor Profile by Percentage Type and Fund Category

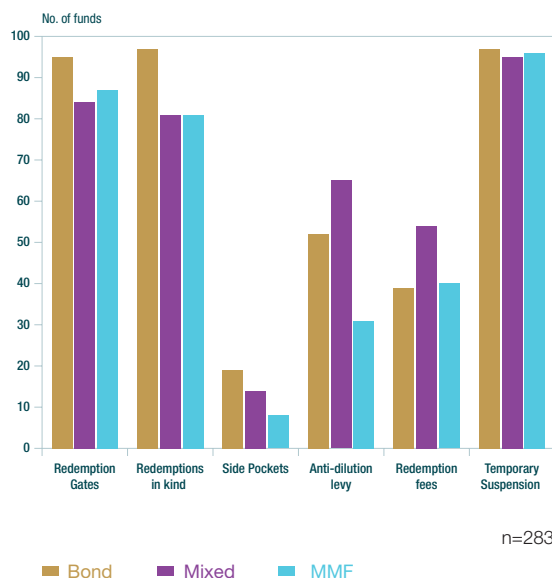
Source: Central Bank of Ireland, ESRB.

paper but note the inconsistency and suggest validation of liquidity buckets prior to their use by regulators or central banks.

4.2.5 Investor Concentration

The investor profile of a fund is important in the consideration of appropriate levels of liquidity. As noted in Section 2, investors' profile can affect redemption outflows during stressed market conditions. In particular, recent research has shown that retail investors may exhibit stronger sensitivity towards fund performance and outflows than institutional investors. This research in part comes because of a much-held belief that most funds are held by retail investors. However, the results below illustrate that this is not the case for most large bond, mixed and MMFs. Chart 4 illustrates the reported investor concentration for 243 investment funds.

Analysis reveals that 91 per cent of funds report that more than half of their investors are institutional (including those funds that report they are institutionally focused). For

Chart 5: Availability of Liquidity Management Tools

Source: Central Bank of Ireland, ESRB.

Definitions as provided in ESRB Questionnaire:

- (a) Redemptions gates:** where redemption requests exceed a certain threshold, funds can decide to carry forward any redemption requests in excess of that threshold to the next dealing day.
- (b) Redemption in kind:** fund may decide to satisfy redemption requests by transferring securities, instead of cash, to the redeeming unit-holder.
- (c) Side pockets:** funds may place illiquid investments in a separate 'side pocket' and issue shares in the side pocket to unit-holders in the investment fund on a pro rata basis. This tool is only available to AIFs in Ireland (IOSCO, 2015).
- (d) Anti-dilution levy:** funds can charge an investor buying or selling units when the fund is in a net subscription or redemption position.
- (e) Redemption fees:** funds have the ability to charge a redemption fee in circumstances where it is experiencing large outflows.
- (f) Temporary suspension of dealings:** dealings in the fund can be temporarily suspended.

67 per cent of funds we find that institutional investors hold 100 per cent of fund units.¹⁸ In contrast, we find that in only 9.5 per cent of funds do retail investors hold more than 50 per cent of units. Moreover, in only 1 fund (0.4 per cent) do we find that retail investors hold 100 per cent of units. While the majority of funds report their investor concentration is largely institutional, we note data is only available on a first counterparty basis, and it is not possible to distinguish the ultimate beneficial owner (which may be retail). Further analysis of the redemption patterns of funds may be a useful validation of these results.

4.2.6 Redemption Policy

A fund's redemption policy is the frequency at which a fund allows redemptions or subscriptions to take place. This may impact upon liquidity risk under stressed market

¹⁸ Institutional investors are entities such as banks, insurance companies and investment funds that pool the funds of their members to purchase a range of assets. Alternatively, funds can consist of retail investors (individual investors).

Table 3: Redemption Policy (Percentage of Funds)

Redemption Policy	Bond funds (n=155)	Mixed funds (n=28)	MMFs (n=42)	All funds (n=225)
Investors can redeem daily	92.0%	92.9%	100%	93.3%
Investors can redeem within 7 days	2.6%	3.6%	0%	2.2%
Investors can redeem within 8-14 days	0.6%	0.0%	0%	0.4%
Investors can redeem within 15 or more days	5.2%	3.6%	0%	4.0%

Source: Central Bank of Ireland, ESRB.

conditions. Table 3 describes the redemption policy reported by fund category for 225 responding entities.

Of the above sample, 93 per cent of funds report a daily redemption policy. As expected MMFs have the largest proportion of daily redemptions of the three categories (100 per cent).¹⁹ This would be an important characteristic when designing a stress test as most funds have daily redemptions. It also speaks to the potential for liquidity transformation in funds.

4.2.7 Liquidity Management Tools

Similar to insights regarding redemption policy, we suggest that liquidity management tools should be considered for inclusion in the design of fund stress tests. Chart 5 illustrates the availability of liquidity management tools for 283 funds in our sample.²⁰

We find that redemption gates, redemptions in kind and temporary suspensions are the most commonly available tools. Bond funds report the highest availability of redemptions in kind, redemption gates, side pockets and suspension of redemptions. Redemption fees and anti-dilution levies (ADLs) are most commonly available in mixed funds (54 per cent and 65 per cent respectively).

The above six tools are ex-post in nature as they are used ‘after an event’. An anti-dilution

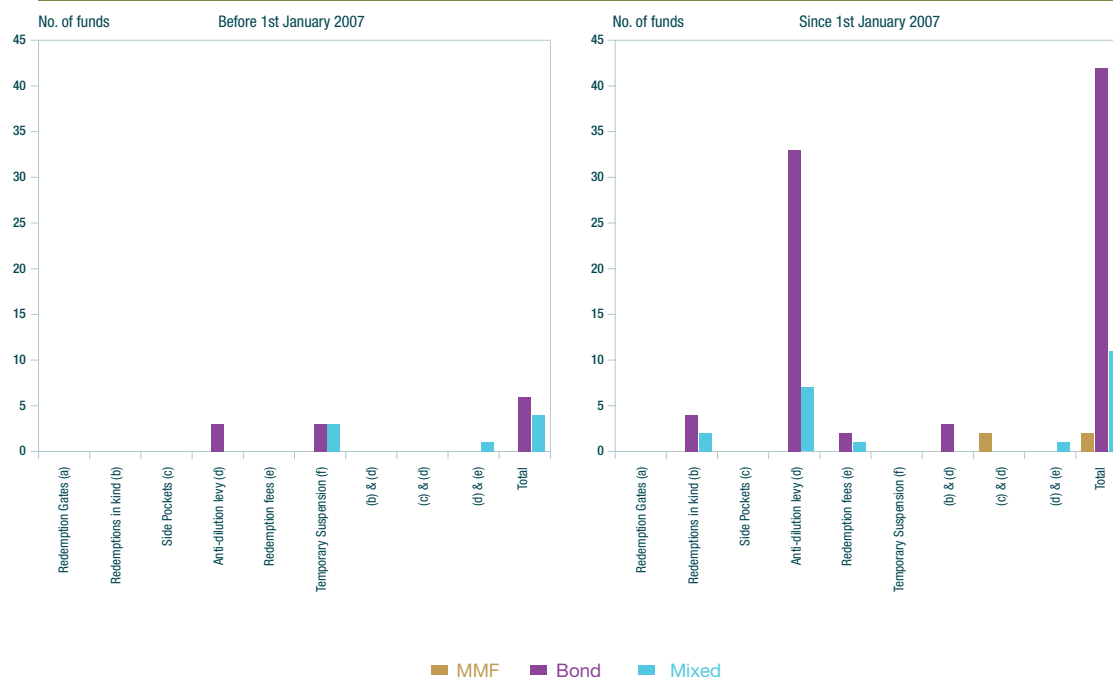
levy or redemption fee may also be deemed ex-ante, or pre-emptive, as it may be used under normal circumstances in Ireland, i.e. ‘before an event’.

Chart 5 illustrates what is available but it does not illustrate whether these tools are used. Chart 6 illustrates the tools which funds report they have applied during two time periods: (a) prior to 1 January 2007 and (b) from 1 January 2007 to 30 June 2015. Approximately 4 per cent of funds (10 funds) use liquidity management tools during the first period with 19 per cent (55 funds) doing so in the latter period. We note that liquidity management tools are used most commonly by bond funds, then mixed funds with only 2 MMFs using tools in the second period. These tools are still only used in a minority of cases. This is possibly because funds have no need to use these tools as they can manage liquidity and also because the use of these tools may damage the fund’s reputation and franchise value (RISK, 2016). In addition, the use of tools could also act as a negative signal to investors, leading to further redemption pressure on a fund.

We find that the most commonly used tool is an ADL. These tools are generally pre-emptive in nature and used to reduce the negative impact of large subscriptions and redemptions on “non-trading” investors rather than in response to stressed market conditions. This may be an important factor if simulating a “large redemption” stress test. As mentioned

¹⁹ Central Bank (Supervision and Enforcement) Act 2013 (Section 48(1) (UCITS) Regulations 2015, s 87(3)(b) requires that all UCITS MMFs must provide ‘...daily subscriptions and redemptions of units’.

²⁰ Liquidity management tools must be outlined in constitution documents that are approved by the Central Bank of Ireland. In Ireland, activation does not require pre-approval from the regulator (although guidance on use of certain tools is provided by the Central Bank); however this is not case in other jurisdictions (IOSCO, 2015, pp. 13-15). There are no current rules that require that specific tools be available to funds domiciled in Ireland.

Chart 6: Use of Liquidity Management Tools

Source: Central Bank of Ireland, ESRB.

Note: for definitions see Chart 5.

above, the effectiveness of these tools in preventing 'first-mover advantage' would be useful future research.

5. Conclusion & Recommendations

This report highlights the main findings of the ESRB liquidity questionnaire of large Irish bond, mixed and money market funds. In the survey, assets are categorised into cash equivalent and non-cash equivalent assets, based on ratings. We see a broad outline of the liquidity of large Irish domiciled bond, mixed and money market funds. Based on portfolio asset compositions MMFs appear to be the most liquid followed by bond and then mixed funds. This is expected. Below we respond to some questions outlined in the introduction of the paper.

Is regulation affecting liquidity?

We note that there is some evidence that regulation has reduced liquidity in the highlighted markets. It appears as if it may

have affected some market participants more than others, specifically those affected by new capital requirements. There is some evidence that these have impacted risk appetite and thus liquidity.

What are the most useful models and tools to use when analysing liquidity?

The survey tells us that asset managers use many models and tools when assessing liquidity, from a Liquidity Cost Score to Monte Carlo simulations. The tests are usually performed at the fund level and on a monthly basis. We also note that funds may use pre-emptive liquidity management tools (such as anti-dilution levies) to disincentivise and manage large redemptions.

How do we define liquidity?

Liquidity is defined by the ESRB in the quantitative section in a binary sense – cash and non-cash. This is based on ratings. This is a useful guide and is often used by regulators (e.g. Basel III's HQLA) but more granular methods are also outlined in the qualitative section. Asset managers report

they use measures such as trading volumes, the number of daily transactions, average transaction size and bid-ask spreads as measures of liquidity. Challenges will arise for reporting and analysis of these more granular measures but more work is required by central banks and regulators to assess the best definition and measures of liquidity for liquidity stress tests and systemic risk analyses.

How do we recreate the dynamics of a financial crisis?

As over 90 per cent of the sample report the availability of daily redemptions, liquidity and maturity transformation are potential risks, which warrant further analysis. We also learn that asset managers test liquidity under a number of scenarios, for example rising interest rates or credit spreads. Liquidity buffers are dynamic in nature and sensitive to market conditions as asset managers trade-off liquidity against profitability. Our survey shows that a large percentage of funds are held by institutional investors. Of the funds which report investor concentration, two thirds have 100 per cent institutional investors whereas less than 10 per cent state that retail investors hold more than 50 per cent of units. Retail investors have been shown to place more weight on negative signals in stressed market conditions, so this result suggests that the funds in our sample may be less subject to “run risk” than retail investors.

These findings help to describe the landscape of large funds from a liquidity standpoint. The results will aid those looking to evaluate liquidity risk in funds from a regulatory perspective and from a systemic risk perspective.

Bibliography

AFG, 2015. Code of Conduct on the use of Stress Tests, Paris: The French Asset Management Association.

Ansidei, Julie, Elias Bengtsson, Daniele Frison, & Giles Ward. 2012. Money Market Funds in Europe and Financial Stability. ECB Occasional Paper Series, June, Issue No. 1.

BCBS, 2013. Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools, Basel: Bank for International Settlements.

Central Bank of Ireland, 2017a. Resident Monthly Money Market Funds Return (MMM): Notes on Compilation, Dublin: Central Bank of Ireland.

Central Bank of Ireland, 2017b. Resident Investment Funds Return (MMIF): Notes on Compilation, Dublin: Central Bank of Ireland.

Central Bank of Ireland, 2017. Macro-financial Review 2017:1. Macro-Financial Review: Dublin, Central Bank of Ireland.

Chen, Qi, Itay Goldstein, & Wei Jiang. 2010. Payoff Complementarities and Financial Fragility: Evidence from Mutual Fund Outflows. *Journal of Financial Economics*, Volume 97, pp. 239-262.

Cipriani, Marco, Antonio Martin, Patrick McCabe, & Bruno M Parigi. 2014. *Gates, Fees and Pre-emptive Runs*, New York: Federal Reserve Bank.

Dwyer, Gerald & Paula Tkac. 2009. The financial crisis of 2008 in fixed-income markets. *Journal of International Money and Finance*, Volume 28, pp. 1293-1316.

ECB, 2009. *Manual on Investment Fund Statistics*, Frankfurt: European Central Bank.

ESMA, 2013. Guidelines on Reporting Obligations under Articles 3(3)d and 24(1), (2) and (4) of the AIFMD, Paris: European Securities and Markets Authority.

ESMA, 2017. Report on Trends, Risks and Vulnerabilities, Paris: European Securities and Markets Authority.

ESRB, 2017. EU Shadow Banking Monitor, Frankfurt: European Systemic Risk Board.

FSB, 2017a. Global Shadow Banking Monitoring Report 2016, Basel: Financial Stability Board.

FSB, 2017b. Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities, Basel: Financial Stability Board.

IMF, 2016. Ireland Financial Sector Assessment Program: Technical Note - Asset Management and Financial Stability, Washington D.C.: International Monetary Fund.

IOSCO, 2015. Liquidity Management Tools in Collective Investment Schemes, Madrid: International Organisation of Securities Commissions.

Li, Wei, Ashish Tiwari & Lin Tong. 2016. Investor Decisions under Ambiguity: Evidence from Mutual Fund Investor Behavior. *Management Science*, 27 May.

OSC, 2015. Report on Staff's Continuous Disclosure Review of Mutual Fund Practices Relating to Portfolio Liquidity, Ontario: Ontario Securities Commission.

Ramirez, Sandra, Jesus Sierra Jimenez, & Jonathan Witmer. 2015. Canadian Open-End Mutual Funds: An Assessment of Potential Vulnerabilities. *Financial System Review*, Volume June, pp. 47-55.

RISK, 2016. Swayed by Swing Pricing? RISK, Volume January, pp. 14-16.

Consolidated Banking Data: Introducing Enhanced Statistics for Ireland

Kenneth Devine, Jennifer Dooley, Ciaran Meehan and Aisling Menton.¹

Abstract

The financial crisis highlighted a need for enhanced statistics to allow for a more in-depth financial stability analysis. The Bank for International Settlements (BIS) consolidated banking data, which measures banks' country risk exposures, is one dataset that facilitates a worldwide evaluation. It captures the global consolidated claims of international banks headquartered in BIS reporting countries and has been expanded to address data gaps identified following the financial crisis. The benefits of these more granular data are demonstrated through the analysis of foreign claims by Irish banks, international claims on Ireland by foreign banks and linkages between BIS reporting countries, both pre and post crisis. A network analysis of the exposures of banking sectors in BIS reporting countries on vulnerable EU states and sovereigns is also presented.

¹ Authors are an Economist, Data Analyst, Data Analyst and Senior Economist, respectively, in the Money & Banking Team of the Statistics Division of the Central Bank of Ireland. The views expressed in this article are solely the views of the authors and are not necessarily those held by the Central Bank of Ireland or the European System of Central Banks. The authors would like to thank Joe McNeill and Tiernan Heffernan for their helpful comments.

1. Introduction

This article discusses the Bank for International Settlements (BIS) consolidated banking data, and introduces a breakdown of data not previously published by the Central Bank of Ireland.² The expanded data breakdowns are based on an update to the BIS reporting template in December 2013. The article analyses foreign claims by Irish headquartered banks (hereafter Irish banks) by country and sector, and shows how these have declined substantially since the onset of the financial crisis.³ International claims on Ireland by foreign banks, and how these compare to other vulnerable economies, are also examined. Network analysis is used to examine linkages between BIS reporting countries and vulnerable countries before and after the financial crisis, particularly in relation to claims on the official sector.

The paper is structured as follows: Section 2 provides an overview of the enhanced statistics. In section 3 we deal with the analysis of foreign claims by Irish banks, while section 4 explores the enhanced sector breakdown of claims. Section 5 explores claims by international banks on Ireland. Section 6 looks at contingent claims of Irish banks, while Section 7 concludes.

2. Overview of the Enhanced Statistics

The BIS consolidated banking statistics (CBS) dataset collects detailed information on sector and maturity breakdowns, according to where the lending takes place. Individual country data are available for 216 countries, territories and international organisations.⁴ The data are collected both on an immediate risk and on

an ultimate risk basis, for those banks that are headquartered and owned in the reporting country.⁵ Data on an immediate risk basis shows claims on the first counterpart country and sector, whereas data on an ultimate risk basis are based on the country and sector where the ultimate risk or obligor resides, after taking into account risk transfers (BIS, 2013). For example, if a bank in Ireland lends to an affiliate of an American headquartered company based in Luxembourg, this loan is considered as a claim against Luxembourg in the immediate risk statistics. However, on an ultimate risk basis, this is considered as a claim against the US, as this is where the final risk resides.⁶ Data are collected on inward and outward risk transfers, to show how risk is transferred from the immediate risk country to the ultimate risk country.

The BIS initiated enhancements to the consolidated banking statistics after the financial crisis. In 2012, the Committee on the Global Financial System (CGFS), which oversees the collection of the BIS international banking statistics (IBS), approved a major set of enhancements to the IBS aimed at filling long-standing data gaps and better capturing the financial landscape (CGFS, 2012). The initiative by the CGFS was a part of the G20 Data Gaps Initiative, which recommended improvements in a broad range of statistics (FSB-IMF, 2009). These changes to the BIS statistics were introduced in two stages. Stage 1 related to Locational Banking Statistics (LBS) only, whereas stage 2 addressed enhancements to both the LBS and CBS.⁷

The main enhancement to the CBS was the inclusion of domestic positions for the first time, whereas previously the CBS only included foreign claims. While domestic Irish

² The data tables are available at: <https://centralbank.ie/statistics/data-and-analysis/credit-and-banking-statistics/consolidated-banking-statistics>

³ In most of the analysis in this paper, unless otherwise stated, the banks used in the analysis are the three Irish headquartered banks. This is to allow for a comparison of data across time periods, and to control for bank population changes.

⁴ Some very small countries are included in a 'residual' figure for geographic regions. The reporting form, is available at: [http://www.centralbank.ie/statistics/statistical-reporting-requirements/credit-institutions/maturity-and-sectoral-return-\(mts\)](http://www.centralbank.ie/statistics/statistical-reporting-requirements/credit-institutions/maturity-and-sectoral-return-(mts))

⁵ Data are also collected for those banks that are headquartered in Ireland, but are not Irish owned, for example, Depfa Bank. Depfa is headquartered in Ireland, and Ireland is the ultimate location for consolidation, but as it is owned by a German non-financial corporate, it is not included in foreign claims by Irish banks. There are a number of banks of this entity type located in Ireland, and they complete a different reporting template than Irish owned banks.

⁶ Further examples can be found at: https://www.bis.org/statistics/bankstatguide_faq.pdf

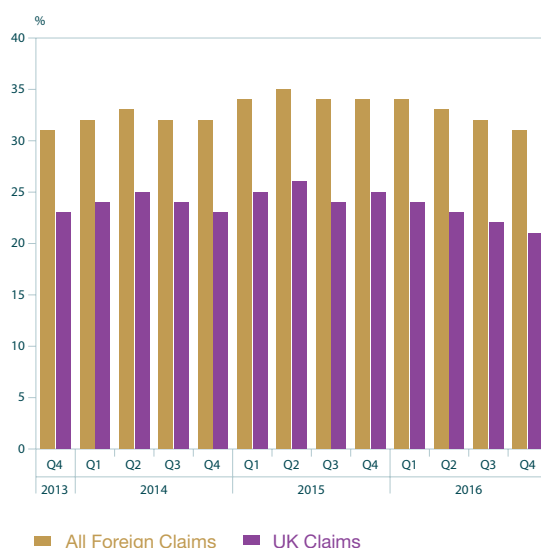
⁷ Locational banking statistics measure claims and liabilities, including inter-office positions, of banking offices resident in reporting countries. These statistics are reported using principles that are consistent with balance of payments methodology.

Table 1: Definition of breakdown of Claims

Foreign Claims (A+B+C)	International claims + Local claims in local currency
International Claims (A+B)	Cross-border claims booked by banking offices outside of Ireland (A) + local claims booked by banking offices in Ireland in foreign currency (B)
Local Claims in Local Currency (C)	Local claims booked by banking offices outside Ireland in local currency (C)
Domestic Claims (D+E)	Cross-border claims booked by banking offices outside Ireland on residents in Ireland (D) + local claims booked by banking offices in Ireland on Irish residents (E)

Source: www.bis.org

Chart 1: Foreign Claims over Total Assets; Total & UK



Source: Central Bank of Ireland.

claims in local currency are not addressed in this paper, their availability allows for the reporting of total assets of the consolidated balance sheet of domestic banks. Additionally, it allows for the balanced reporting of net risk transfers between immediate and ultimate risk data. Table 1 outlines the different claims categories covered in the data.

A further enhancement to the data was the inclusion of an expanded sector breakdown (see Table 3). The revised series sub-divides the non-bank private sector into non-bank financial institutions, non-financial corporations, and households.

Data enhancements are also available for the funding side of the banks' consolidated balance sheet, with total liabilities disaggregated by instrument. These data are only available as a total, rather than on an individual country basis.

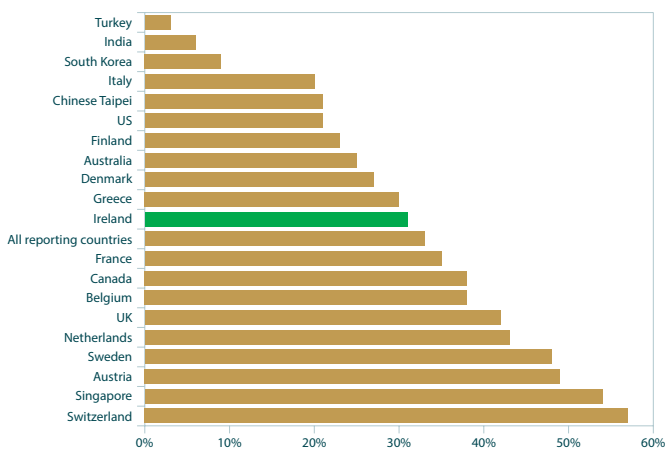
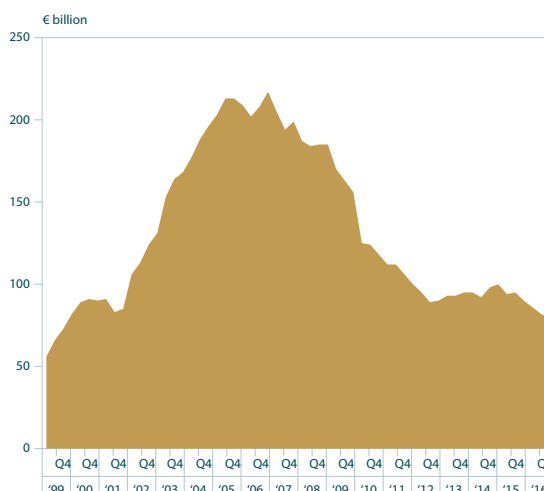
3. Analysis of Foreign Claims by Irish Banks

3.1 Overview – Foreign Claims over Total Assets

The proportion of foreign lending over total assets shows the importance of foreign lending to Irish banks. While this lending improves diversification, it also provides an indication of their vulnerability to spillover effects from other countries' banks.⁸ The ratio of Irish banks' foreign lending to total assets has remained relatively stable, starting at 31 per cent in Q4 2013, increasing to 35 per cent in Q2 2015, and falling back to 31 per cent in Q4 2016 (See Chart 1). For the UK, which accounts for the largest amount of foreign claims by Irish banks, the ratio of UK claims to total assets dropped to a low of 21 per cent in Q4 2016, having peaked at 26 per cent in Q2 2015. The scale of foreign claims against the UK highlights the vulnerability of Irish banks to any downturn in that economy.

Chart 2 shows that Irish banks' foreign claims as a proportion of total assets, at 31 per cent, are close to the average for all reporting countries in Q4 2016. This would indicate that Irish banks are not overly exposed to

⁸ Total assets are only available since December 2013, with the inclusion of Ireland in the new data collection.

Chart 2: Proportion of Foreign Claims over Total Assets, Q4 2016Source: www.bis.org.**Chart 3: Total Foreign Claims, Immediate Risk for Irish Banks, Q4 1999-Q4 2016**

Source: Central Bank of Ireland.

foreign claims, in comparison to their peers in other countries. Countries with financial centres where domestic banks have large international operations, such as Singapore and Switzerland, have the highest proportion of claims over total assets.⁹ While Ireland has a large financial centre which hosts many foreign owned banks, the activities of Irish banks are more domestically focused.

3.2 Geographical Risk

Data on an immediate risk basis shows claims on counterparties and countries on a first counterpart basis. These data show how Irish banks have reduced their foreign exposures on a first counterpart basis, from a peak of €217 billion in Q3 2008 to just €79 billion in Q4 2016 (See Chart 3). Over the same period, the level of foreign claims fell consistently, with Q2 2011 recording the largest quarter-on-quarter decline of €31 billion.

In Q4 2008 there were claims against 129 territories on an immediate risk basis and 128 on an ultimate risk basis, but this had contracted to 108 territories in both categories by Q4 2016.¹⁰ However, the composition of these territories had undergone some changes between the two reporting periods. As can be seen from Chart 4, claims of Irish banks were overwhelmingly on the Developed Countries grouping, which accounted for 91 per cent pre-crisis and 95 per cent post-crisis on both an immediate and ultimate risk basis.¹¹ While other exposures were relatively minor, pre-crisis data shows that Developing Europe was the next significant country grouping, but by Q4 2016 this had declined in importance. Conversely, International Organisations increased in significance on an immediate risk basis since 2013, reflecting the establishment of the European Financial Stability Facility and the European Financial Stability Mechanism.¹²

The same countries account for the largest declines in claims on an ultimate risk basis as for immediate claims. In both cases, the UK

⁹ Data for total assets is not freely available for all reporting countries.

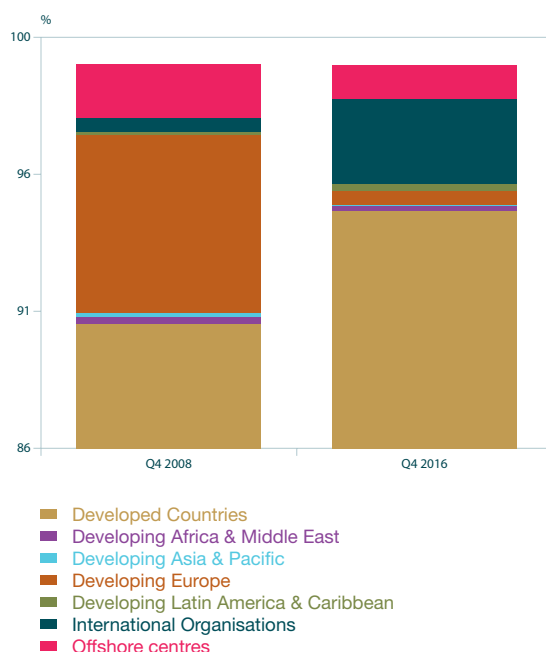
¹⁰ Territories include a 'residual' for geographical regions, for example residual Europe. It also includes international organisations.

¹¹ The country groupings of Developed Countries, Developing Europe, etc. are grouped according to the BIS reporting template, and follow closely those country groupings used by the Bank of England:

http://www.bankofengland.co.uk/statistics/Pages/iadb/notesiadb/consolidated_foreign_claims.aspx.

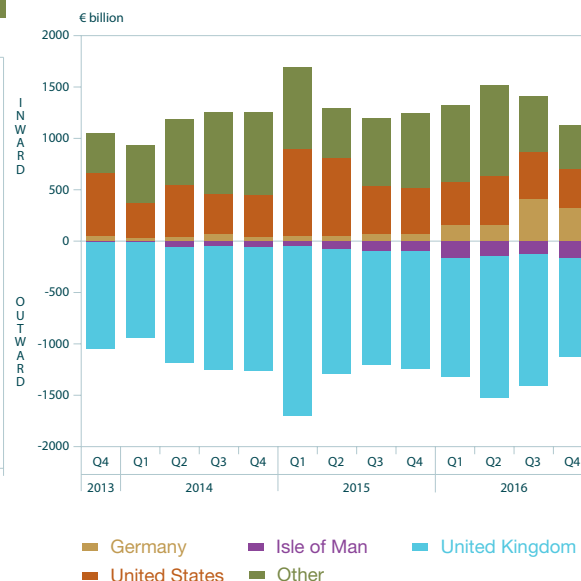
¹² International Organisations does not include the ECB, which is resident in Germany, or the BIS, which is resident in Switzerland, for the purposes of the BIS Consolidated Banking Statistics.

Chart 4: Proportional Country Groupings, 2008 and 2016



Source: Central Bank of Ireland.

Chart 5: Risk Transfers Between Countries



Source: www.bis.org.

recorded the highest falls between Q4 2008 and Q4 2016, with declines of €57 billion on immediate claims and €53 billion on ultimate claims. Despite this, the UK remains the predominant claims destination for Irish banks, as shown in Table 2. The equivalent figures for the US were €17 billion in both cases, while significant declines were also recorded for Poland, Spain, France and Germany.

Table 2 shows that total foreign claims fell by 61 per cent between the two reporting periods, with declines across all geographical areas with the exception of International Organisations and Developing Latin America & Caribbean countries on an immediate risk basis, and Offshore centres on an ultimate risk basis. The country grouping to record the largest percentage decline between the two periods was Developing Europe, much of which was attributable to the disposal by AIB of its operations in Poland.

Countries where Irish banks no longer have foreign claims on either risk bases include British Overseas Territories, Macau Sar and Kazakhstan. For immediate risks, San Marino and Honduras also no longer have claims, while Chile ceased to feature on an ultimate risk basis. However, exposures to these countries were small in Q4 2008, at around €260 million for immediate claims and €270 million for ultimate claims.

Conversely, when compared with Q4 2008, new exposures were recorded against Uruguay and Georgia in Q4 2016 for both risk bases. Trinidad & Tobago also provided exposures at the immediate risk level while Burkina Faso featured with regard to ultimate risk claims. Evidence of consolidation and deleveraging are shown in the fact that 29 countries that had an ultimate risk claim recorded against them in 2008, no longer appear in the data in Q4 2016. Again, the amounts were small, adding up to just under €20 million for immediate claims and €35 million for ultimate claims.

Table 2: Risk Data by Geographic Region

Geographic Region	Immediate Risk			Ultimate Risk		
	Q4 2008	Q4 2016	% change	Q4 2008	Q4 2016	% change
Developed Countries	185,283	75,054	-59	187,729	75,215	-60
Of which:						
<i>United Kingdom</i>	110,424	53,453	-52	105,965	52,492	-50
<i>United States</i>	23,207	6,004	-74	23,584	6,387	-73
Developing Africa and Middle East	447	151	-66	452	193	-57
Developing Asia and Pacific	318	20	-94	335	42	-87
Developing Europe	13,315	412	-97	13,189	412	-97
Developing Latin America and Caribbean	189	196	4	188	180	-4
International organisations	1,077	2,450	127	1,077	2,450	127
Offshore centres	4,002	1,009	-75	2,795	854	-69
Total	204,631	79,293	-61	205,765	79,347	-61

Source: Central Bank of Ireland.

3.3 Risk Transfer

The collection of data on both an immediate risk basis and an ultimate risk basis allows users to analyse risk transfers between countries. The data shows how claims by Irish banks on foreign countries are transformed from immediate risk to ultimate risk, with reporting institutions submitting data on net risk transfers, broken down between inward transfers and outward transfers. Outward risk transfers reduce exposure to a given counterparty country, while the reverse is true for inward transfers. Using the example in Section 2, of a loan to an affiliate of an American headquartered company based in Luxembourg, an outward transfer would be recorded for Luxembourg and an inward transfer to the US where the ultimate risk resides. As the data includes Ireland since end-2013, it allows for a more meaningful analysis of this information, as all risk transfers, inward and outward, now sum to zero.¹³

An analysis of geographical regions of foreign claims by Irish banks shows that, between December 2013 and June 2015, offshore centres record mostly inward risk transfers, but from June 2015 onwards these became significant outward risk transfers. Conversely,

developed countries have recorded sizeable inward risk transfers from June 2015 onwards.

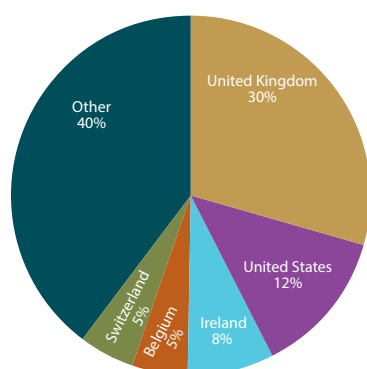
Chart 5 provides a breakdown by country highlighting that, since December 2013, the UK has recorded the biggest outward risk transfer each quarter. Another country of note is the Isle of Man. The recipients of these risk transfers are, in the most part, the US and Germany. These data are only available at the country level, without any sector breakdown. The scale of gross transfers (inward plus outward) indicates the importance of countries in terms of risk transfer. As can be seen from Chart 6, the UK, the US, Ireland, Belgium and Switzerland were the most active countries in terms of inward and outward risk transfer from Q4 2013-Q4 2016.

D'Avino (2016) examined the difference between claims from non-residents by location of residence on an ultimate risk basis and on an immediate risk basis for US banks. Replicating this analysis for Ireland in Q4 2016, reveals that Malta and Luxembourg are intermediary borrowers. Claims on these borrowers fall by €144 million (99 per cent) and €151 million (63 per cent), respectively, on an ultimate risk basis.¹⁴ For counterpart countries Switzerland and Germany, ultimate

¹³ While claims on Ireland are excluded from most of the analysis in this paper, it makes sense to include Ireland in risk transfer analysis, as risk transfers will sum to zero once claims on Ireland are included.

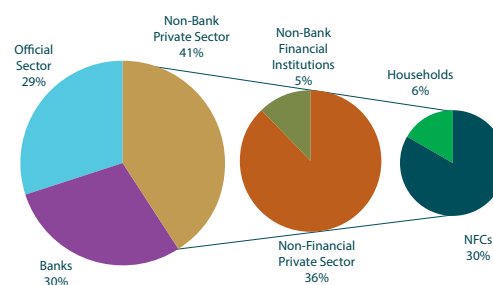
¹⁴ Cross-border claims on Uruguay disappear entirely when comparing immediate risk with ultimate risk, albeit, the volume is low at €17 million.

Chart 6: Aggregate Risk Transfers, Q4 2013-Q4 2016



Source: Central Bank of Ireland.

Chart 7: Sector Breakdown of International Claims, Q4 2016



Source: Central Bank of Ireland.

Table 3: Sector Breakdowns of CBS data

Old		New	
1	All Sectors (=2+3+4)	1	All Sectors (=2+3+4)
2	Banks	2	Banks
3	Official Sector (General Government and Central Bank)	3	Official Sector (General Government and Central Bank)
4	Non-Bank Private Sector	4	Non-Bank Private Sector
		4a	Non-Bank Financial Institutions
		4b	Non-Financial Private Sector
		4bi	Non-Financial Corporations
		4bii	Households

Source: www.bis.org

risk positions are greater than immediate risk positions. Irish banks' claims on Swiss residents total €222 million, while €269 million is due indirectly through transfers from other countries. Similarly, €628 million is due directly from German residents while almost €948 million is due from Germany via counterparties located in other countries. There are no noteworthy changes between ultimate risk and immediate risk for Canada and Italy, indicating that these claims are due directly to Irish banks without the involvement of a third country intermediary. According to D'Avino, company structures can be important as funding decisions are typically made at the group level. For instance, banks located in Offshore centres are mainly branches or subsidiaries of large-scale global banks and can act as intermediary borrowers.

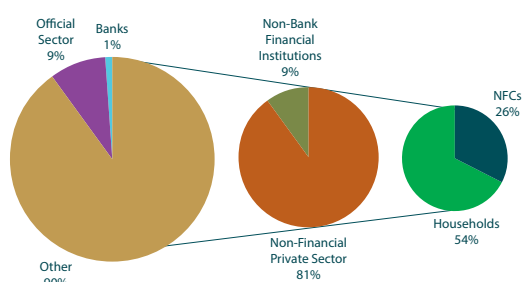
4. Sector Breakdown of Claims

4.1 Immediate Risk

The enhanced data series also provides expanded sector breakdowns for foreign and domestic claims. Previously breakdowns were available only for banks, official sector and non-bank private sector, and only for international claims, i.e. cross-border claims and local claims in foreign currencies. The new data includes local claims in local currencies and provides an expanded sector breakdown. The expanded breakdowns are presented in Table 3.

As can be seen from Charts 7 and 8, the sector breakdown differs between international

Chart 8: Sector Breakdown of Local Claims, Q4 2016



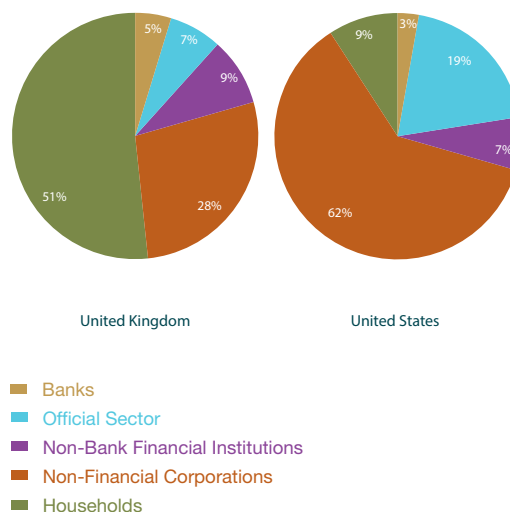
Source: Central Bank of Ireland.

claims (accounting for €30 billion in Q4 2016) and local claims in local currencies (accounting for €50 billion in Q4 2016). In Q4 2016, the non-bank private sector accounted for 41 per cent of international claims, of which 36 per cent were vis-à-vis the non-financial private sector. Lending to the official sector and banks accounted for the remaining 59 per cent.

In contrast, local claims in local currencies has a different profile, with 90 per cent of exposures recorded against the non-bank private sector (Chart 8). Of this, the non-financial private sector accounts for 81 per cent of total claims, of which 54 per cent was attributable to households, compared to just 6 per cent for international claims. This shows that local claims in local currencies, tend to have more interaction with domestic, non-financial business within the country where the banking office is located. The data for local claims in local currency is composed of just five countries, namely, Jersey, Isle of Man, France, UK and US.

At country level, the largest claims of Irish banks' are on the UK and US. However, the sectoral composition of these claims differs between the two countries. As can be seen

Chart 9: Sector Claims on UK and US, Q4 2016



Source: Central Bank of Ireland.

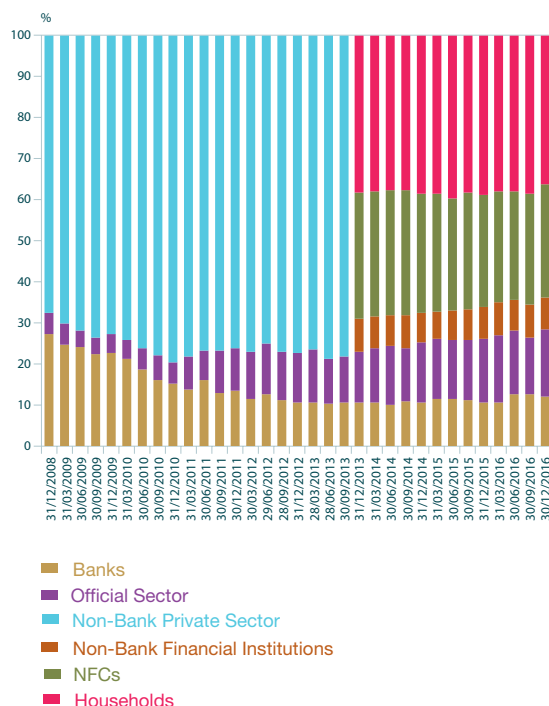
in Chart 9, 88 per cent of claims on the UK were against the non-bank private sector in Q4 2016 compared to 78 per cent of claims on the US.¹⁵ Within the non-bank private sector, 52 per cent of claims on the UK are vis-à-vis households, while 62 per cent of claims on the US relate to non-financial corporations. The high level of claims on households in the UK most likely reflects the presence of Bank of Ireland in the UK mortgage market, through their partnership with the UK Post Office (BOI, 2015).

4.2 Ultimate Risk

Chart 10 shows developments in ultimate risk data since Q1 2008 broken down by sector. The expanded data available since Q4 2013 indicates that the household and NFC sectors are the most significant components of the non-bank private sector breakdown. These data are only available for total claims, and are not split between local and international claims. Comparing total immediate risk sectors against ultimate risk sectors, there is no difference in sector breakdown, therefore banks are not transferring risk between sectors.

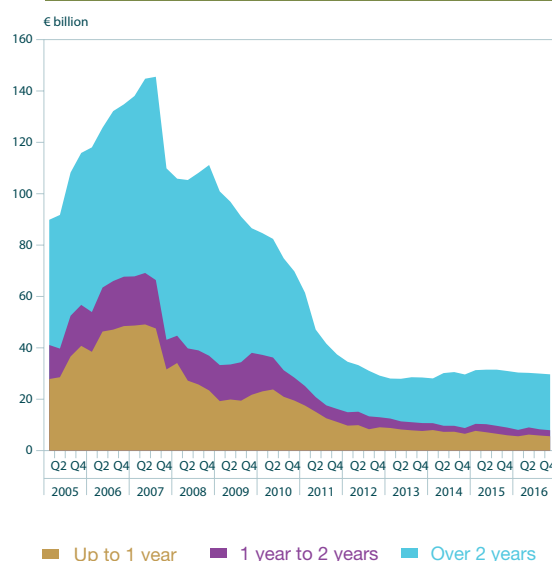
¹⁵ Chart 10 shows sectors as a subset of main sectors. Banks, official sector and non-bank private sector add to 100 per cent. Non-bank financial institutions and non-financial private sector are a subset of non-bank private sector. Non-financial corporations and households are a subset of non-financial private sector.

Chart 10: Sector Breakdown on Ultimate Risk Basis



Source: Central Bank of Ireland.

Chart 11: Maturity Breakdown of International Claims



Source: Central Bank of Ireland.

4.3 Maturity Breakdown

A remaining maturity breakdown is available for international claims, but not for local claims in local currency. As can be seen from Chart 11, international claims peaked in Q3 2007, at €145 billion.¹⁶ This had declined significantly by Q4 2016 to €30 billion. The chart shows that the remaining maturity of foreign claims has been predominantly in the over two years category. However, the remaining maturity of international claims has lengthened in recent times, with 73 per cent in the over two years category in Q4 2016, compared to just 54 per cent at the peak. The remaining maturity profile of Irish banks is significantly longer than that reported by all countries. For all countries, residual maturity of up to one year accounts for the majority of international claims.

5. Analysis of International Claims on Ireland

International Claims on Ireland

The largest lenders to Irish residents on an ultimate risk basis among BIS reporting countries have typically been the UK and Germany, with France, the US, Belgium, the Netherlands and Japan (Chart 12) also being significant. However, the composition of these lenders has changed over the last number of years. It is important to note that international claims on Ireland are vis-à-vis all sectors of the economy, not just the banking sector.

In the period 2006 to 2008, substantial increases were observed for UK, US, German and French and claims on Ireland. This represented a period of strong growth in foreign claims on Ireland, which peaked in June 2008. During the period of the financial crisis, i.e. from Q1 2009 to end-2012, while overall claims declined, claims of German and UK banking groups declined substantially, by 56 per cent and 31 per cent respectively. Over

¹⁶ This data does not include local claims in local currencies, so the peak mentioned here will differ than that of total claims.

Chart 12: Ultimate Lenders to Ireland

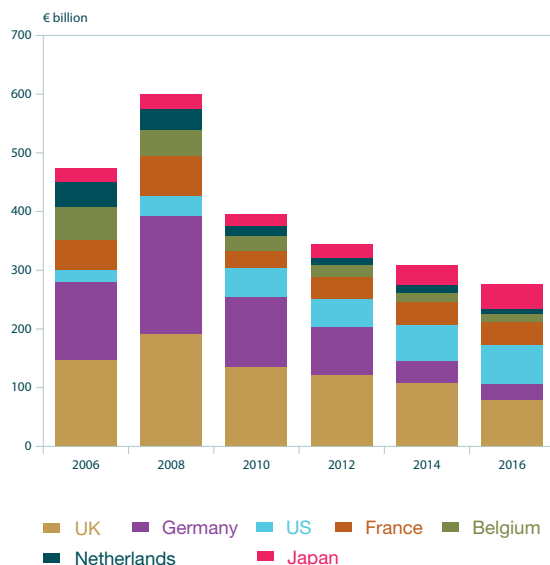
Source: www.bis.org.

Chart 13: Ultimate Lending to Ireland by Sector

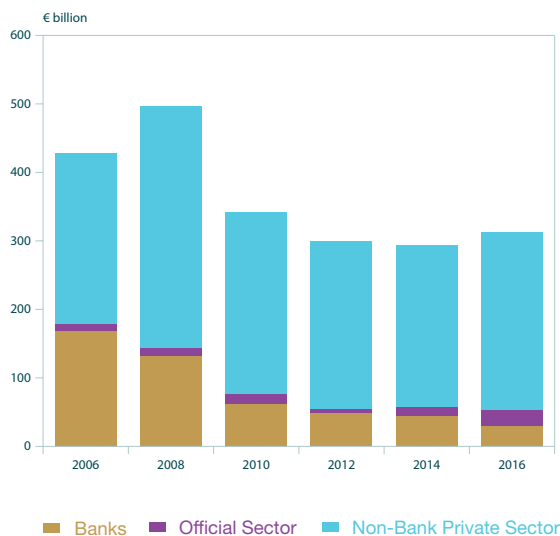
Source: www.bis.org.

Table 4: Liabilities of Irish Residents to Foreign Banks and Foreign Claims of Irish banks, by Country, Q4 2016, € million, Ultimate Risk

Nationality	Liabilities	Claims
United Kingdom	74,930	52,492
United States	63,586	6,387
Japan	38,942	82
France	36,079	3,914
Germany	25,129	948
Switzerland	16,209	269
Belgium	12,991	1,130
Netherlands	9,545	1,703
Italy	6,594	1,306

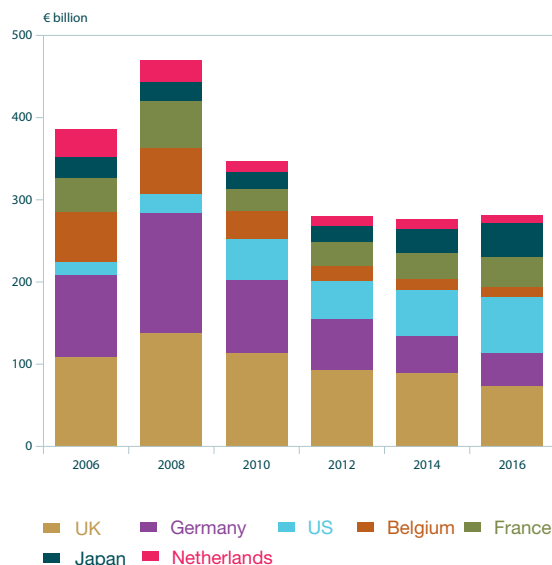
Source: BIS Consolidated Banking Statistics, Table B.4 and Central Bank of Ireland Consolidated Banking Statistics.

the same period, Japanese banks' claims increased by 23 per cent. Post 2012, German and UK banks' claims on Ireland continued to decline, and had fallen by 68 per cent and 35 per cent, respectively, by end-Q4 2016. Japanese and US banking groups took their place, as the outstanding claims of each increased by 75 per cent and 44 per cent, respectively, over the same period. Japanese banks have increased their cross-border claims

since the financial crisis, and a large share of this is attributed to growing overseas loans by major Japanese banks (Lam, 2013).

Claims on Ireland are predominantly on the non-bank private sector (Chart 13). In 2006, 58 per cent of claims were against the non-bank private sector, and 40 per cent of claims were against Irish resident banks. The proportion of claims against Irish resident banks declined

Chart 14: Immediate Lenders to Ireland



Source: www.bis.org.

to just 10 per cent by Q4 2016, reflecting the global exposure reduction in the midst of the financial crisis, while the non-bank private sector increased, as a proportion, to over 83 per cent. The increase in claims on Ireland by Japanese and US banks has largely been vis-à-vis the non-bank private sector, principally to multinational corporations.

On an immediate risk basis, the countries whose banks had the largest claims on Irish residents, pre-crisis, were the UK and Germany (Chart 14). Belgium, France and the Netherlands also held large claims on Ireland in the pre-crisis period. Following the onset of the financial crisis, the US became an important player in early 2009, with Japanese claims becoming more significant since early 2013. By Q4 2016, the US and Japan accounted for 20 per cent and 12 per cent, respectively, of total immediate claims on Irish residents. The UK remained the country with the largest immediate claim, accounting for 22 per cent, while Germany held approximately 11 per cent.

Table 4 compares the foreign claims of Irish banks with liabilities of Irish residents to foreign banks. Given the international nature of the Irish economy through foreign multinational companies and the International Financial Services Centre (IFSC), it is not surprising that the liabilities of Irish residents to foreign banks

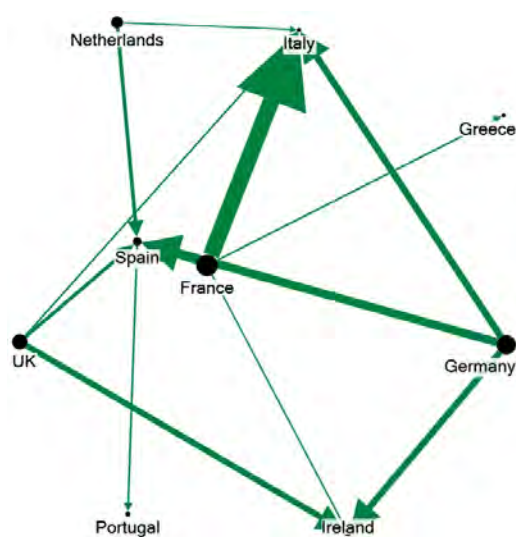
are significantly higher than the foreign claims of Irish banks. However, liabilities outstrip assets for most reporting countries. Examining the geography of international banking balance sheets liabilities is of vital importance, as their magnitude is likely to be much more important than that of claims (D'Avino, 2016). Total foreign claims of Irish Banks stood at €79 billion at end-Q4 2016, while total liabilities were significantly higher at €315 billion. Irish banks' foreign claims on the US, on an ultimate risk basis, amounted to €6.4 billion as at end-Q4 2016. However, total liabilities of Irish residents to US banks' worldwide equalled €63.6 billion. D'Avino's assertion is, therefore, particularly relevant in the case of Ireland.

5.1 Local Liabilities in Local Currencies

The data also includes a breakdown of local liabilities in local currencies. This details liabilities of Irish bank offices abroad, in the domestic currency, to counterparties located in the host country. Therefore, data is only available for those countries where Irish banks operated a local office. In the period since Q2 1999, this amounted to eight countries. However, at end-2014, local liabilities are reported for only two countries, namely the UK and the US. The UK accounted for the vast majority of local liabilities in local currencies.

5.2 Exposure to Vulnerable EU Countries

The total ultimate claims by BIS reporting countries on vulnerable EU countries¹⁷ amounted to €2.3 trillion at end-Q4 2008, with 22 per cent of these claims on Irish residents. Chart 15 illustrates the exposures of banking sectors in BIS reporting countries on vulnerable EU states using network analysis. Network analysis is useful for presenting the scale and depth of exposures figures. It also provides a set of tools and concepts for undertaking the analysis of relations and patterns (Driscoll, 2010). Charts 15 and 16 show claims by BIS reporting banks on vulnerable EU Countries in Q4 2008 and Q4 2016. The thickness of the lines represents the size of the claims, with the line between France and Italy representing a €337 billion claim and the line between the UK and Italy representing a €54 billion claim. Both charts are weighted to the largest claims, which were held by France in Q4 2008. In

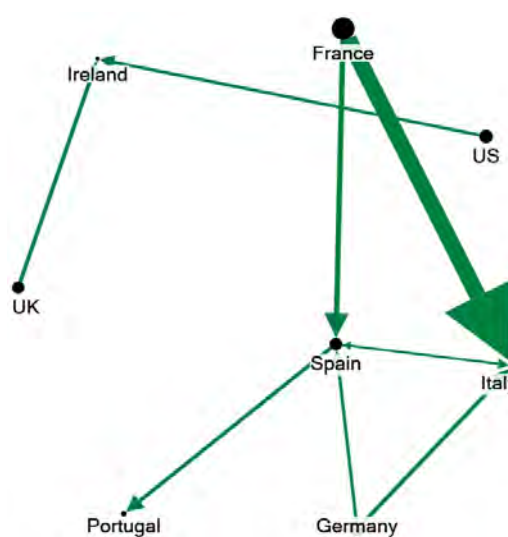
Chart 15: Network Analysis of Claims on Vulnerable EU Countries, Q4 2008

Claims	€ billion
France → Italy	337
Germany → Spain	182
Germany → Italy	149
Germany → Ireland	145
UK → Ireland	137

Note: Created with NodeXL (<http://nodexl.codeplex.com/>). Only claims greater than €40 billion were included in this chart.
Source: www.bis.org

addition to France, Germany and UK were also significant holders of vulnerable EU debt, as represented by the size of the nodes for these countries in Chart 15. The national banking groups of France the UK and Germany had claims of between 2 to 6 per cent of their total foreign lending activity on Irish residents as at end-Q4 2008, discernible from the thickness of the lines from these countries to Ireland. As stated above, 57 per cent of this total exposure on Ireland was to the non-bank private sector, which includes non-bank financial institutions, non-financial corporations (NFCs), households and non-profit institutions serving households (NPISHs). The remainder was lent to Irish banks.

Vulnerable EU borrowings from BIS reporting banks decreased substantially by €1.2 trillion from Q4 2008 to Q4 2016, causing a number of countries to fall out of the network and bring the outstanding amount of claims to €1.3

Chart 16: Network Analysis of Claims on Vulnerable EU Countries, Q4 2016

Claims	€ billion
France → Italy	264
France → Spain	96
Germany → Italy	77
UK → Ireland	75
Spain → Portugal	73

Note: Only claims greater than €40 billion were included in this chart.
Source: www.bis.org

trillion (Chart 16). The top lenders to this group now included the US. Nearly one quarter of this decline related to claims on Ireland, which stood at just €315 billion at Q4 2016. The line between France and Italy represents a reduced claim of €264 billion, while the line between Spain and Italy highlights a claim of €50 billion. On a sector basis, claims on banks resident in vulnerable countries recorded the largest declines, yet claims on the non-bank sector also recorded substantial declines.

5.3 Exposure to Vulnerable EU Sovereigns

Exposure to the vulnerable EU sovereigns of Ireland, Italy, Spain, Portugal and Greece, amounted to €511 billion, or 18 per cent of all outstanding claims on the official sector for the BIS reporting countries at end-Q4 2008.¹⁸ The national banking sectors with the largest exposures were France, Belgium, Ireland,

¹⁷ Greece, Ireland, Italy, Portugal and Spain.

¹⁸ Institutions report data for Official sector, which includes the general government sector, central bank sector and international organisations. This is the proxy for sovereign debt used in this paper.

**Chart 17: Network Analysis of Claims on EU
Periphery Sovereigns, Q4 2008**

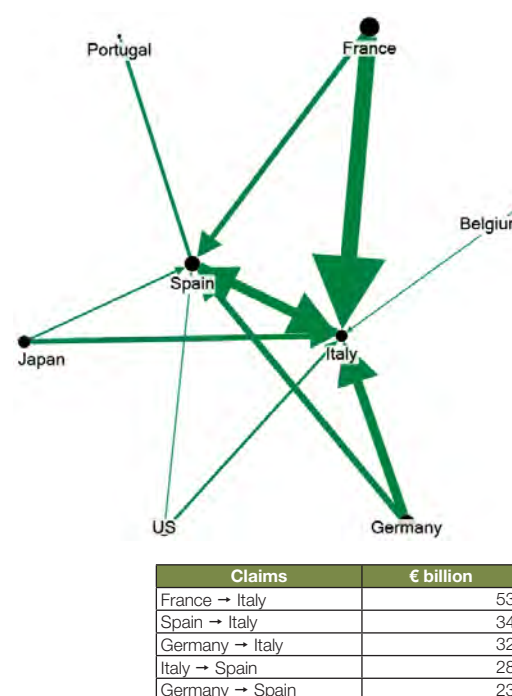


Note: Only claims greater than €7 billion are included in this chart.
Source: www.bis.org

Japan and the UK (note the size of the nodes in Chart 17). Italy was the most indebted sovereign to BIS reporting banks, accounting for 60 per cent of the total vulnerable EU sovereign debt. France held claims of €129 billion on Italy, as depicted by the thickness of the line between the two nations. Ireland's public sector share was just two per cent (€11 billion), with French (€2.6 billion) and UK (€2.9 billion) banks together holding just under half of this exposure. However, this represented a relatively small proportion of the total exposures of these two national banking groups. Belgium, Switzerland and Japan also held 6 per cent, 6 per cent and 5 per cent of claims on the Irish sovereign debt, respectively.

Total exposure to the vulnerable EU sovereigns fell to €332 billion by Q4 2016, with euro area countries holding the majority of the claims. While claims of France on Italy had fallen significantly, they remained substantial, at €53 billion. Irish domestic banks significantly

**Chart 18: Network Analysis of Claims on EU
Periphery Sovereigns, Q4 2016**

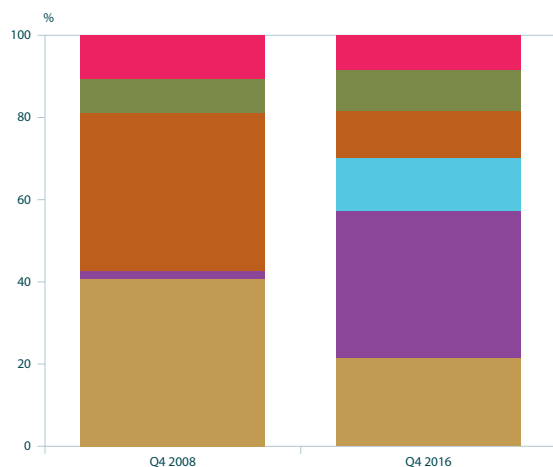


Note: Only claims greater than €7 billion are included in this chart.
Source: www.bis.org

reduced their exposure to this sector between Q4 2008 and Q4 2016. However, holdings of Irish sovereign debt by all BIS reporting banks had increased significantly to €23 billion in Q4 2016, from €11 billion in Q4 2008. The UK and US were the major holders of these claims on the Irish official sector in Q4 2016, whereas French domestic banks had reduced their exposure between the two periods (Chart 19).

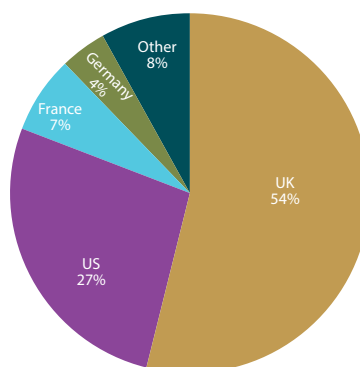
6 Contingent Claims

Contingent claims include credit commitments and guarantees outstanding of all the worldwide offices of Irish resident banks. The data are collected on an ultimate risk basis. Guarantees and credit commitments represent the unutilised portions of binding contractual obligations and any other irrevocable commitments. A more detailed definition of guarantees and credit commitments is available in Table 5 (BIS, 2013). Only

Chart 19: Exposure of BIS Reporting Countries to Irish Sovereign, 2008 v 2016

UK US Germany France Japan
Belgium

Source: www.bis.org.

Chart 20: Contingent Claims Q4 2016

Source: Central Bank of Ireland.

Table 5: Contingent Liabilities Definition

Guarantees extended	Contingent liabilities arising from an irrevocable obligation to pay a third-party beneficiary when a client fails to perform certain contractual obligations. They include secured, bid and performance bonds, warranties and indemnities, confirmed documentary credits, irrevocable and standby letters of credit, acceptances and endorsements. Guarantees extended also include the contingent liabilities of the protection seller of credit derivatives instruments.
Credit commitments	Arrangements that irrevocably obligate an institution, at a client's request, to extend credit in the form of loans, participation in loans, lease financing receivables, mortgages, overdrafts or other loan substitutes or commitments to extend credit in the form of the purchase of loans, securities or other assets, such as backup facilities including those under note issuance facilities and revolving underwriting facilities.

Source: www.bis.org

commitments which, if utilised, would qualify as a cross-border claim and local claim in any currency, are included.

the largest proportion of credit commitments, at €1.4 billion, followed by the US. A similar pattern is evident for guarantees extended.

Contingent claims reached their peak in Q4 2005, at €13.8 billion, vis-à-vis 64 countries. This had fallen to €2.9 billion in Q4 2016, vis-à-vis 64 countries, although the composition has changed during the period. Credit commitments represent the largest proportion of foreign contingent claims, accounting for €2.4 billion in Q4 2016, compared to just €0.5 billion for guarantees. The UK accounted for

7 Conclusion

This article discussed the BIS consolidated banking data, introducing geographic and sectoral breakdowns for Ireland, not previously published by the Central Bank of Ireland. The enhanced dataset shows how foreign claims by Irish banks have declined substantially since the onset of the financial crisis, both on an immediate and an ultimate risk basis. Claims are overwhelmingly on developed economies with the UK predominant. While international claims span all sectors, local claims by foreign offices of Irish banks are principally with households and NFCs. The article also compares the foreign claims of Irish banks with liabilities of Irish residents to foreign banks. Liabilities clearly outstrip claims of Irish banks, reflecting the globalised nature of the Irish economy. Finally, exposures to vulnerable EU countries, including Ireland, are examined using network analysis. Vulnerable borrowings have declined significantly since the onset of the crisis, with claims on banks recording the largest decrease. While overall claims on vulnerable country sovereigns have also fallen since 2008, the reverse is true for Ireland. The enhanced data provide very valuable information in terms of analysing vulnerabilities from foreign exposures of national banks, and in assessing the indebtedness of domestic entities to foreign banks.

References

Bank for International Settlements. 2013.

“Guidelines for reporting BIS international banking statistics”

<http://www.bis.org/statistics/bankstatsguide.pdf>

Bank of Ireland. 2015. “Annual Report for the Year Ended 31 December 2015”.

<http://investorrelations.bankofireland.com/wp-content/assets/BOI-Annual-Report-2015.pdf>

Committee on the Global Financial System.

2012. “Improving the BIS International Banking Statistics” CGFS Publications, No. 47, November 2012.

<http://www.bis.org/publ/cgfs47.htm>

D'Avino, Carmela. 2016. “US banks’

international balance sheet linkages: a data survey”, *Journal of Financial Economic Policy*, Vol. 8 Issue: 4, pp.514-531.

<https://doi.org/10.1108/JFEP-02-2016-0015>

Driscoll, Áine. 2010. “Monitoring Systemic

Risk to the Irish Banking System Through Network Analysis Using Consolidated Banking Statistics”. Master of Arts in Policy Evaluation and Planning, University College Galway.

Financial Stability Board and International Monetary Fund. 2009. “The Financial Crisis and Information Gaps”, Report to the G20 Financial Ministers and Central Bank Governors, 20 October 2009.

<https://www.imf.org/external/np/g20/pdf/102909.pdf>

Lam, Waikie, Raphael. 2013. “Cross-border

Activity of Japanese Banks”. International Monetary Fund Working Paper, WP/13/235.

<http://www.imf.org/external/pubs/ft/wp/2013/wp13235.pdf>

Non-standard Monetary Policy Measures and the Balance Sheets of Eurosystem Central Banks

Sharon Donnery, David Doran, Ruth Gleeson and Konstantina Carroll¹

Abstract

The ECB's on-going non-standard monetary policy measures have led to changes in the composition and size of euro area national central banks' (NCBs) balance sheets. These changes have increased and broadened the financial risk exposures of central banks, and led to a substantial increase in potential interest rate mismatch risk. Nonetheless, the Treaty mandates the Eurosystem to implement monetary policy measures to achieve price stability, even if it results in losses for the Eurosystem or individual NCBs. This article examines the changes to central bank balance sheets and risks as a result of these non-standard measures. Given that the ability of central banks to generate income is a central aspect of independence, interest rate risk and the associated implications for central bank income are discussed, along with steps to mitigate some of these risks.

¹ The authors are Deputy Governor – Central Banking, and Head of Function – Financial Risk Management, Risk Analytics Manager and Risk Analyst in the Organisational Risk Division, respectively. The views expressed in this article are solely the views of the authors and are not necessarily those held by the Central Bank of Ireland or the European System of Central Banks. The authors would like to thank Glenn Calverley, Gabriel Fagan, Philip R. Lane, Maurice McGuire, Micheál O'Keeffe, Fergal Power and Peter Sinnott for helpful comments. Any remaining errors or omissions are our own.

1. Introduction

In normal times, central bank balance sheets are relatively straightforward.² The nature of the central bank function means that elements of its balance sheet liabilities are remunerated at almost zero cost (such as via banknotes) allowing it to generate income through the investment of assets. The spread of a central bank's investment yields over the cost of funding its liabilities is typically the largest contributor to its income. Other monetary policy related activities are clearly also important parts of the balance sheet, including assets, such as lending to banks, and liabilities, such as banks' deposits and their holdings of minimum reserves deposits with the central bank. In this traditional model, central bank balance sheets are typically exposed to four general categories of financial risk, namely: credit risk (reflecting exposure to monetary policy and investment counterparties and instruments); market risk (reflecting the fluctuation or volatility of market prices of assets held); liquidity risk (reflecting the possibility that low levels of liquidity when disposing of an asset will result in low prices and a capital loss); and currency risk (reflecting volatility in foreign currency exposures where they are held by the central bank).

Since the onset of the global financial crisis, however, the structure of central bank balance sheets has changed substantially, and altered some of the assumptions underpinning the traditional model. In both the euro area and in many economies around the globe, central banks have adopted non-standard or 'unconventional' monetary policy measures that are inter-alia intended to address the stressed financial market conditions arising from the crisis.

The most obvious implication of these non-standard measures on NCBs' balance sheets has been an increase in their size. Larger balance sheets have increased NCBs' exposure to credit risks, but also significantly increased exposure to interest rate risks.

Importantly, these new and expanded balance sheet items, along with their associated financial risks, have altered some of the traditional dynamics around the generation of central bank income.

This article considers these issues and their consequences for central bank balance sheets. The article is structured as follows: Section two examines the typical structure of central bank balance sheets in normal times; Section three considers the treatment of non-standard measures on central bank balance sheets; Section four reviews the impact of monetary policy and interest rate normalisation on central bank balance sheets; Section five examines how some of the increase in risks can be mitigated, while the final section concludes.

2. Central Bank Balance Sheets in Normal Times

A useful starting point for assessing the impact of unconventional monetary policy on central bank balance sheets is to consider a central bank balance sheet under normal financial market and monetary policy conditions. While euro area national central bank balance sheets can differ, they share common key components. Figure 1 presents a stylised balance sheet that illustrates the key entries in a typical central bank balance sheet.

On the liabilities side of the balance sheet, central banks are responsible for issuing currency and this provision of euro banknotes is reflected in the stylised balance sheet. Central banks also hold financial buffers in the form of capital and reserves, which also represent a liability on the balance sheet. Together, these liabilities are jointly termed 'free resources', as they are not remunerated.

The financial buffers form of reserves refers to profits which are retained by a central bank to act as a buffer against financial losses. This is separate to minimum reserve accounts, which are deposits held by credit institutions

² The discussion of central bank balance sheets in this article are largely common across all central banks, whether they are within the euro area or not. The stylised balance sheet discussion in this article focuses primarily on euro area central bank balance sheets, as other central banks outside of monetary union may have large foreign currency operations, which may make some of the dynamics discussed in this article less observable or distinguishable. Therefore, we use the terms 'central bank' and 'NCB' interchangeably in this article to refer to the balance sheet of a typical central bank in the euro area. For more information on the Eurosystem balance sheet, see <https://www.ecb.europa.eu/press/pr/wfs/2017/html/ecb.fs170711.en.html>.

Figure 1: Stylised balance sheet of a euro-area NCB under normal conditions³

Assets	Liabilities	
Investment assets	Banknotes	Free Resources
	Financial buffers (capital and provisions)	
Monetary policy operations (e.g. Main Refinancing Operation (MRO), or other term operations)	Minimum reserves/current accounts	
	Deposit facility	
	Government deposits	
± Net Target	Balance	
Other	Other	

with their central banks. Credit institutions are required to hold prescribed ‘minimum reserves’ with NCBs and these can also be used to influence the level of liquidity in the system and thus the transmission of monetary policy.⁴ Credit institutions can also hold additional deposits (or ‘excess reserves’) with the Eurosystem through use of the deposit facility, although recourse to this is usually relatively low during normal times when monetary policy is effected using a liquidity deficit. At certain times, emergency liquidity assistance (ELA) is another important feature of NCB balance sheets. In addition, NCBs may hold deposits from government, and others, which is also reflected as a liability on the balance sheet.⁵

Turning to the assets side of the balance sheet, there are effectively two key components – those relating to monetary policy operations and those relating to central bank investments.⁶ Credit institutions obtain liquidity from their NCB, which the NCB provides using monetary policy operations. During normal times, this liquidity is most often provided in the form of short-term repos (effectively secured loans) to banks - known as main refinancing operations in the euro area - and monetary policy is implemented by setting the

interest rate on these operations. The other main component of an NCB’s balance sheet, for the purposes of this analysis, concerns investment assets which are not related to monetary policy; that is foreign reserves, investments and gold holdings. While the objective behind these holdings can relate to an NCB’s national tasks, such as maintaining access to foreign currencies or preserving capital value, we focus here on their role as an income-generating tool to cover an NCB’s operating expenses, considering that the ability to generate income is central to ensuring the financial independence of central banks. Finally, within the Eurosystem, the NCBs and ECB have claims on, and liabilities to, each other, including due to cross border payments using a system known as TARGET2⁷, which are often reflected on a NCB’s balance sheet.⁸

Turning to the contribution of these items to the cash flows of an NCB, an important factor is the concept of ‘free resources’ mentioned previously. Effectively, the role of a central bank uniquely creates a large liability on the balance sheet – called ‘free resources’ - that requires no remuneration given the central bank’s requirement to honour the nominal (face) value of banknotes and currency in circulation. This

³ Certain elements are presented in a simplified manner, and may not be matched exactly as represented in Figure 1. For instance, investment assets may not be fully matched by free resources.

⁴ Minimum reserves are remunerated at the main refinancing operations rate (MRO), while all reserves in excess of this are remunerated at the deposit facility rate (DFR).

⁵ For instance, see the liabilities of the Banque de France (Banque de France, 2017).

⁶ The Central Bank of Ireland currently holds assets on its balance sheet related to the liquidation of IBRC (see CBI, 2017).

⁷ Trans-European Automated Real-time Gross Settlement Express Transfer System.

⁸ An NCB’s balance sheet can also include other various assets and liabilities, which is referenced by ‘other’; however, for the purpose of simplicity, this analysis focuses on the above highlighted items. Some examples of other items that can often be found on an NCB’s balance sheet include receivables from the IMF, foreign currency balances, and fixed assets.

Figure 2: Income generation for a euro-area NCB under normal conditions

Assets	Rate	Liabilities	Rate
Investment assets	Return on investments (+)	Banknotes	0
		Capital (Buffers)	

$$\text{'Free resource' Income} = (\text{Investment Assets} \times \text{Yield on Investments})$$

Monetary policy operations (MRO)	MRO rate ¹² (+)	Minimum reserves	MRO rate (+)
Other assets	Mix rate (+)	Deposit facility	Deposit Facility Rate (DFR)
		Government deposits	(+)
		Other liabilities	Mix rate (+)

$$\text{Other Interest Income} = \sum (\text{Assets} \times \text{Rate}) - \sum (\text{Liabilities} \times \text{Rate})$$

concept allows for income generation whereby funds generated by issuing banknotes are invested by the NCB in interest-bearing assets. The resulting income is known as seigniorage income.⁹ A central bank's financial buffers (capital, reserves, provisions and revaluation accounts where relevant) can also be included as contributing to this 'free resource'. As illustrated in the top half of Figure 2, the income generated as a result of these free resources is dependent on two factors: (i) the level of banknotes (and financial buffers); and (ii) an NCB's choice of investment assets and the subsequent financial performance (i.e. yield) of those assets over time.¹⁰ This yield is generally positive under normal financial market conditions and seigniorage is usually a significant source of income for the NCBs in the euro area.

In terms of liquidity providing monetary policy operations, the interest rate charged on these is typically positive. At the same time, certain liabilities represent an expense, in particular

those relating to credit institutions' minimum reserves and excess deposits. While the rate associated with the latter (the deposit facility rate), is normally less than that charged on monetary policy liquidity providing operations, monetary policy operations typically do not contribute to profitability during normal times.¹¹ This is because the level of excess deposits is generally close to zero, which means that the interest earned on liquidity providing operations tends to be largely cancelled out by the interest paid to banks on their minimum reserves (which is remunerated at the monetary policy rate). While other items on a NCB's balance sheet can lead to additional income or expense, the significant income earned from free resources during normal times means that traditionally central banks are profitable institutions.

In terms of accounting and financial reporting, NCBs and the ECB follow common Eurosystem accounting rules as set out in the relevant ECB guideline, as well as other

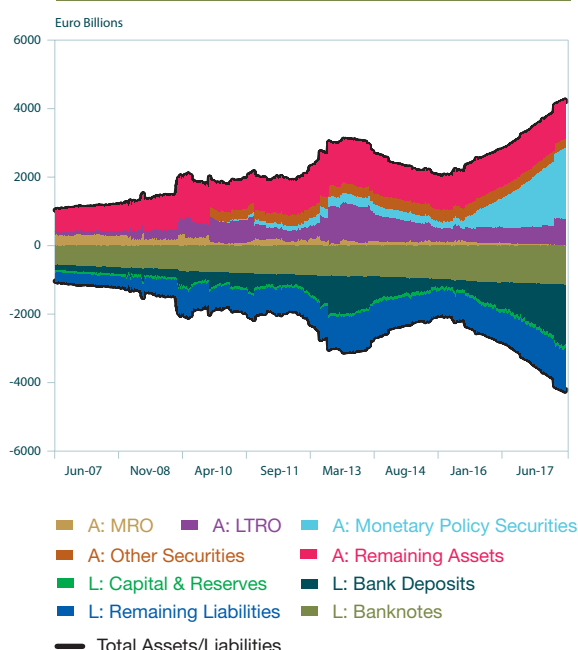
⁹ While there are differing definitions, seigniorage income as referred to in this article is the return generated by investing in assets that match certain liabilities that carry no cost of funding, such as banknotes/currency in circulation and reserves. Currency in circulation is not entirely cost free, however, insofar as there are, inter alia, costs of currency production, storage and distribution. For simplicity, however, we refer to these as free resources as they are not remunerated.

¹⁰ While most of the entries in the stylised balance sheet relate to monetary policy, there are important distinctions regarding the rate of return and cost of funds that applies to the respective assets and liabilities. It is important to note that central banks may differ in how they exactly apportion and offset assets and liabilities and their respective rates. Indeed, the stylised categorisation of entries on the balance sheet illustrated here is simplistic for illustrative purposes, such that different assets may be notionally apportioned against different liabilities when assessing the net return and generation of income from the central bank's operations.

¹¹ In some cases, the monetary policy rate is paid on a portion of a bank's deposits at the central bank (such as on the minimum reserve requirements) and the deposit facility rate paid on the remainder of excess liquidity placed with the central bank.

¹² The MRO rate is referenced for simplicity, but may also include lending at the overnight standing facility rate, amongst others.

Chart 1: Consolidated Eurosystem Balance Sheet as at 30 June 2017



Source: ECB Statistical Data Warehouse, Central Bank of Ireland calculations.

relevant accounting standards (e.g., IFRS or local GAAP) where applicable.¹³ Perhaps the most notable difference within the ECB accounting guidelines, when compared to IFRS, is the treatment and recognition of income. Under ECB rules, unrealised gains relating to marked-to-market securities (as well as currency and gold) are held in revaluation accounts and do not affect the profit and loss account (until such gains are realised).¹⁴ Such revaluation accounts are recorded on the liability side of an NCB's balance sheet at an amount equivalent to the increase in value of the corresponding asset. In contrast, unrealised losses are recorded on the profit and loss account once any relevant amounts accumulated in revaluation accounts are first eliminated. This asymmetric treatment is considered prudent in the case of central banks in the euro area, as under these rules

unrealised gains are not included in any income distribution.

An important element of Eurosystem financial reporting entails the sharing of income and loss between the NCBs and the ECB (in certain circumstances). For many assets and liabilities, in particular those deemed to be relating to the performance of the monetary policy function, such as issuing euro banknotes or implementing monetary policy operations, the income (or loss) is pooled and redistributed amongst NCBs and the ECB - the respective net results of which are reported in NCBs' annual accounts.¹⁵ While this concept is noteworthy when calculating the exact exposures and income of the NCBs, the concept does not alter the main income and expense drivers of the stylised central bank balance sheet outlined above.

3. Changes to Balance Sheet Composition due to Euro Area Non-standard Monetary Policy Measures

Since the onset of the financial crisis, monetary policy in the euro area, and indeed in many economies around the globe, can no longer be considered to be operating in normal times. Monetary policy measures implemented in the euro area to date include; (i) the introduction of fixed rate, full allotment for liquidity providing refinancing operations, (ii) the provision of long term liquidity to counterparties (Longer Term Refinancing Operations (LTRO) and Targeted Longer Term Refinancing Operations (TLTRO)), (iii) the provision of foreign currency liquidity, (iv) policy rates being set to the zero lower bound and even into negative territory for some rates, and (v) large scale asset purchases known as the expanded asset purchase programme (the APP or EAPP).¹⁶ Collectively, these monetary policy measures are known as non-standard measures.

¹³ Guideline (EU) 2016/2249 of the ECB of 3 November 2016 on the legal framework for accounting and financial reporting in the European System of Central Banks (ECB/2016/34).

¹⁴ NCBs may also hold securities as part of their investment asset portfolio which are classified as 'held-to-maturity'. The intention is not to sell these underlying securities, apart from in certain situations as specified in the ECB's accounting guideline, and the balance sheet value of such assets remains static over time apart from any amortisation. Changes in market prices of these assets do not impact the balance sheet or profit and loss account.

¹⁵ This is performed on the basis of the NCB's capital subscriptions (referred to as the capital key). NCB's shares in the ECB's capital are calculated based on total population and GDP and are adjusted every five years, or once a new country joins the EU. See ECB 2015a for further information.

¹⁶ The Eurosystem has purchased sovereign and public sector bonds, covered bonds, asset back securities and corporate sector bonds under a number of different purchase programmes since the financial crisis emerged. See ECB (n.d.) for more information.

Figure 3: Stylised balance sheet of a euro-area NCB following non-standard measures

Assets		Liabilities		Free Resources
Investment assets		Banknotes		
		Capital (Buffers)		
Monetary policy operations (MRO)		Minimum reserves/current accounts		
Monetary policy operations (LTRO/TLTRO)		Deposit facility		
Securities held for monetary policy purposes (incl. APP)				
		Government deposits		
± Net Target balance				
Other		Other		

Each of these measures was implemented in order to repair and/or enhance the transmission of monetary policy.¹⁷ The move to fixed rate, full allotment and the increase in liquidity provision marked the beginning of non-standard measures and were introduced to address tensions within euro area money markets and the shortage of bank liquidity. Historically low interest rates have been introduced to help incentivise borrowing and expenditure that will generate economic activity and raise the inflation rate towards the target level. Long-term liquidity providing operations, such as the TLTROs, were initiated to incentivise the flow of credit between banks and the private sector through certainty of low cost borrowing. Finally, outright purchases of bonds were undertaken to address fragmentation of financial markets and to lower interest rates further out the yield curve.¹⁸

The most noticeable impact of the non-standard measures on the Eurosystem's balance sheet has been an increase in size. The consolidated Eurosystem balance sheet has increased to approximately €4,200 billion as at end-June 2017, from a pre-crisis level of approximately €1,000 billion in 2006 (see Chart 1). There has also been a notable change in the composition and structure of the balance sheet, with the more recent increase in balance sheet size being primarily driven by the asset purchases under the APP. The long term provision of liquidity shown under 'LTRO' has also added to the increase in size. These

elements have replaced the MRO operations as the primary source of liquidity provision to the banking system. The large levels of excess liquidity provided via these measures has had a subsequent effect on the liabilities of central banks, as credit institutions' recourse to the deposit facility has also increased significantly.

The non-standard measures described above in relation to the consolidated Eurosystem balance sheet have had a similar effect on size and composition of individual NCB balance sheets. Figure 3 presents a stylised balance sheet of a euro area NCB following the implementation of non-standard measures, highlighting the increased holdings of securities and the corresponding expansion in bank deposits as the notable changes when compared with the balance sheet under normal conditions.

The non-standard measures have also had the effect of lengthening the maturity profile of NCB assets. A substantial portion of refinancing operations in the euro area are now longer-term liquidity providing operations, with maturities as long as four years in the case of TLTROs since 2016, compared to operations between one week and three months previously. Even more significant are the purchases of assets under the APP, and in particular the public sector purchase programme (PSPP), under which eligible securities have a residual maturity of between one to 30 years.¹⁹ As at end-June 2017, the

¹⁷ See ECB 2015b for further information on the transmission of non-standard measures

¹⁸ See ECB 2015c for further discussion.

¹⁹ The minimum remaining maturity for eligibility had been set to two years, and was changed to one year at the Governing Council meeting in December 2016, to ensure the continued smooth implementation of the programme.

Figure 4: Income generation for a euro-area NCB under current non-standard measures²¹

Assets	Rate	Liabilities	Rate
Investment assets	Return on investments (Low)	Banknotes	0
		Capital (Buffers)	

$$\text{Seigniorage Income} = (\text{Investment Assets} \times \text{Return on Investments})$$

Monetary policy operations (MRO)	MRO rate (0%)
Monetary policy operations (LTRO)	LTRO rate (0% to -0.4%)
Securities held for monetary policy purposes (incl. APP)	Euro area bond yields (Low)
Other assets	Mix rate

Minimum reserves	MRO rate (0%)
Deposit facility	Deposit Facility Rate (DFR) (-0.4%)
Government deposits	
Other liabilities	Mix rate

$$\text{Other Interest Income} = \sum (\text{Assets} \times \text{Positive Rate}) + \sum (\text{Liabilities} \times \text{Negative Rate}) - \sum (\text{Liabilities} \times \text{Positive Rate}) - \sum (\text{Assets} \times \text{Negative Rate})$$

total remaining weighted average maturity for the PSPP purchases was 7.90 years (see ECB, n.d.)

The accounting treatment of these non-standard measures is an important feature that helps to minimise volatility that would otherwise be seen in central banks' annual accounts. In particular, securities purchased under the APP are held at amortised cost (see ECB 2015d), whereby the amortisation restores the asset to face value based on the remaining maturity of the asset - for example, if a bond were purchased below face value, the value of the asset would increase over its lifetime towards its face value. This accounting classification means that the Eurosystem APP securities are not marked-to-market, and underlying market movements will not affect their balance sheet value. A profit or loss associated with the value of an APP security would only be realised in the event of a sale of that asset. The ECB has stated, however, that while there are no accounting constraints on sales, they are not expected as normal practice for the foreseeable future.²⁰

One implication of this accounting practice is that the sole source of income associated with the APP is the generally fixed interest income earned on securities held until they mature. This has resulted in a significant proportion of central bank balance sheets now generating income that is fixed and relatively static given the longer-term maturities of the securities.

Furthermore, key policy rates for monetary policy have been set to historically low levels (at end June 2017, the MRO rate is 0% and the deposit facility rate is -0.4%), which directly affects the interest income and expense flows. The low interest rates along with the APP purchases has led to sustained downward pressure on bond yields, such that a low (and in some cases negative) interest rate may be earned on these fixed rate assets. While the interest income earned from liquidity providing open and term market operations (all effectively at the MRO rate) is also low, the negative deposit facility rate has enabled NCBs to achieve a positive income stream from monetary policy liquidity related operations. In addition, legacy holdings and investment

²⁰ See ECB (2017)

²¹ MRO and DFR have been at these levels since 16 March 2016.

portfolios have meant that NCBs have remained profitable to date under the non-standard measures. Figure 4 illustrates how these changes have affected the components of net interest income for NCBs.

4. Risks Associated with Monetary Policy and Interest Rate Normalisation

The non-standard monetary policy measures have had a substantial impact on the risk exposures of central banks. Pattipeilohy (2016) notes that the type of risk exposure depends on the design of the central bank balance sheet. In terms of the Eurosystem, taking the accounting treatment into consideration, there are two key risks to consider: (i) credit risk; and (ii) interest rate risk.

The increased outright holdings of bonds have led to a corresponding increase in credit risk for the Eurosystem. This has been partially managed by the risk mitigation measures implemented by the Eurosystem, including eligibility criteria, as well as issue and issuer purchase limits. Nevertheless, residual credit risk exposure naturally remains. In general, however, prudent limits and eligibility criteria are designed to ensure that these exposures are within the risk appetite of central banks in carrying out their role to preserve price stability. Ultimately, however, a successful programme would improve macroeconomic conditions, which, in turn, should reduce the probability of defaults in the euro area, as discussed by Andrade et. al. (2006) with respect to corporate bonds.

The second notable area of increased risk for the Eurosystem relates to the effects of changes in interest rates. As already noted, the holdings of bonds under the APP are accounted for at amortised cost meaning the typical form of interest rate risk, i.e., that affects the bonds' market price, does not apply, other than if an exit strategy incorporating bond disposal were being considered. The more relevant form of interest rate risk for the

Eurosystem relates to a potential mismatch in the sensitivity of the Eurosystem's assets and liabilities to changes in short term interest rates – particularly those assets acquired as part of implementing the non-standard measures. A large portion of the fixed income bonds bought under the APP have been acquired at a time of relatively low, and in many cases negative, interest rates. In contrast, a large portion of the Eurosystem's liabilities are primarily deposit based and linked to a variable rate, whereby the associated cost is the deposit facility rate or the MRO rate.

Despite the deposit rate being negative, the differential between this and the yields on purchased bonds does not pose a major concern for central banks at present; particularly given the large amounts of excess liquidity placed on deposit within the Eurosystem at negative rates. The ECB's December 2016 policy decision, to allow NCBs to purchase bonds at rates below the deposit facility rate, changes this dynamic somewhat, as it means that interest losses on some bonds purchased with negative rates cannot be offset fully by interest income from the deposit facility.

As economic conditions improve and inflation nears its target level, the deposit facility rate and the MRO rate are policy rates that are expected to rise over time. Given that central banks have effectively fixed the interest income on bonds purchased under the APP at low or negative interest rates, this points towards a potential widening spread between rising cost of funds on the liabilities and the low return on the assets. While this scenario is effectively a successful outcome, in that a normalisation of monetary policy should correspond with improved macroeconomic conditions, it nonetheless results in central banks' balance sheets being exposed to potential interest rate mismatch risks. The potential for increasing interest rate mismatches in the context of rising policy rates may result in the cost of associated liabilities being greater than the income from purchased assets, which would, in turn, affect the profitability of central banks. Discussion on this, as well as further considerations related to

Figure 5: Income generation for a euro-area NCB after policy rates increase

Assets	Income		Liabilities	Expense
Investment assets	Return on investments	— / ↑	Banknotes	0
			Capital (Buffers)	

$$'Free resource' / Seigniorage Income = (Investment Assets \times Return on Investments)$$

Monetary policy operations (MRO)	MRO rate Variable	↑	Minimum reserves	MRO rate Variable	↑
Monetary policy operations (LTRO)	LTRO rate Static		Deposit facility	DFR Variable	↑
Securities held for monetary policy purposes (incl. APP)	Euro area bond yields Static	—	Government deposits		
Other assets	Mix		Other liabilities	Mix rate	

Interest Income: Relatively Static and Low

Interest Expense: Increasing

$$Other Interest Income = \sum (Assets \times Rate) - \sum (Liabilities \times Rate)$$

central bank income arising from non-standard measures, is included in the recent annual report of the Bank of International Settlements (see Box IV.D, BIS 2017).

rate losses on purchase programme assets are covered by investment income. Over the longer term, NCBs are expected to return to profitability.

Furthermore, this scenario of interest rate driven losses may be compounded by the low yield environment impacting on income from other areas of NCBs' balance sheets, such as the investment portfolios. The non-standard measures, in particular the APP, have helped to lower yields on a broad scale meaning that seigniorage income is likely to be reduced compared to pre-crisis levels.²² Depending on each central bank's own investment policies and risk tolerances, it may be the case that a portion of investment assets will be invested in low yielding assets during the period that the interest rate mismatch on the purchase programme assets arises. It could therefore take a number of years, in some cases, before sufficient investments are made at higher yielding bond rates before the net interest

These forward looking scenarios are illustrated in Figure 5, which shows how a stylised NCB balance sheet may look as interest rates rise and how this may affect the profitability of the respective central bank. As has been referenced, the MRO and DFR rates are likely to increase over time, meaning that while additional income is expected from monetary policy operations, this could be offset by increases in interest expense, in particular due to excess deposits. At the same time, since assets under the APP are held at amortised cost, the income on this is expected to be relatively low and static, which could, under certain circumstances, lead to increasing net interest losses. In terms of movements in the balance sheet, excess deposits may decrease over time and there is also the possibility of

²² However, this is dependent on investment decisions and the amount of banknotes in circulation.

reinvestment of maturing APP assets as rates and yields rise, which may increase the rate of return on this portfolio and improve the net interest income position. Nonetheless, a negative net interest income scenario, potentially leading to individual accounting year losses, is a plausible scenario which warrants consideration and potentially mitigating actions.

5. Addressing the Changing Risk Profile of the Central Bank Balance Sheet

The increased exposure to interest rate risks described above is a direct and necessary consequence of implementing non-standard monetary policy measures aimed at steering inflation toward its target level. In this regard, the risks are unavoidable in the first order insofar as a policy rate hiking cycle that can lead to the realisation of losses from interest rate risk will occur in a scenario where the monetary policy measures being implemented by central banks have been successful. These potential interest rate losses could be viewed as a comparatively small cost to be incurred in order to achieve the greater economic benefits from the successful implementation of non-standard measures and the associated objective of sustained price stability. There is, therefore, a reasonable degree of expectation that these losses will be incurred under certain scenarios.

Unlike commercial banks, however, a central bank cannot easily take offsetting financial market measures to hedge or prevent the expected losses from occurring, as to do so would effectively be to take a position against the stated monetary policy stance that has been communicated. This could, therefore, potentially hinder the adjustment of the monetary transmission mechanism towards the intended target. In this regard, it is worth noting that the objective of the Eurosystem is to achieve price stability. While central banks normally make profits, these are a second order objective and are incidental to, but in

some ways enabled by, the central bank's pursuit of its monetary policy objectives. Therefore, given the Eurosystem mandate, implementation of monetary policy measures that enable the Eurosystem to achieve its price stability objective is appropriate, even if it results in losses for the Eurosystem or an individual NCB.

This leaves a central bank with a limited choice of risk mitigation options, compared to a commercial bank. The absence of any risk mitigation action would mean that interest rate mismatch losses may occur and they may contribute to an overall accounting loss for a central bank in any given year where other sources of income are insufficient to cover the interest rate losses. The realisation of such accounting losses may have a number of effects on central banks, not least reducing the stock of capital and buffers and therefore raising questions around the speed and ability of the central bank to be recapitalised, and to remain fully independent when in need of recapitalisation.

5.1 Interest rate risk mitigation proposed by other institutions

These issues affecting central bank balance sheets in recent years, and potential steps to mitigate them, have been discussed by a number of institutions. Af Jochnick (2015) identified how some of these issues have affected the Sveriges Riksbank - explicitly stating that the Riksbank will probably make losses over the next few years and noting that many other central banks will come under similar pressures, particularly those that have bought large volumes of bonds with long maturities to stimulate the economy. The author also notes that this will not only have implications for the ability to pay dividends to the government, but that the losses will also affect the equity of the Riksbank.

The Riksbank further emphasised these issues in Floden (2016), where it is noted that that it is more likely that the Riksbank will

incur losses, rather than profits, on bonds purchased as yields continued to move lower. While this will result in lower profits and lower dividends being distributed to the government, the paper also notes that there are offsetting benefits to government finances – such as through the lower cost of borrowing that is also brought about by the monetary policy stance. Furthermore, the author highlights a counterpoint to these losses associated with the Riksbank's improved equity position, which increased from SEK 70 billion before the financial crisis to SEK 120 billion in 2016, which means that the Riksbank is in an adequate position to deal with projected losses.

Christensen, Lopez and Rudebusch (2013) identify these issues in the context of the US Federal Reserve's holdings of securities under their quantitative easing programme. The paper runs a number of stress-test simulations on the Fed's balance sheet in order to identify risks that may arise under various model-based yield curve scenarios. The authors identify the risk that as short-term interest rates rise, including the rate that the Fed pays on its bank reserves, the funding cost of its securities portfolio will increase – implying a significant increase in interest income risk with the knock-on effect of lower remittances to the US Treasury. Indeed, the authors further note that, in extreme circumstances, these remittances could fall to zero.

The Bank for International Settlements (BIS) has also considered some of these issues. Turner (2014), for example, notes that central banks have a growing maturity mismatch and that higher short-term rates could at some point lead to losses, and suggests that such losses can have political consequences that might weaken central bank independence. Similarly, Archer and Moser-Boehm (2013) note the potential for central banks to incur consequential risks in pursuing their monetary policy mandate that would otherwise be avoided or mitigated by a commercial bank. The foreword to the latter paper notes two accounting policies that are particularly suited

to central banks dealing with potential losses arising in similar such circumstances: (i) the use of revaluation reserves, especially in an asymmetric manner, treating unrealised gains and losses differently; and (ii) the use of general risk ("rainy day") provisions.

Vergote, Studener, Efthymiadis and Merriman (2010), in their paper on the ECB's financial accounts, discuss some of the mechanisms employed by the ECB to address risks and potential losses. The paper notes that financial losses have been offset mainly through risk provisions, partly because they can be built up faster than the general reserve mechanism. The authors state that, in addition to a general reserve, the ECB also set up a risk provision against exchange rate, interest rate and gold price risks in 2000. Since 2010, the scope of this provision has also included credit risk.

ECB (2012) provides further details regarding financial reporting in the Eurosystem, particularly in relation to provisions for potential losses. The paper notes that the accounting framework of the ECB, and those of a number of euro area NCBs, allow general provisions to be made for foreign currency, interest rate, gold price and credit risks. While stating that a provision of this type is used by the ECB, the paper also suggests that this general provision has enhanced the ECB's protection against financial risks, as it may be used to cover realised and unrealised losses.

These considerations are contextualised by discussions of the importance of central bank profitability for the reputation of a central bank and its ability to deliver on its mandate (for example, Archer and Moser-Boehm (2013) and Stella and Lonnberg (2008)). These discussions often point towards the benefits of taking action to mitigate potential losses so as to avoid volatility in central bank income, bearing in mind that the requirement for central banks to distribute a certain amount of their profits to their treasury may, in some cases, limit their ability to accumulate sufficient reserves. Ingram (2011) also supports the use of risk provisions by central banks. In particular,

the author discusses the importance of risk provisions and notes that such a provision is used by the ECB, and many NCBs, and that it enables the ECB to reduce the potential volatility in its distributable annual profits.

A number of euro area NCBs have also identified the growing risks on their balance sheets and have taken steps to mitigate these risks. Weidmann (2017), in his introductory comments at the financial statements press conference 2016, explicitly highlighted the growing maturity mismatch on the Bundesbank balance sheet, which could lead to losses. He noted that while exchange rate, credit and default risks are already factored into their risk provisions, the growing interest rate risk also needs to be addressed – and announced an increase in their risk provisions by €1.75bn (to €15.35bn), largely in reflection of these interest rate risks.²³

Many other euro area NCBs' annual reports mention the exposure to increasing risks and the role for risk provisions that address exchange rate, credit, gold, and interest rate risks, amongst others. De Nederlandsche Bank (2016a) explicitly addressed these risks. The introductory statement at the launch of their 2015 Annual Report states that "A future rise in interest rates will, for example, entail balance sheet risks for De Nederlandsche Bank's (DNB) future profitability. This is one of the reasons why we ... have decided to make a general risk provision in the coming years." The 2015 Annual Report provides further detailed discussion around the assessment that quantitative easing has resulted in greater balance sheet risks for the central bank, wherein Box 1.1 states "... DNB is exposed to interest rate risk that is manifested when key interest rates are raised significantly and rapidly. As the purchased assets will be held until at least the end of March 2017 and the principal payments will be reinvested, the exposures and risks for DNB will increase further and will remain high for a long time. The low interest rates have also led to a decline in DNB's profitability. Moreover,

profitability is also declining because existing monetary programmes, such as the securities markets programme (SMP), which produce higher returns, are coming to an end" (De Nederlandsche Bank, 2016b).

5.2 Addressing these risks at the Central Bank of Ireland

The impact of the non-standard measures on the balance sheet of the Central Bank of Ireland ("the Bank") has been similar to that described above for stylised NCB balance sheets. While the magnitude of risks will vary across NCBs, according to the bonds purchased and their yields, the increase in the Bank's balance sheet size due to non-standard measures has created an increased level of risk. As part of the Bank's on-going monitoring of its balance sheet risks, analysis was performed to identify the magnitude and type of risk exposures facing the Bank, before considering the materiality of those risks and how they may be mitigated or accounted for. In assessing the Bank's risk mitigation options, consideration was first given to both the accounting guideline followed by the Bank, and the profit distribution rules that the Bank adheres to.

As a member of the Eurosystem, the Bank complies with the ECB's Accounting Guideline.²⁴ Prior to year-end 2016, the Bank followed all mandatory aspects of the Guideline but applied accounting standards generally accepted in Ireland in instances where aspects of the Guideline were non-mandatory or silent.²⁵ In line with the mandatory elements of the Guideline, the Bank carries out an assessment of its financial risk on an annual basis. In recent years, this has resulted in the retention of a provision for credit risk, relating to impairments on securities held for monetary policy and investment purposes. Importantly, these provisions were established as specific risk provisions, requiring evidence of impairment, and are different to the 'rainy day' or general risk provisions described above.

²³ Deutsche Bundesbank (2016).

²⁴ Guideline (EU) 2016/2249 of the ECB of 3 November 2016 on the legal framework for accounting and financial reporting in the European System of Central Banks (ECB/2016/34)

²⁵ The Financial Reporting Standard applicable in the UK and Ireland is Financial Reporting Standard 102 (FRS 102).

With regard to building up the Bank's buffers in anticipation of a potential loss occurring from risks identified, the pre-emptive retention of profits in order to build reserves can be considered. The distribution of profit from the Bank to the Exchequer is governed by the Central Bank of Ireland (Surplus Income) Regulations (1943). The result of this regulation is that the Bank is required to transfer a minimum of 80 percent of its profits in any given year to the State, and thus a maximum of 20 percent can be transferred to its general reserve, where it would serve as a buffer against risks.²⁶ While such regulations are common practice and allow for a balance between building central bank reserves and providing a return to the exchequer, such profit distribution rules can limit the Bank's ability to create financial buffers in a speedy manner, particularly where material new risks develop quickly.

While these existing mechanisms have been used to create financial risk buffers to date, additional measures were considered to be necessary in light of the increased risk resulting from the non-standard measures. To enable the Bank to make provisions for a broader range of financial risks, should material risks be identified, the Bank prepared a general risk provision policy. On completion of a full risk assessment, the Bank identified additional material risks and identified a need to introduce an additional risk provision in its 2016 Annual Accounts in accordance with the policy (see Box 8, Central Bank of Ireland, 2017). The ability to incorporate such a provision into the Bank's accounts was further enabled by a move to follow all aspects of the ECB's Accounting Guideline, including those categorised as non-mandatory (See Note 36, Central Bank of Ireland, 2017). The inclusion of a category of provisions for 'foreign exchange rate, interest rate, credit, and gold price risks', otherwise known as a general risk provision, is explicitly addressed by the non-mandatory aspects of the Guideline.

The calibration of the provision for the 2016 Annual Accounts was based on a risk modelling exercise, involving scenario analysis, where a wide range of interest rate paths were considered, including extreme scenarios. The risk was measured over the medium term with reference to both value-at-risk and expected shortfall. This analysis was based on the Bank's balance sheet at year-end 2016, with a forward-looking dimension that made some allowance for asset disposals and maturities. The results of this analysis were then considered alongside expert professional judgement (see Note 33(ii), Central Bank of Ireland, 2017). As a result, a provision of €165m was set aside to cover the materialisation of the scenario described in Section 4, where rising interest rates could result in the generation of negative net interest income, due to the mismatch on the Bank's balance sheet.

6. Conclusions

Central bank balance sheets have changed in both size and composition since the financial crisis, through increased lending to counterparties and purchases of assets as part of non-standard monetary policy measures. These changes have transformed the traditional dynamics of central bank balance sheets, compared to more normal times, with significant implications for profitability and risks.

In particular, central banks that have purchased securities under quantitative easing-style asset purchase programmes are now increasingly exposed to potential interest rate mismatch risks. This risk arises from a potential widening in the spread between interest rates on assets and liabilities; namely where a sizeable portion of central bank liabilities are linked to policy rates which are expected to rise in the coming years and where a large amount of assets entail securities purchased at very low or negative yields. This interest rate mismatch implies that financial losses could arise in future years and, if other central bank investment

²⁶ Recent practice, since 2008, has tended to see the Bank retain the maximum allowed 20 percent of profits in order to build up the Bank's level of reserves in response to the expanded balance sheet size and associated risks that have arisen since the financial crisis. In some years, reported transfers to reserves have differed from 20 percent of profits due to the impact of actuarial losses and gains.

income were also suppressed due to low yields on investment assets, there is a risk of overall accounting losses in certain scenarios.

Given the importance of financial independence (and the need for central banks to generate income to cover their own expenses), central banks in many countries have taken various steps to mitigate these growing risks. While strong capital and reserves provide a source of resilience, the role of risk provisioning has grown in importance for central banks in recent years. In the euro area, both the ECB and many euro area NCBs have explicitly identified these growing risks and many have provisioned for interest rate risk within a general risk provision framework.

The Central Bank of Ireland has also identified increased risks in the course of its regular risk assessment of its growing balance sheet. In particular, an increased exposure to interest rate mismatch risk has been identified. As a consequence, and in compliance with ECB accounting guidelines, the Bank introduced an additional risk provision in its 2016 Annual Accounts, which falls under the category of provisions for 'foreign exchange rate, interest rate, credit, and gold price risks'. Following an evaluation of the potential impacts and likelihood of this risk, a provision of €165m was set aside in the 2016 Annual Accounts. In the event that the risks fail to be realised, the provisions will be released and added back to future profit and loss statements in accordance with the Bank's general risk provision policy. The Bank will reassess these and other financial risks as part of its ongoing management and mitigation of such exposures. Were the risks to materialise, the provisioning for the risks when they are initially identified helps the Bank to adequately deal with the losses when they occur and thereby supports the Bank's independence and helps to maintain a robust level of capital and financial buffers.

References

- Andrade, Philippe, Johannes Breckenfelder, Fiorella De Fiore, Peter Karadi, and Oreste Tristani. (2016). 'The ECB's asset purchase programme: an early assessment', ECB Working Paper Series No 1956.
- Archer, David, and Paul Moser-Boehm. (2013). 'Central bank finances', BIS paper No. 71.
- Af Jochnick, Kerstin. (2015). 'Does the Riksbank have to make a profit?', Speech, Swedish House of Finance, Stockholm, 23 January.
- Banque de France. (2017). 'Banque de France Annual Report 2016'.
- BIS. (2017). '87th Annual Report'.
- Central Bank of Ireland. (2017). 'Annual Report 2016'.
- Christensen, Jens H.E., Jose A. Lopez and Glenn D. Rudebusch. (2013). 'A probability-based stress test of Federal Reserve Assets and Income', Federal Reserve Bank of San Francisco Working Paper Series, 2013-38.
- De Nederlandsche Bank. (2016a). Press release: Introductory statement by the president at the press conference for DNB's 2015 Annual Report, 24 March.
- De Nederlandsche Bank. (2016b). '2015 Annual Report'.
- Deutsche Bundesbank, (2017), 'Annual Report 2016'.
- ECB. (2012). 'Financial reporting in the Eurosystem', ECB Monthly Bulletin, April.
- ECB. (2015a). 'Capital subscription', webpage, <https://www.ecb.europa.eu/ecb/orga/capital/html/index.en.html>.
- ECB. (2015b). 'The transmission of the ECB's recent non-standard monetary policy measures', Economic Bulletin (7).
- ECB. (2015c). 'The Role of the Central Bank Balance Sheet in Monetary Policy', Economic Bulletin (4).
- ECB. (2015d). 'ECB announces expanded asset purchase programme', Press Release, 22 January.
- ECB. (2017). 'More details on the public sector purchase programme (PSPP) - Questions & answers', webpage, <https://www.ecb.europa.eu/mopo/implement/omt/html/pspp-qa.en.html>.
- ECB. (n.d.). 'Asset purchase programmes', webpage, <https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html>.
- Floden, Martin. (2016). 'The Riksbank's bond purchases affect government finances', Speech, West Sweden Chamber of Commerce, Goteborg, 09 November.
- Guideline (EU) 2016/2249 of the ECB of 3 November 2016 on the legal framework for accounting and financial reporting in the European System of Central Banks (ECB/2016/34), OJ L 347, 20.12.2016, p. 3.
- Ingram, Ian. (2011), 'Funding models for central banks. The European Central Bank – a special case?', The Capital Needs of Central Banks, edited by Milton, S. and P. Sinclair, pp. 145-168.
- Ireland, Central Bank of Ireland (Surplus Income) Regulations 1943, S.I. No. 93/1943, Dublin.
- Pattipeilohy, Christiaan (2016). 'A comparative analysis of developments in central bank balance sheet composition', BIS Working Papers No. 559.
- Stella, Peter, and Ake Lonnberg. (2008). 'Issues in Central Bank Finance and Independence', IMF Working Paper, WP/08/37.
- Turner, Philip. (2014). 'The exit from non-conventional monetary policy: what challenges?', BIS Working Paper No. 448.

Vergote, Oliver, Werner Studener, Ioannis Efthymiadis and Niall Merriman. (2010). 'Main drivers of the ECB financial accounts and ECB financial strength over the first 11 years', Occasional Paper Series No. 111.

Weidmann, Jens. (2017). Introductory comments at the financial statements press conference 2016, Frankfurt am Main, 23 February.

Statistical Appendix

Statistical Appendix

The publication of the Statistical Appendix of the Quarterly Bulletin was discontinued from Quarterly Bulletin 1 2014. Statistical data compiled by the Central Bank are accessible on the Statistics page of the Central Bank's website, <http://www.centralbank.ie/polstats/stats/Pages/default.aspx>. Some tables, previously published in the Statistical Appendix, have been expanded to provide more comprehensive data. A number of statistical tables, which were not published in earlier Bulletins, have also been added.

The list of statistical tables and links to access them on the website are given on the following page.

STATISTICAL TABLES: CENTRAL BANK WEBSITE LINKS

Money and Banking:

<http://www.centralbank.ie/polstats/stats/cmab/Pages/Money%20and%20Banking.aspx>

- Summary Irish Private Sector Credit and Deposits
- Financial Statement of the Central Bank of Ireland
- Credit Institutions – Aggregate Balance Sheet
- Credit Institutions (Domestic Market Group) – Aggregate Balance Sheet

Business Credit and Deposits:

<http://www.centralbank.ie/polstats/stats/cmab/Pages/BusinessCredit.aspx>

- Credit Advanced to Irish Resident Private-Sector Enterprises
- Deposits from Irish Resident Private-Sector Enterprises

Private Household Credit and Deposits:

<http://www.centralbank.ie/polstats/stats/cmab/Pages/HouseholdCredit.aspx>

- Credit Advanced to and Deposits from Irish Private Households

Money Market Funds:

<http://www.centralbank.ie/polstats/stats/cmab/Pages/MoneyMarketFunds.aspx>

- Money Market Funds Aggregate Balance Sheet
- Money Market Funds Currency Breakdown of Assets

Retail Interest Rates:

<http://www.centralbank.ie/POLSTATS/STATS/CMAB/Pages/Retail%20Interest%20Rate%20Statistics.aspx>

- Retail Interest Rates - Deposits, Outstanding Amounts
- Retail Interest Rates - Loans, Outstanding Amounts
- Retail Interest Rates and Volumes - Loans and Deposits, New Business
- Official and Selected Interest Rates

Investment Funds:

<http://www.centralbank.ie/polstats/stats/investfunds/Pages/data.aspx>

- Ireland: Investment Funds Data

Securities Issues:

<http://www.centralbank.ie/polstats/stats/sis/Pages/Issues.aspx>

- Securities Issues Statistics

Financial Vehicle Corporations:

<http://www.centralbank.ie/polstats/stats/fvc/Pages/data.aspx>

- Irish Financial Vehicle Corporations

Locational Banking Statistics:

<http://www.centralbank.ie/polstats/stats/locational/Pages/data.aspx>

- Total Positions of Banking Offices Resident in Ireland vis-a-vis Residents and Non-Residents

Quarterly Financial Accounts:

<http://www.centralbank.ie/polstats/stats/qfaccounts/Pages/Data.aspx>

- Financial Accounts for Ireland: Q1 2012 to present – ESA 2010

Public Finances and Competitiveness Indicators:

<http://www.centralbank.ie/polstats/stats/sis/Pages/SecuritiesHoldingsStatistics.aspx>

- Gross National Debt
- Holdings of Irish Government Long-term Bonds

<http://www.centralbank.ie/polstats/stats/Pages/hcis.aspx>

- Nominal and Real HCIs

T +353 1 224 6278 **F** +353 1 671 6561 www.centralbank.ie publications@centralbank.ie



Banc Ceannais na hÉireann
Central Bank of Ireland

Eurosystem

Bosca OP 559, Baile Átha Cliath 1, Éire
PO Box 559, Dublin 1, Ireland