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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.

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Forecast Summary Table

	2013	2014	2015	2016 ^f	2017 ^f
Real Economic Activity					
(% change)					
Personal consumer expenditure	-0.8	1.7	4.5	3.8	2.2
Public consumption	0.1	5.4	1.2	2.5	1.1
Gross fixed capital formation	-5.4	18.2	32.7	14.0	7.0
Exports of goods and services	3.1	14.4	34.4	5.6	4.4
Imports of goods and services	1.4	15.0	26.7	7.8	4.7
Gross Domestic Product (GDP)	1.1	8.5	26.3	4.5	3.6
Gross National Product (GNP)	4.7	9.2	18.7	4.5	3.1
External Trade and Payments					
Balance-of-Payments Current Account (€ million)	3,857	3,208	26,156	21,887	22,898
Current Account (% of GNP)	2.1	1.7	10.2	8.1	8.1
Prices, Costs and Competitiveness					
(% change)					
Harmonised Index of Consumer Prices (HICP)	0.4	0.2	0.0	0.0	1.0
<i>of which:</i> Goods	-0.6	-1.9	-3.0	-3.3	-1.4
Services	1.6	2.5	3.0	3.1	3.1
HICP excluding energy	0.5	0.6	1.0	0.9	1.1
Consumer Price Index (CPI)	0.5	0.2	-0.3	0.2	1.0
Nominal Harmonised Competitiveness Indicator (Nominal HCI) ¹	-4.0	3.0	0.4	n.a.	n.a.
Compensation per Employee	1.6	1.8	2.7	2.5	2.5
Labour Market					
(% change year-on-year)					
Total employment	2.2	1.9	2.5	2.6	1.5
Labour force	0.4	-0.3	0.5	1.5	0.8
Unemployment rate (ILO)	13.1	11.2	9.4	8.3	7.7
Technical Assumptions²					
EUR/USD exchange rate	1.33	1.33	1.11	1.11	1.11
EUR/GBP exchange rate	0.85	0.81	0.73	0.84	0.84
Oil price (\$ per barrel)	108.58	100.10	53.70	42.51	49.72
Interbank market – Euribor ³ (3-month fixed)	0.23	0.21	-0.02	-0.18	-0.13

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

² The technical assumption made is that exchange rates remain unchanged at their average levels in mid-September. 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

A wide range of domestic spending and activity indicators suggest that Irish economic activity continues to expand at a healthy pace, though growth momentum may have slowed slightly over the first half of the year. Gauging the strength of the economy is complicated by the uncertainties surrounding GDP and GNP as reliable measures of domestic incomes and production. However, the broad thrust of data for the first half of the year suggest some weakening in the external performance, along with some moderation in the growth of domestic demand. On balance, the outlook is for a modest slowdown in growth this year relative to earlier expectations. Looking ahead, a further moderation in growth is projected in 2017. Domestic factors are set to be the main drivers of growth over the forecast horizon, with risks to the outlook coming mainly from external factors.

Given the problems of interpretation with the main National Accounts measures, it is necessary to look beyond the headline GDP and GNP figures to other, more reliable, spending and activity indicators to get a more accurate measure of the level of activity in the domestic economy. These indicators suggest that, while economic activity continues to expand at a reasonably healthy pace, some signs of slowing have emerged. Signals in relation to consumer spending have become more mixed, although the balance of evidence across a range of indicators points to only a marginal slowdown, with consumer spending still supported by solid gains in employment and rising earnings. With regard to investment, while growth in the overall aggregate has increased, this has largely been driven by strong growth in intangibles investment, with some softening in the domestic components. As a result of these developments, growth in underlying domestic demand, which excludes investment in intangibles and aircraft, has moderated in the first-half of 2016. However, while some easing in the pace of growth may be emerging on the domestic side of the economy, the extent of the slowing would appear to remain relatively modest.

In addition to the uncertainties arising from the absence of a meaningful, commonly agreed, measure of Irish economic activity, assessing

the outlook for the economy is further complicated by the potential adverse effects on Ireland of Brexit. Given the close relationship between the Irish and UK economies, a slowdown in UK growth and a weakening of sterling against the euro would adversely affect those sectors with a high dependency on exports to the UK.

Reflecting these concerns, the Bank materially revised its growth forecast for the Irish economy for 2016 and 2017 in the last Bulletin. In the interim, the initial fears in relation to Brexit have given way to a more sanguine assessment in recent months, against the background of some more positive UK economic data and an accommodative policy environment. While this leads to the judgement that it is not appropriate, at this point, to make a further negative Brexit adjustment to the forecasts, the potential for adverse macroeconomic, financial and currency market effects to quickly reemerge remains. In such circumstances, risks to the latest forecasts remain clearly tilted to the downside (see Box B, page 15).

Looking ahead, the main impetus to growth this year and next will come from domestic demand. The outlook for the growth of consumption and investment spending remains healthy, although growth rates are

projected to moderate over the forecast horizon. Having grown by just below 5.0 per cent in 2015, underlying domestic demand is projected to grow by close to 4 per cent this year, slowing to 2.7 per cent in 2017. The projected slowdown in 2017 reflects the unwinding of some positive factors which have boosted disposable income growth this year and some adverse effects from Brexit. On the external side, the outlook for exports is subject to considerable uncertainty, in view both of the volatility surrounding recent data and potential Brexit effects. Subject to these caveats, export growth is expected to moderate over the forecast horizon.

Taking account of developments and prospects since the last Bulletin, the latest forecast is for slightly lower GDP growth in 2016 and unchanged growth in 2017, compared to the previous projections. GDP growth of 4.5 per cent is now forecast for 2016, 0.4 per cent lower than the previous projection, largely reflecting a weaker external contribution. In 2017, reflecting the unchanged negative Brexit adjustment incorporated in the last Bulletin, GDP growth is projected to slow to 3.6 per cent. Risks to these projections are clearly weighted to the downside, reflecting the possibility of a more adverse impact of Brexit on the UK economy than currently envisaged, a larger spill-over to the broader international economy or the potential for more negative domestic confidence and labour market effects than incorporated in these forecasts.

Given these risks, policies should remain focussed on underpinning stability and reducing uncertainty. Ireland is especially exposed due to the legacy of high public and private sector debt levels, the sensitivity of small, highly open economies to international shocks and Brexit-related vulnerabilities. In this regard, a prudent fiscal strategy remains essential given the feedback loops between fiscal stability, financial stability and macroeconomic stability. To underpin such a strategy, it would be desirable to establish long-term targets, which would appropriately reflect Ireland's risk exposures and be robust to statistical issues, and which can act as an

anchor for annual budgetary decisions. The greater the commitment to attaining such targets, the more it would be possible to run a flexible, counter-cyclical fiscal policy in response to temporary shocks.

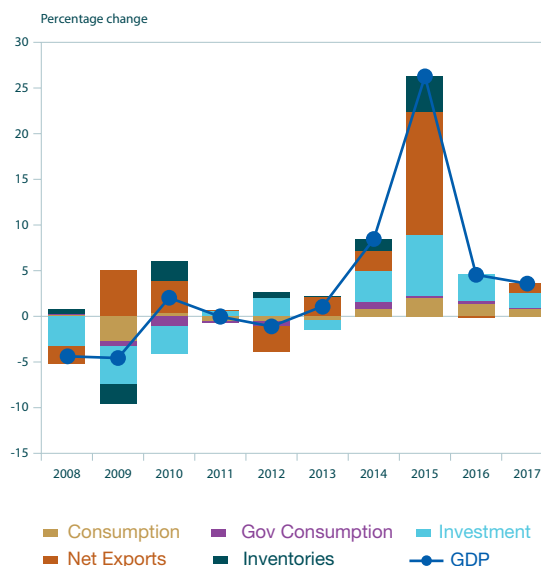
The volatility of the headline National Accounts measures also emphasise the importance of differentiating between temporary and permanent influences on the future paths of revenue and expenditure. While the uncertainties in relation to the measurement of economic growth make it more difficult to calculate the underlying path for tax revenues, it would be prudent to assume that some fraction of the recent surge in corporation tax revenues might be temporary in nature.

The Domestic Economy

Overview

- Irish GDP is forecast to grow by 4.5 per cent this year reflecting a reduced contribution from exports together with some moderation in the growth of domestic demand. This represents a modest slowdown from an estimated underlying rate of about 6 per cent in 2015, when the effect of the level shift in 2015 GDP is excluded (see Box A).
- A downward revision to projected GDP growth this year is mainly accounted for by a weaker external performance. The outlook for external demand has also been reduced for 2017. However, since this was already reflected in a negative Brexit adjustment in the last Bulletin, forecast GDP growth of 3.6 per cent for next year remains unchanged. GNP growth is forecast to average 4.5 per cent in 2016, slowing to 3.1 per cent in 2017.
- While total domestic demand was boosted by a sharp increase in R&D investment in the second quarter, underlying domestic demand, excluding intangibles and aircraft, moderated significantly in the first half of the year. While housing output continued to recover in line with expectations, core machinery was particularly weak.
- Consumer spending grew strongly in the first quarter yet declined in seasonally adjusted terms in the second quarter. For the year as a whole, underlying domestic demand is projected to increase by close to 4 per cent, with about 2.7 per cent growth projected in 2017. This is broadly in line with previous projections but reflects a stronger outlook for investment offset by a slight downgrade in the outlook for consumer spending.
- The growth in consumer spending in the first half of this year was lower than might be expected given the strength of higher-frequency indicators such as retail sales, car sales and consumer sentiment together with a stronger than expected labour market outturn. Reflecting these mixed signals, the forecast for growth in consumer spending has been revised down marginally to 3.8 per cent in 2016. A more pronounced slowdown to growth of about 2.2 per cent is forecast for next year. This reflects a projected slowing in employment growth and the unwinding of some positive factors that have boosted disposable incomes this year. These include

Chart 1: Contributions to GDP



Source: CSO and Central Bank of Ireland.

lower energy prices and an appreciating exchange rate which has contained consumer price inflation at close to zero this year. In addition, as noted in the previous Bulletin, the impact of Brexit on consumer sentiment will become more evident in 2017.

- A weak first half outturn together with a downgrade to external demand assumptions has prompted a downward revision to the outlook for export growth to about 5.6 per cent this year. Lower export growth in 2017 mainly reflects the assumed impact of Brexit. Import growth is also set to moderate, with projected growth of 7.8 per cent in 2016 and 4.7 per cent in 2017.
- The performance of the labour market has been stronger than expected this year. Employment growth of 2.7 per cent in the first half of the year exceeded expectations. However, there was also a sharp pick up in labour force growth, which prompted an upward revision to the unemployment rate from 7.8 per cent to 8.3 per cent (July). Furthermore, data on migration flows for the year to April 2016 point to a return to net inward migration for the first time since 2009. Taking all of these factors into account, the forecast for both

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

	2015			2016 ^f			2017 ^f
	EUR millions	volume	price	EUR millions	volume	price	EUR millions
Personal Consumption Expenditure	92,377	3.8	1.0	96,846	2.2	1.1	100,066
Public Net Current Expenditure	26,985	2.5	1.0	27,932	1.1	2.0	28,817
Gross Domestic Fixed Capital Formation	54,103	14.0	2.0	62,933	7.0	2.2	68,830
<i>Building and Construction</i>	14,243	8.3	2.8	15,848	6.6	3.4	17,471
<i>Machinery and Equipment</i>	16,365	13.2	1.5	18,807	2.8	1.5	19,630
<i>Intangibles</i>	23,495	18.0	2.0	28,279	10.0	2.0	31,729
Value of Physical Changes in Stocks	1,293			1,293			1,293
TOTAL DOMESTIC DEMAND	174,758	6.9	1.2	189,004	3.6	1.6	199,005
<i>of which: Underlying Domestic Demand</i>	143,774	3.9	1.2	151,285	2.7	1.5	157,713
Exports of Goods & Services	317,197	5.6	0.2	335,704	4.4	1.1	354,332
FINAL DEMAND	491,955	6.1	0.5	524,708	4.1	1.3	553,337
Imports of Goods & Services	-235,987	7.8	0.2	-254,950	4.7	0.7	-268,932
<i>Statistical Discrepancy</i>	-155			-155			-155
GROSS DOMESTIC PRODUCT	255,813	4.5	0.8	269,603	3.6	1.8	284,250
Net Factor Income from Rest of the World	-53,173	4.6	0.2	-55,728	5.4	1.1	-59,363
GROSS NATIONAL PRODUCT	202,640	4.5	1.0	213,875	3.1	2.0	224,887

employment and unemployment has been revised upwards when compared to the last Bulletin. Employment is now forecast to increase by 2.6 per cent this year, slowing to about 1.5 per cent growth next year. The unemployment rate is forecast to average 8.3 per cent this year and 7.7 per cent in 2017.

- Headline inflation remains subdued. Weak global commodity prices and a strengthening exchange rate are reflected in negative goods price inflation. This has been offset by positive services inflation. CPI and HICP inflation are expected to average 0.2 and zero per cent respectively in 2016. A pick-up in inflation is expected in 2017 as the

impact of commodity price declines and the appreciation of the exchange rate begin to fade. Inflation as measured by both the CPI and the HICP is forecast to average 1 per cent in 2017.

- Risks to the outlook for the economy remain firmly weighted to the downside and mainly relate to external factors. Model simulations, which are reported in Box B below, illustrate the vulnerability of the Irish economy to global economic shocks such as Brexit. While the results are very much in line with estimates of a Brexit effect published in the last Bulletin, they also point to the risk of a more negative outcome.

Demand

Domestic Demand Overview

Following growth of 4.9 per cent in 2015, underlying domestic demand is projected to grow by 3.9 per cent in 2016 and by 2.7 per

cent in 2017. The projected moderation in growth in 2017 follows an unwinding of some of the effects that are boosting real purchasing power at present and potential implications on sentiment arising from Brexit related uncertainty.

Box A: An indicator of domestic economic activity in 2015

By Graeme Walsh¹

Preliminary estimates of real GDP growth suggested that the Irish economy grew by 7.8 per cent in 2015. This figure was later revised upwards to an extraordinary 26.3 per cent. Similarly, the preliminary estimate of real GNP growth was revised up from 5.7 per cent to 18.7 per cent. These revisions reflect a large level shift in output caused, in the main, by the relocation of a sizeable amount of intangible assets to Ireland, which had the effect of ‘on-shoring’ a significant amount of economic activity carried out elsewhere. This effect of increasing globalization has complicated the assessment of Ireland’s recent underlying economic performance.

While compiled in accordance with international standards, the results of the 2015 National Income and Expenditure Accounts have generated a considerable focus on measures of domestic incomes, production and the level of economic activity carried out in Ireland in 2015. Estimates can be produced in a number of ways, for example, through attempting to adjust the published figures in various ways (e.g. to abstract from the effects of contract manufacturing, focussing on net measures of activity etc.). This box adopts a different approach using a statistical model that draws on the historical relationship between measures of output growth and economic activity (notably labour market activity) in the absence of any large level shifts. An extended discussion, covering annual, quarterly, and monthly data, can be found in Walsh (2016, forthcoming).

The model is called an unobserved components (UC) model and its purpose is to estimate an indicator of domestic economic activity in 2015 using a number of variables. There are two main types of variable in the model: (i) direct measures of output growth; and (ii) other indicators of the business cycle. The measures of output growth include Gross Domestic Product (GDP), Gross National Product (GNP), Gross National Income (GNI), and Gross Value Added (GVA). Additional indicators of the business cycle include employment growth (EMP), the unemployment rate (URATE) and underlying domestic demand (UDD). The latter is derived from a relatively straight-forward accounting approach which strips out investment in intangibles and aircraft from total domestic demand. A third variable is included in the model to signify that a variable experienced a level shift in 2015.

The role of the direct measures is to ground the indicator and provide an appropriate starting point for estimating a number for 2015. The other indicators, which are related to domestic activity, particularly the labour market, are used to drive the results in 2015. The model is shown below, where the level shift is denoted by L_t .

UC Model

Measurement Equations

$$\begin{bmatrix} GDP_t \\ GNP_t \\ GNI_t \\ GVA_t \\ UDD_t \\ EMP_t \\ URATE_t \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ \alpha_1 \\ \alpha_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ \lambda_1 \\ \lambda_2 \end{bmatrix} Indicator_t^* + \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \\ 0 \\ 0 \\ 0 \end{bmatrix} L_t + \begin{bmatrix} \epsilon_{1,t} \\ \epsilon_{2,t} \\ \epsilon_{3,t} \\ \epsilon_{4,t} \\ \epsilon_{5,t} \\ \epsilon_{6,t} \\ \epsilon_{7,t} \end{bmatrix}$$

State Equation

$$Indicator_t^* = \mu + \rho Indicator_{t-1}^* + \epsilon_t^*$$

¹ Irish Economic Analysis Division.

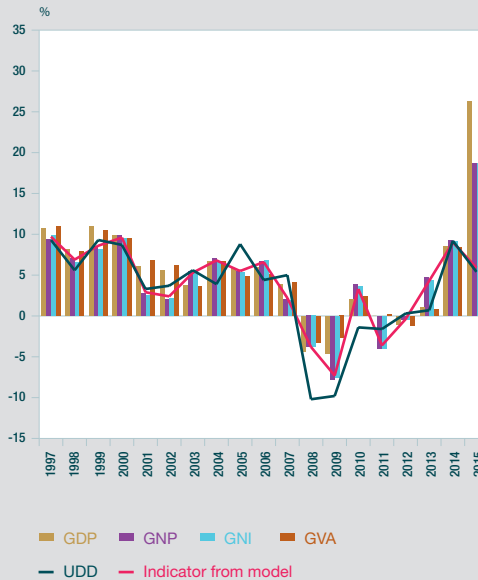
Box A: An indicator of domestic economic activity in 2015

By Graeme Walsh

The indicator derived from the model using annual data is shown in Figure 1. Over the sample period to 2014, it closely tracks the official measures of output growth (e.g. GDP, GNP, GNI, and GVA). This is a desirable result, as the aim of the model for present purposes is not to generate an alternative output measure for all years but rather to adjust the level shift in 2015. We can be confident about the size of this adjustment precisely because the indicator closely tracks the data up to end-2014, and because the UDD, EMP and URATE measurements are, by assumption, not impacted by the level shift.

Focusing on 2015, Table 1 provides a comparison of annual growth rates for 2015. The indicator provides a significantly smaller, yet still strong, estimate of 5.9 per cent when compared to official measures. One caveat associated with this approach is that the indicator in 2015 relies on a fairly narrow set of variables (in our case EMP and URATE). Walsh (2016 forthcoming) examines the sensitivity of the results to including a wider set of variables, such as those in the Bank's economic heatmap (see Bulletin 2, 2016), which includes variables on expenditure, output, trade, the labour market and prices.

Box A Chart 1: Comparisons of the estimated indicator with GDP, GNP, GNI, GVA, and UDD (annual growth rates).



Source: CSO and author's calculations.

Table 1: Annual growth rates for 2015

	GDP	GNI	GNP	GVA	UDD	Indicator from model
2015	26.3%	18.7%	18.7%	28.1%	5.4%	5.9%

Consumption

The volume of personal consumption expenditure is projected to grow by 3.8 per cent in 2016 and by 2.2 per cent in 2017. This outlook was revised downwards following the release of the Quarterly National Accounts (QNA) data, which revealed a surprisingly weak profile for spending on goods in the second quarter of the year. In seasonally adjusted terms, the volume of consumption is estimated to have contracted by 0.5 per cent in the second quarter following strong gains in the first 3 months of the year.

The forecast is also influenced by recent and prospective labour market developments as well as higher frequency data (retail sales and taxation trends). The savings ratio is expected to remain broadly unchanged over the forecast horizon. So far, any Brexit related effects appear limited although it will take a number of months for any trends to emerge. Following a sharp drop in the ESRI/KBC Bank Consumer Sentiment Index in July, sentiment improved in August.²

² The index fell from 103.4 in June to 99.6 in July before increasing to in August to 102.7. The 3-month moving average index also increased in the period to end-August.

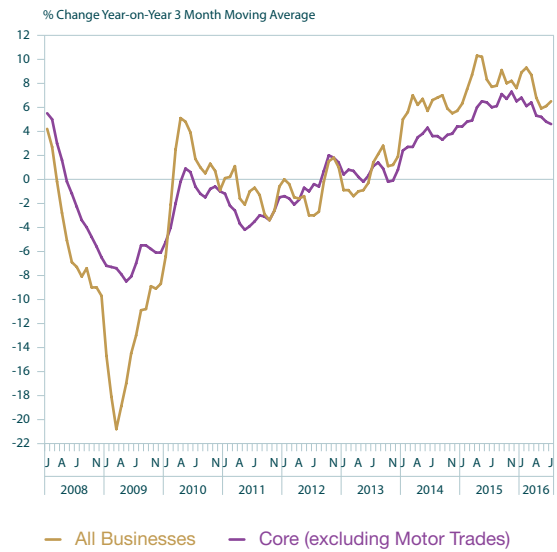
Investment

Investment expenditure is expected to increase by 14 and 7 per cent in 2016 and 2017, respectively – an upward revision compared to the previous Bulletin. The dampening effect of uncertainty stemming from the Brexit decision on overall investment over the forecast horizon may be mitigated somewhat given the shortages in the residential and commercial property markets. The QNA data for the second quarter of 2016 suggest that activity in the construction sector picked up as the year progressed. Building and construction expenditure increased by 13.9 per cent year-on-year in the second quarter of 2016; machinery and equipment investment, excluding other transport equipment (mainly aircraft) declined by 24.8 per cent over the same period.

In the residential sector, new house completions are expected to number approximately 14,000 and 16,000 units in 2016 and 2017, respectively, following 12,666 completions in 2015. Although this represents a substantial increase, it is well below available estimates of medium term requirements. On the non-housing side, other building and construction registered an increase of 2.4 per cent in the second quarter of 2016 year-on-year. With current available supply of commercial space dwindling, and a strong pipeline of incoming investments, investment in commercial real estate construction is also projected to be strong. Taking all of these factors into account, overall building and construction investment is projected to increase by approximately 8.3 per cent in 2016 and 6.6 per cent in 2017.

On the machinery and equipment side, following a period of restocking, the trend – net of aircraft – turned negative in the first two quarters of the year, which has led to a downward revision to our forecasts - to 3 and 5 per cent for 2016 and 2017, respectively. In conjunction with the forecasts for building and construction, underlying investment – i.e.

Chart 2: Index of Volume of Retail Sales



Source: CSO.

investment excluding intangibles and aircraft, is forecast to increase by approximately 6.1 and 6 per cent in 2016 and 2017. The level of investment as a percentage of GDP (net of aircraft and intangibles, however, is still well below what is indicated by historical and international norms (generally about 20 per cent of GDP).

As indicated in previous Bulletins, the inclusion of intellectual property (IP) assets and the change in aircraft leasing arrangements in gross fixed capital formation adds considerably to the unpredictability in published investment figures. Investment in ‘intangible’ assets (generally in the form of a purchase of a licence or patent) amounted to €12.8 billion in the first half of 2016 – an increase of 18.9 per cent in the year. While this was most likely related to the activities of multinationals, it represents a large proportion of overall investment (approximately 46 per cent) and adds considerable noise to the investment figures. For this reason, it is instructive to focus on the underlying components of investment.

Table 2: Goods and Services Trade 2015, 2016^f, 2017ⁱ

	2015			2016 ^f			2017 ⁱ
	EUR millions	% change in volume	% change in price	EUR millions	% change in volume	% change in price	EUR millions
Exports	317,197	5.6	0.2	335,704	4.4	1.1	354,332
Goods	195,592	5.2	-0.3	205,145	4.3	0.5	215,037
Services	121,605	6.3	1.0	130,559	4.6	2.0	139,296
Imports	235,987	7.8	0.2	254,950	4.7	0.7	268,932
Goods	85,024	8.3	-0.2	91,892	4.9	0.6	96,930
Services	150,963	7.5	0.5	163,058	4.6	0.8	172,002

Government Consumption

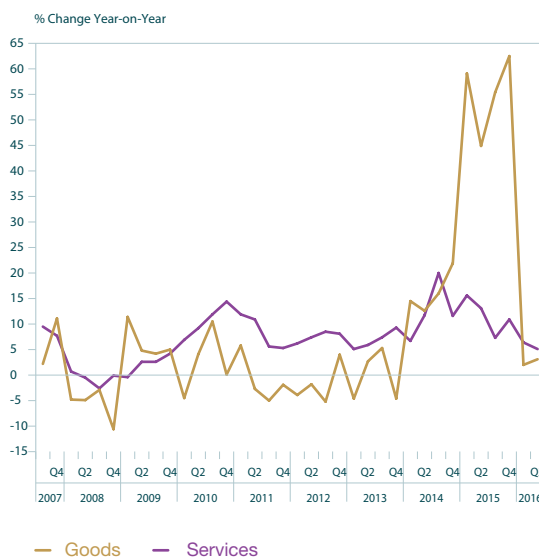
The volume of government consumption is expected to grow by 2.5 per cent this year and by a further 1.1 per cent in 2017. This outlook is based on the end-year National Income and Expenditure Accounts (NIE) and announced government expenditure plans.

External Demand and the Balance of Payments

Exports and Imports

The latest QNA data indicate that overall export growth improved marginally in the second quarter of 2016, to yield an increase of 3.8 per cent in the first half of this year. The muted performance of goods exports weighed somewhat on overall exports over this period, with a 2.6 per cent annual rate of change largely owing to recent developments in contract manufacturing. In contrast, services exports proved quite buoyant, with an average annual increase of 5.8 per cent during the first six months of 2016; much of the growth in services export activity over this period emanated from the computer services sector.

On the basis of the most up-to-date external demand assumptions for Ireland, the outlook for demand in our main trading partners in both 2016 and 2017 is somewhat weaker than in the previous Bulletin; the revision is almost entirely due to the envisaged implications of

Chart 3: Volume of Exports

Source: CSO Quarterly National Accounts.

Brexit. Evidence from the new export orders index of the Manufacturing Purchasing Managers Index (PMI) further suggests some softening of goods export demand is in prospect during the second half of 2016. In view of this and the somewhat muted goods export outturn for the first half of this year, the projected profile for the year as a whole is weaker than previously envisaged, with overall export growth of around 5.6 per cent currently projected. The prospects for 2017 are broadly unchanged, with growth in exports of around 4.4 per cent. It is important to note

Table 3: Balance of Payments 2015, 2016^f, 2017^t

€ million	2015	2016 ^f	2017 ^t
Trade Balance	81,209	80,754	85,400
Goods	110,568	113,253	118,106
Services	-29,359	-32,499	-32,706
Net Factor Income from the Rest of the World	-51,914	-55,728	-59,363
Current International Transfers	-3,139	-3,139	-3,139
Balance on Current Account	26,156	21,887	22,898
(% of GDP)	10.2	8.1	8.1

that the short-term outlook for Irish exports is characterised by higher than usual levels of uncertainty in view of the considerable volatility surrounding recent data and external demand developments.

A noticeable feature of Ireland's trade performance during the second quarter of 2016 was the pronounced upward momentum in imports of both goods and services. The strength of services imports over this period may be largely attributed to the research and development sector, with a dramatic increase in the import of intellectual property assets. As regards the outlook for 2016 as a whole and 2017, growth in imports is projected to ease to 7.8 per cent and 4.7 per cent, respectively, reflecting both the envisaged weakening of exports and an expected slowing in the pace of domestic demand growth.

Net Trade, Factor Incomes and International Transfers

The trade balance narrowed sharply during the second quarter of 2016 as a falloff in net goods exports was compounded by a pronounced widening of the services deficit. Net factor income outflows declined sharply year-on-year in the first half of 2016 reflecting a particularly weak first quarter.

Combining the prospective trends across the current account, a surplus of around 8.1 per cent of GDP is expected for 2016 as a whole; some further albeit modest improvement in the current account balance is projected in 2017. It is however noteworthy that given the magnitude of factor income flows and the uncertainty of their timing, small changes can have a sizable impact on current account projections.

Box B: Modelling the Impact of Global Shocks on the Irish Economy

By Michael O'Grady, Jonathan Rice, Reamonn Lydon and Graeme Walsh³

As a Small Open Economy (SOE), Ireland is susceptible to global economic shocks. Understanding how the economy might evolve over a given horizon requires us to take account of these interdependencies between the domestic and global economy. This means considering many different transmission channels stemming from global and peripheral sources. In the current environment, for instance, one may wish to consider the economic impact of Brexit, changes in the US monetary policy stance, the effect of fluctuations in oil prices or other commodities, or the international effect of a global economic slowdown. One of the approaches the Bank uses to analyse these relationships is a Global Vector Autoregression, or 'GVAR' model. As with all VARs, the GVAR uses information on the historical co-movement of a range of variables to understand how shocks ripple through the global economy. Originally proposed in Pesaran et al. (2006) the GVAR method complements other approaches for modelling large datasets with multiple variables, including large scale Bayesian VARs (BVARs) and factor augmented VARs (FAVARs).⁴

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⁴ For a technical discussion of the GVAR modelling technique see Dees, Di Mauro, Pesaran and Smith (2006). For a recent summary of the literature, in particular how the GVAR model relates to other approaches used to model datasets with large numbers of variables (FAVARs and BVARs) see Chudik and Pesaran (2014). The original GVAR for this context was developed by Pesaran, Schuermann and Weiner (2004).

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Using a GVAR model, this Box estimates the impact of four different shocks on the Irish economy: (i) a fall in UK GDP; (ii) a tightening of US monetary policy; (iii) an oil price increase, and; (iv) a global GDP shock. The GVAR is estimated using the toolbox of Smith and Galesi (2014) for 25 countries. We extend the original global database to include data from 2013(q1) to 2016(q1) and add Ireland to the set of countries. We also update the trade-weight matrix in Smith and Galesi to 2015, using the IMF Direction of Trade Statistics (DoTS) database. We provide a brief intuition for the GVAR approach at the end of the box.

The GVAR covers 25 countries, comprising approximately 88% of global GDP and is estimated using quarterly data from 1980(q1) to 2016(q1). Of these 25 countries, 17 are modelled individually, with the remaining 8 countries clustered together as a single 'euro area' group. The domestic variables used in the GVAR are real output, the inflation rate, the short-term interest rate, the long-term interest rate, the real effective exchange rate and real equity prices. The inclusion of both short and long-term interest rates captures the effect of bond markets on output and inflation. The global variables included in the GVAR are oil prices, the price of raw materials and the price of metal. The euro area data is collated using the average of each domestic variable for the set of euro area countries, weighted by each country's average Purchasing Power Parity GDP weight, calculated over the 2012-2014 period.

The impacts of each of the four shocks are presented below in Table 1 for Ireland, the euro area, the UK and the US. Impulse responses are calculated over a 40 quarter horizon; however, we focus on response estimates at the four and eight-quarter horizons in the table, which we consider to be a reasonable period to gauge impact of the shocks using this approach.

With respect to the UK output shock, Irish GDP responds considerably more negatively than either the US (-0.11% at 8 quarters) or the euro area (-0.10% at 8 quarters), with cumulative losses of 0.33% and 0.32% per cent of GDP after four and eight quarters. These estimates for Ireland are very much in-line with estimates presented for Ireland in the Q3 2016 bulletin, which were based on a BVAR model. Figure 1 shows the response of GDP for Ireland and the euro area. Time paths for the euro area response are similar to Ireland, with the majority of the response observed after 12 quarters.

Turning to the other shocks, the Irish eight-quarter GDP response to a US interest rate shock is the smallest estimate of the four countries presented in the table. This is due to the more staggered time-path of the response; over the full 40-quarter horizon period, the cumulative response of Irish GDP is estimated to be a reduction of 1.1%.

The Irish economy is relatively strongly affected by the shock to oil prices (a one standard error increase in the price of oil, equivalent to a permanent price increase of 12.6%). Figure 2 shows the time path for the cumulative impact of oil prices on Irish GDP and inflation. Despite a minor increase in the value of output in the periods directly after the shock, the effect on GDP turns negative after four quarters, with the peak effect at the 14-quarter horizon point estimated to be -0.46% of GDP and statistically significant. The cumulative impact after 40 quarters is -0.30%. For annual inflation, the initial impact is a 0.16% increase, declining gradually thereafter.

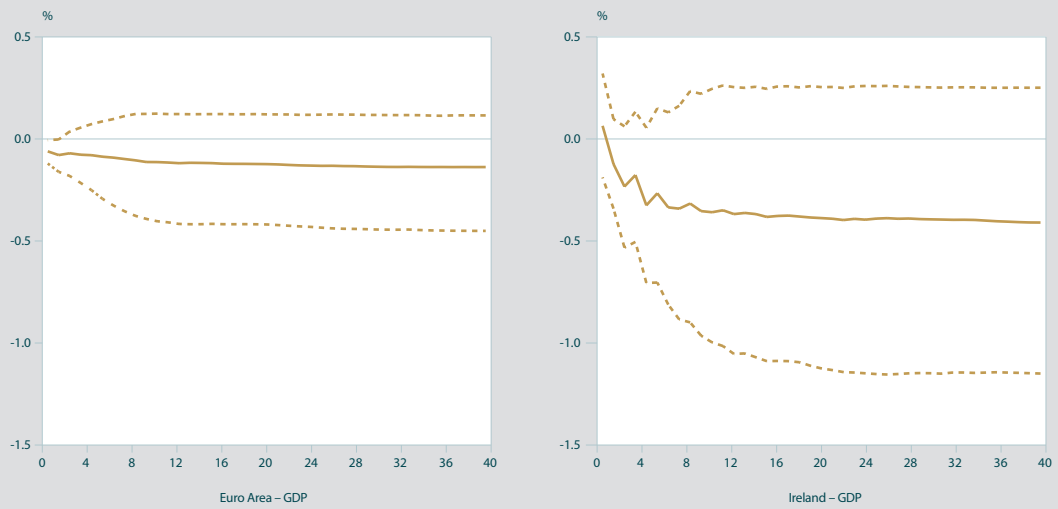
The global GDP shock represents a decline in aggregate output across all countries in the model, with domestic shock responses defined in terms of the country's PPP-GDP weighting. Again, Ireland is strongly impacted, with cumulative output losses equal to 1.21 and 0.85 per cent of GDP after the four and eight quarter horizons, respectively.

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Box B Table 1: Change in GDP following shock at four and eight-quarter horizons

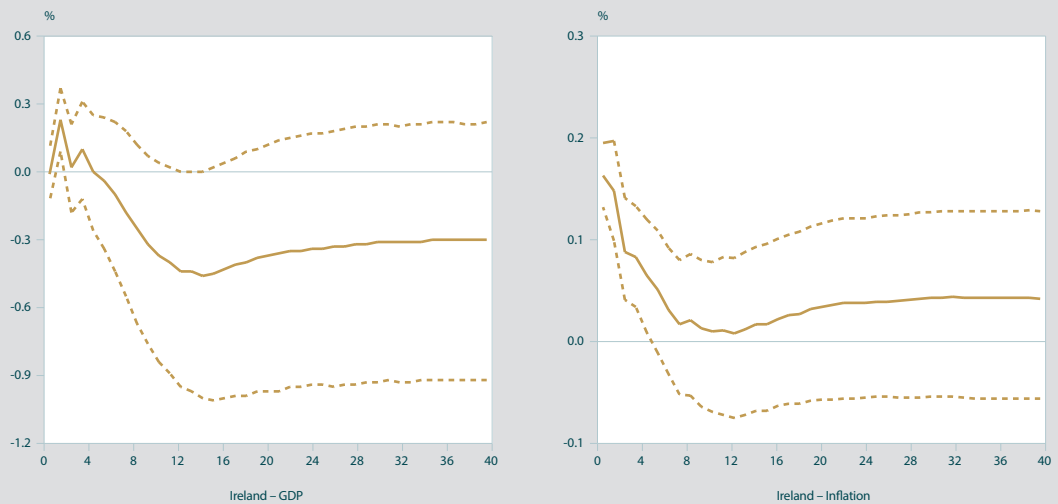
	UK GDP (-1%) Horizon		US Int. Rate (+100 bps) Horizon		Oil prices (+1se) Horizon		Global GDP (-1%) Horizon	
	4 qtr	8 qtr	4 qtr	8 qtr	4 qtr	8 qtr	4 qtr	8 qtr
Ireland	-0.33%	-0.32%	0.16%	-0.40%	0.00%	-0.26%	-1.21%	-0.85%
Euro area	-0.08%	-0.10%	-0.18%	-0.48%	0.01%	-0.13%	-0.91%	-0.96%
U.K.	-1.19%	-1.21%	-0.15%	-0.95%	-0.18%	-0.34%	-0.71%	-0.57%
US	-0.05%	-0.11%	-0.38%	-0.96%	0.07%	-0.08%	-1.05%	-0.88%

Box B Figure 1: Output Response to negative UK GDP Shock of 1%



Source: Central Bank of Ireland calculations using IMF and CSO data.

Box B Figure 2: Irish Output and Inflation Response to positive (12.6%) Oil Price Shock



Source: Central Bank of Ireland calculations using IMF and CSO data.

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GVAR models - The GVAR model is best described using a two-stage approach. To begin, small-scale country-specific models (called error correction models) are separately estimated, conditional on the global economy. These models predict country-specific domestic variables and include weighted cross-section averages of foreign variables. The weighting of foreign variables is based on a matrix of trade weights between all countries in the model. Intuitive justification for this approach is simple; a GDP shock in the UK is likely to have a larger effect on Ireland than it will have on Mexico, as Ireland engages in more trade with the UK than does Mexico. The Bank is also currently developing a weighting matrix based on capital flows between countries. The foreign variables entering these error correction models are assumed to be weakly exogenous for the purposes of estimation, that is, individual countries are small relative to the rest of the world. The models allow for co-integration among domestic variables as well as between domestic and foreign variables.

At the second stage, these country-specific models are stacked into one large global model and solved simultaneously for all endogenous variables. In this setting, various shock-scenarios may be considered using impulse response functions. The shocks occur in the model through shocks to the errors of the individual country-specific models. All shocks are modelled dynamically, calculated using Generalized Impulse Response Functions (GIRFs). GIRFs calculate shocks using the observed distribution of error terms, making them independent of conventional orthogonalization techniques, and can be considered a special case of Structural Impulse Response Functions (SIRFs). Standard errors are estimated using a sieve bootstrap procedure using 1,500 simulations and calculated as per Sims and Zha (1998). Finally, it should be noted that the GVAR is a linear regression model, estimating responses from shocks within an observed distribution. Rescaling shocks, so as to represent extreme events within the tails of these distributions, changes the nature of the shocks, so that a linear rescaling of the impulse responses may not reflect the true responses to such extreme tail events.

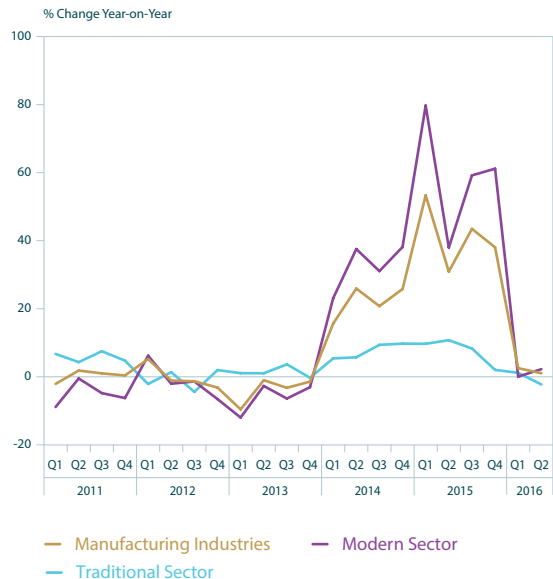
Supply

On the output side, the latest QNA data confirm a strong performance in the first 6 months of the year. On the services side, the broad other services sector grew by 7.4 per cent year-on-year in the second quarter of 2016, with the distribution, transport, software and communications sector and public administration up 7.4 and 6.3 per cent, respectively, over the same period. The agricultural sector continued a recent trend of strong growth in Q2 2016 with a 10.2 per cent increase year-on-year. A notable increase was seen in the building and construction sector for Q2 2016, with robust growth of 12.2 per cent. Industrial output growth appears to have stabilised after the extraordinary gains made in 2015 when growth for the year was 87.3 per cent, with 2 per cent growth in the first half of 2016 on an annual basis.

The most recent data from the monthly industrial production and turnover series showed strong growth for the manufacturing sectors, with year-on-year growth of 7.4 per cent in July 2016. This headline number obscures an underlying divergence between some of the manufacturing sub-sectors. The modern sector, which is heavily influenced by multinational corporations, saw 14.1 per cent growth on an annual basis. However, the mainly indigenous traditional sector saw a year-on-year contraction of 8.9 per cent. While the volume of industrial production data is quite volatile from month to month, analysing the first 7 months of 2016 in comparison to the same period for 2015 also shows a weakened performance for the traditional sector. For this period in 2015, the traditional sector saw growth of 11.1 per cent while in 2016 this sector saw a 1.9 per cent decrease.

A notable development with regard to the supply side of the economy is the recent adjustment of the Industrial Production and Turnover (IPT) results for 2015. These results have been modified to reflect the large revisions seen in the NIE for 2015.⁵ The revisions to the IPT have had a similar effect to the NIE revisions. The IPT has seen a large

Chart 4: Volume of Industrial Production



Source: CSO.

level shift from January 2015, with growth for manufacturing industries of 38.5 per cent now observed for 2015 in comparison to a previous estimate of 17.4 per cent. It is important to note that these revisions only affect 2015; the growth figure for 2014 remains unchanged.

The modern sector plays a key role in this surge in production. Growth in the modern sector for 2015 was previously estimated to be 23.5 per cent. This has now been revised upwards to 57.1 per cent. The modern sector is heavily influenced by the activities of multinational corporations and this is consistent with the explanation provided by the CSO that the revisions are attributable to the globalisation activities of a small number of companies. The traditional sector is largely unaffected by the revisions to 2015 with growth being reduced slightly from 5.1 per cent to 4.4 per cent.

On the services side, the latest monthly services index showed growth of 5 per cent in the year to end-July (relative to growth of 6.6 per cent over the same period in 2015).

⁵ See Box A: "Recent Revisions to the National Income and Expenditure Accounts," in the Domestic Economy Chapter of the Central Bank of Ireland *Quarterly Bulletin* No. 3, 2016.

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

	2014	2015	2016 ^f	2017 ^f
Agriculture	109	110	115	116
Industry (including construction)	348	374	393	404
Services	1,458	1,481	1,509	1,526
Total Employment	1,916	1,964	2,016	2,046
Unemployment	241	203	183	171
Labour Force	2,157	2,167	2,200	2,217
Unemployment Rate (%)	11.2	9.4	8.3	7.7

Note: Figures may not sum due to rounding.

The Investec manufacturing PMI for August showed moderate expansion overall at 51.7 (values above 50 signify an increase). The manufacturing employment PMI also showed expansion at 52.8. However, the new export orders index contracted for the third time in the last four months with a value of 49.8. According to Investec, who compile the series, this contraction is partially driven by a drop in new work orders from the UK. All components of the Investec services PMI showed expansion for August. However, the new exports index fell to a five-month low at 55.1.

The Labour Market

Total employment is forecast to increase by 2.6 per cent in 2016 and by 1.5 per cent in 2017. The most recent set of labour market data from the Quarterly National Household Survey (QNHS) pointed to further robust gains in numbers at work. Employment expanded by 2.9 per cent, year-on-year, in the second quarter of the year, rising above 2 million for the first time since 2009. These employment gains continue to be broad based, with 12 of the 14 sectors (notably construction, accommodation and food services, manufacturing and administrative and support services) posting strong gains.

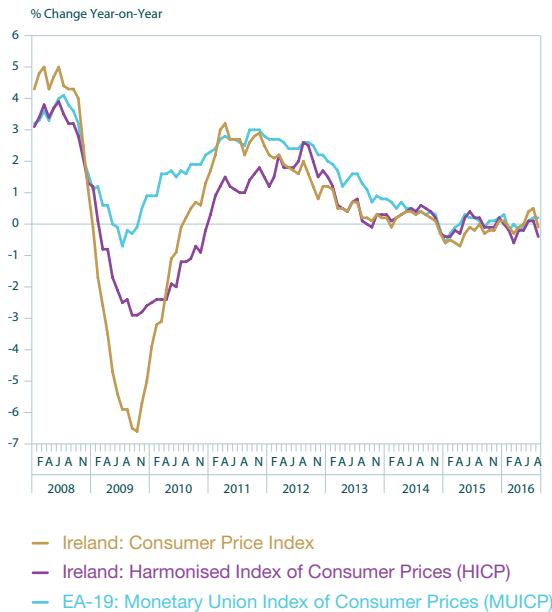
A marked increase in the pace of labour force growth was also notable, with an annual increase of 1.5 per cent in the year to end-June – the strongest rate of increase since 2008.⁶ Following a number of quarters of relatively stagnant growth, the strength in this number came as a surprise. For now, it is difficult to conclude whether these developments are part of a more pronounced permanent upward trend or more of a once-off spike. It is noteworthy that there were large labour force and employment gains amongst younger age cohorts, specifically those aged 15-19 years. In the second quarter, this cohort accounted for 40 per cent of the annual increase in the labour force and close to a fifth of employment gains. These employment gains appear to have been concentrated in the broad services sector for this age group.

A further important development was the return to net inward migration in the year to April 2016, for the first time since 2009.⁷ The CSO also made significant revisions to the monthly unemployment rate data in 2016 - the unemployment rate in July was revised up from 7.8 per cent to 8.3 per cent. Hence, an extra degree of uncertainty surrounds the labour force outlook, with growth of 1.5 per cent projected for 2016 and 0.8 per cent in 2017. The unemployment rate is set to average 8.3 per cent this year before declining to 7.7 per cent in 2017.

⁶ The seasonally adjusted quarter-on-quarter growth rate in the labour force (at 1.0 per cent) was also the fastest rate of increase since 2007.

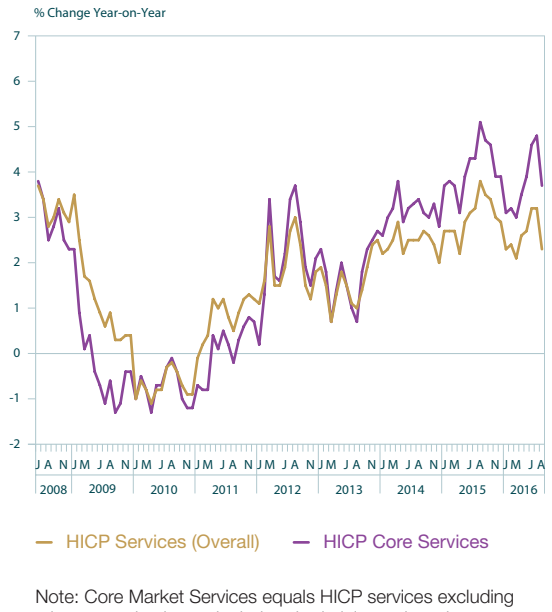
⁷ The CSO's Population and Migration Estimates pointed to net migration of 3,100 persons in April 2016.

Chart 5: Consumer Prices



Source: CSO.

Chart 6: Services Sector Inflation



Note: Core Market Services equals HICP services excluding telecommunications, alcohol and administered services.

Source: CSO.

Pay

For 2016 and 2017, wages, are projected to increase by 2.5 per cent per annum. In the context of strong employment gains and weak price pressures, this outlook points to robust increases in economy wide real compensation levels in both 2016 and 2017. This outlook should lend support to the outlook for consumer spending set out above.

Inflation

Consumer Prices

Aggregate inflation measures for Ireland suggest that price pressures have remained subdued throughout much of 2016, with the Consumer Price Index (CPI) and the Harmonised Index of Consumer Prices (HICP) hovering near zero for much of the year. The CPI and the HICP posted year-on year declines of 0.1 and 0.4 per cent, respectively, in August 2016. The aggregate figure for both measures, however, hides two very different underlying trends: goods prices, continued their downward trend (which turned negative in year-on-year terms in mid-2013), declining

by 3.1 per cent in the year to August 2016. Services prices, on the other hand, recorded a year-on-year increase of 2.6 per cent over the same period, continuing a run of strong price increases, reflecting the pick-up in domestic demand and, in particular, demand pressures in the residential rental market. Thus, there are two opposing forces at work here: weak global goods prices and strong domestically driven services prices.

Compounding low global commodity prices is the weakness in sterling following the Brexit referendum. At the time of writing, the euro was approximately 10 per cent stronger vis-à-vis sterling since June. All else being equal, a rise in the value of the euro serves to decrease the euro price that foreign producers selling in Ireland need to charge to maintain profits in their own currency. The potential for a Brexit-related exchange rate impact was flagged in the previous Bulletin and this factor has contributed to a downward revision to the inflation forecast. The outlook for HICP inflation has been revised downwards and is expected to register increases of 0.0 and 1.0 per cent in 2016 and 2017, respectively.

Table 5: Inflation Measures - Annual Averages, Per Cent

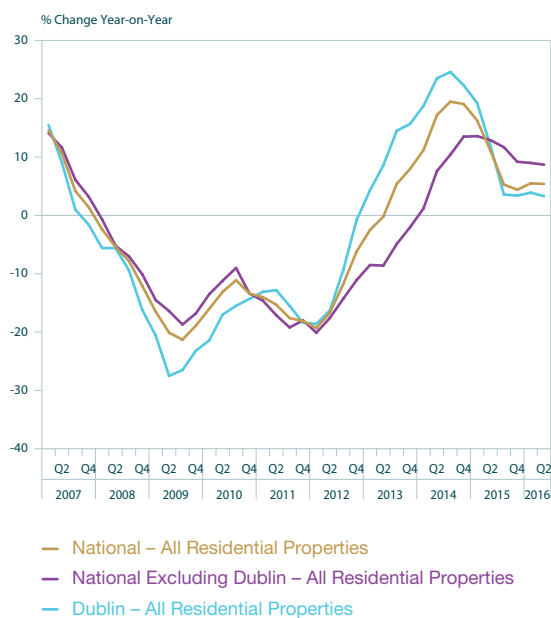
Measure	HICP	HICP excluding Energy	Services ^a	Goods ^a	CPI
2012	1.9	1.0	2.0	1.9	1.7
2013	0.4	0.5	1.6	-0.6	0.5
2014	0.2	0.6	2.5	-1.9	0.2
2015	0.0	1.0	3.0	-3.0	-0.3
2016 ^f	0.0	0.9	3.1	-3.3	0.2
2017 ^f	1.0	1.1	3.1	-1.4	1.0

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

Residential Property

Residential property prices increased by 6.7 per cent in July 2016 on an annual basis. This increase is consistent with the moderation of property price increases seen through late 2015 into 2016. However, the national measure of property prices obscures divergent regional dynamics. Property prices in Dublin have risen at an average rate of 3.6 per cent through the first seven months of 2016, while property prices outside Dublin have increased by 9.2 per cent on average.

An important development with regard to residential property prices in Ireland is the release of a new residential property price index (RPPI) by the CSO. The new RPPI has been adjusted to include housing transactions involving cash buyers. Previously, the RPPI used data solely based on mortgage transactions. The new RPPI offers a significant methodological improvement as cash buyers have played a large role in the housing market in recent years, accounting for over 50 per cent of all transactions by some estimates.⁸ The new RPPI provides revisions back to 2005 and shows that house prices fell by more than previously estimated from their peak in 2007 to their trough in 2013. The new RPPI seems to indicate that cash buyers paid less than mortgage buyers from 2010 to 2016 although it should be noted this difference is observed for property prices outside Dublin; the new RPPI shows minimal change for prices in Dublin.

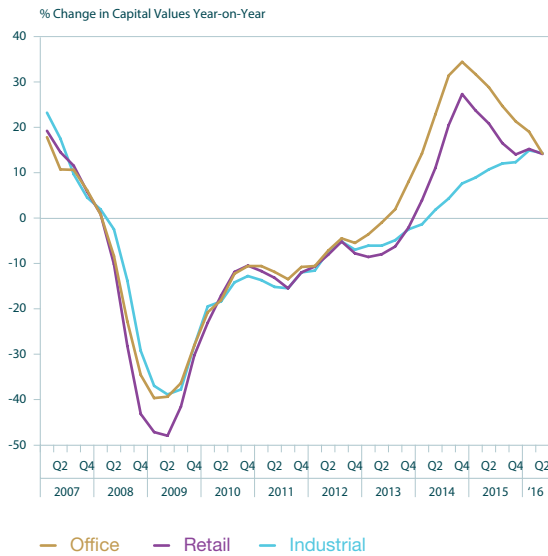
Chart 7: Residential Property Price Indices

Source: CSO.

The latest Residential Tenancies Board data for Q2 2016 shows that rents increased nationally by 9.9 per cent on an annual basis. The strength in the recovery of the Dublin rental market in recent years means that rents in the second quarter were 3.9 per cent higher than their previous 2007 peak. Further rent increases seem likely in the short term given existing supply constraints combined with strong demand for housing.

⁸ See Article: "Estimating Cash Buyers and Transaction Volumes in the Residential Property Sector in Ireland, 2000-2014," by Dermot Coates, Joe McNeill and Brendan Williams, in the Central Bank of Ireland *Quarterly Bulletin* No. 3, 2016.

Chart 8: MSCI/IPD Irish Commercial Property Index



Source: MSCI/IPD.

On the supply side, 6,642 houses were completed in the first half of 2016. This represents an 18.1 per cent increase on the same period in 2015. Planning permissions were granted for 3,141 houses/apartments in the second quarter of 2016; a 1 per cent increase year-on-year. For the first half of the year, planning permissions were granted for 6,232 houses/apartments, which represents a 1.4 per cent decrease in comparison to the same period for 2015.

Commercial Property

The latest data from the MSCI/IPD show that commercial property prices continued to grow at a robust pace in the first quarter of 2016. On an annual basis growth was strong across all sectors with the office, retail and industrial sectors recording increases of similar magnitude. Overall commercial property prices expanded by 14 per cent. The Bank’s latest Macro Financial Review (June 2016) conducts a more detailed analysis of recent developments in the commercial property sector.

Competitiveness

The euro/sterling exchange rate has been strongly affected in recent months by the Brexit referendum. In the weeks following the referendum, the euro appreciated by over 10 per cent against the pound. The euro has appreciated to a much smaller degree relative to the US dollar in 2016 - by early September, the euro had appreciated by 1.5 per cent in the year.

The latest Harmonised Competitiveness Index (HCI) data for August 2016 show that the nominal HCI increased by 2.7 per cent on an annual basis. In real terms, the HCI increased by 2 per cent when deflated with consumer prices and 0.7 per cent when deflated with producer prices. These increases point to some loss of competitiveness and the nominal HCI is now trading above its long term average. However, the real HCIs are still trading at relatively low levels in comparison to recent years.

The Public Finances

Overview

The latest fiscal developments have continued to be broadly positive. The latest set of Government Finance Statistics reveal that the general government deficit declined in nominal terms once again in the first quarter of the year, while Exchequer returns data point to robust tax growth and only modest increases in spending more recently. Reflecting these developments, it is very likely that the 2016 general government balance will improve further from the 1.8 per cent of GDP deficit recorded last year, with the debt ratio also continuing on its downward trend.

Government Finance Statistics

First quarter Government Finance Statistics show a decline in the general government deficit ratio at the start of the year. The deficit ratio declined to 2.3 per cent of GDP from

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

	Jan-Aug 2016	Jan-Aug 2015	Annual Change	Outturn vs Profile
	€m	€m	(%)	(%)
Revenue	38,026	36,698	3.6	1.9
– Tax revenue	29,046	27,344	6.2	1.6
– Appropriations-in-aid	7,234	7,066	2.4	0.4
– Other Revenue	1,746	2,288	-23.7	16.3
Expenditure	40,765	40,419	0.9	-1.0
– Current Primary Expenditure	34,484	34,287	0.6	-0.7
– Capital Expenditure	1,787	1,609	11.1	-2.4
– Interest on National Debt	4,494	4,524	-0.7	-2.3
Exchequer Balance	-2,739	-3,721	26.4	29.0

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.

3.8 per cent one year earlier, supported by a solid increase in tax revenues and lower net capital investment. The general government gross debt ratio also declined, from 97.1 per cent of GDP in the first quarter of 2015 to stand at 80.4 per cent of GDP in the first three months of this year. This decrease was largely driven by developments in the denominator. Similar factors resulted in a fall in the general government net debt ratio to 67.1 per cent.

Exchequer Returns⁹

Exchequer data is currently available for the first eight months of the year. Tax revenues continued to grow at a strong pace up to end-August, while expenditure was marginally higher, with the overall outturn notably better than that recorded in the same period last year (see Table 7). The Exchequer Balance, excluding transactions with no general government impact, is also significantly ahead of profile so far this year, largely due to stronger than expected revenue growth.

Exchequer tax revenue grew by 6.2 per cent on an annual basis in the year to August, with strong gains across virtually all tax categories. Income taxes were up 4.2 per cent year-on-year, as the ongoing recovery in the labour market continues. Meanwhile, the remaining

'big four' tax heads – VAT, excise duties and corporation tax – were up by 3.9 per cent, 19.4 per cent and 5.8 per cent, respectively, relative to the same period in 2015. Corporation tax continues to perform well ahead of expectations, with the outturn more than €500 million above profile in the first eight months of the year. This over-performance has more than offset the below profile returns for VAT and income tax up to end-August. Total tax revenues remain above profile in cumulative terms in the first eight months of the year, despite coming in below target on a monthly basis. Non-tax revenues were lower in year-on-year terms, although this was mostly anticipated and primarily reflects lower dividends and Central Bank surplus income.

On the expenditure side, developments in capital spending and current primary spending drove the overall modest increase in total spending. There were broad based savings across almost all departments which came in below profile in the year to August, although these were partly offset by developments in Health, where current spending was 2.9 per cent higher than budgeted and 4.5 per cent higher than the same period last year. Smaller EU Budget contributions in the first eight months of the year continued to help to contain spending. Capital expenditure

⁹ The figures in this section exclude transactions with no general government impact, giving a closer approximation to the General Government balance. These figures are provided by the Department of Finance in its Analytical Exchequer Statement.

increased significantly in annual terms, primarily reflecting developments in Transport and Education. Meanwhile, interest spending was down 0.7 per cent year-on-year. Overall, total spending was 1.0 per cent below profile in the year to end-August.

Funding and Other Developments

The National Treasury Management Agency (NTMA) raised a further €1.0 billion through bond sales in the third quarter of this year, with auctions continuing to be oversubscribed. This brought the total raised to date in 2016 to €6.6 billion, and as a result the NTMA is comfortably on target to achieve its range of €6-10 billion for the year as a whole. The funding requirement for Ireland is comparatively light this year compared to the €13 billion raised in 2015, due to the smaller general government deficit expected and the next bond redemption not occurring until October 2017. The NTMA cancelled a further €500 million in outstanding bonds linked to the liquidation of IBRC during the third quarter of this year. Ireland remains in the A ratings category with all major credit rating agencies, with a stable or positive outlook.

An Timpeallacht Gheilleagrach

Tugann raon leathan táscairí maidir le caiteachas agus gníomhaíocht intíre le fios go leanann gníomhaíocht eacnamaíoch na hÉireann de bheith ag leathnú ar luas rathúil cé go bhfuil cuid den fhuinneamh imithe as an bhforás sa chéad leath den bhliain. Tá sé casta neart an gheilleagair a mheas mar gheall ar na héiginnteachtaí a bhaineann le OTI agus OTN mar thomhais iontaoifa ar ioncam agus ar tháirgeacht intíre. Ar a shon sin, tugann formhór leathan na sonraí sa chéad leath den bhliain le tuiscint go bhfuil lagú áirithe tagtha ar an ngníomhaíocht sheachtrach, agus go bhfuil an fás ar an éileamh intíre maolaithe freisin. Tríd is tríd, meastar go dtiocfaidh moilliú neamhthoirtéiseach ar an bhfás i mbliana i gcoibhneas leis na hionchais roimhe seo. Ag féachaint romhainn, meastar go dtiocfaidh maolú breise ar an bhfás in 2017. Beidh tosca intíre taobh thiar d'fhormhór an fháis thar thréimhse na réamhaisnéise, agus eascróidh aon rioscaí don ionchas as tosca seachtracha.

I bhfianaise na bhfadhbanna a bhaineann le ciall a bhaint as príomhthomhais na gCuntas Náisiúnta, is gá breathnú ar tháscairí níos iontaoifa caiteachais agus gníomhaíochta, seachas breathnú díreach ar fhigiúirí príomha OTI agus OTN, chun tomhas níos beaichte a fháil ar an leibhéal gníomhaíochta sa gheilleagar intíre. Tugann na táscairí seo le tuiscint go bhfuil moilliú éigin tagtha ar an ngníomhaíocht eacnamaíoch, cé go leanann sí de bheith ag leathnú ar luas sách rathúil. Tá na comharthaí i ndáil le caiteachas tomhaltóirí measctha ach tugann trom na fianaise ó raon táscairí le fios nach bhfuil ach moilliú an-bheag tagtha air agus go bhfuil méaduithe láidre ar fhostaíocht agus ar thuilleamh ag tacú le caiteachas tomhaltóirí. Ó thaobh na hinfeistíochta de, cé go bhfuil méadú tagtha ar an gcomhiomlán foriomlán, bhí sé seo á spreagadh don chuid is mó ag an méadú láidir ar infheistíocht i sócmhainní doláimhsithe, mar aon le maolú áirithe ar na gnéithe intíre. De thoradh na bhforbairtí seo, tháinig maolú ar an bhfás ar an mbunéileamh intíre sa chéad leath de 2016, lena n-eisiatar infheistíocht i sócmhainní doláimhsithe agus in aerárthaí. Cé go bhfuil maolú áirithe ag teacht ar luas an fháis ar an taobh intíre den gheilleagar, is cosúil go bhfuil an moilliú sin neamhthoirtéiseach i gcónaí.

I dteannta leis na héiginnteachtaí atá ann in éagmais tomhais chomhaontaithe, shuntasaigh ar ghníomhaíocht eacnamaíoch na hÉireann, tá sé níos casta fós an t-ionchas don gheilleagar a mheas mar gheall ar na héifeachtaí

díobhálacha a d'fhéadfadh a bheadh ag Brexit ar Éirinn. I bhfianaise an dlúthghaoil idir geilleagar na hÉireann agus geilleagar na RA, d'fhéadfadh moilliú ar fhás na RA agus lagú steirling in aghaidh an euro difear díobhálach a dhéanamh do na hearnálacha sin a bhíonn ag brath go mór ar onnmhairí chuig an RA.

Rinne an Banc athbhreithniú ar a réamhaisnéis fáis do gheilleagar na hÉireann do na blianta 2016 agus 2017 ina Fhaisnéis Ráithiúil dheireanach chun na hábhair imní sin a léiriú. Idir an dá linn, tá measúnú níos dóchasáil tagtha in áit na himní tosaigh a bhain le Brexit, i bhfianaise sonraí eacnamaíochta níos dearfaí sa RA agus i bhfianaise na timpeallachta beartais réidh. Cé go mbreithnítear uaidh seo nach mbeadh sé iomchuí, ag an bpointe seo, coigeartú diúltach breise a dhéanamh ar na réamhaisnéisí de thoradh Brexit, d'fhéadfadh éifeachtaí díobhálacha maicreacnamaíochta, airgeadais agus margaidh airgeadra teacht chun cinn go tapa athuair. Sna himthosca sin, is léir go mbaineann rioscaí ar an taobh thíos leis na réamhaisnéisí is deireanaí (féach Bosca B, leathanach 15).

Ag féachaint romhainn, beidh an t-éileamh intíre taobh thiar d'fhormhór an fháis i mbliana. Tá an t-ionchas don fhás ar thomhaltas agus ar chaiteachas infheistíochta láidir i gcónaí, cé go meastar go maolóidh rátaí fáis thar thréimhse na réamhaisnéise. Tháinig fás 5.0 faoin gcéad nach mór ar an mbunéileamh intíre in 2015 fad a mheastar go dtiocfaidh fás 4 faoin gcéad nach mór air i mbliana agus moilleoidh an fás

sin go dtí 2.7 faoin gcéad in 2017. Léiríonn an moilliú measta do 2017 díchoradh roinnt de na tosca dearfacha a chuir leis an méadú ar ioncam indiúscartha i mbliana, mar aon le roinnt de na héifeachtaí díobhálacha ó Brexit. Ar an taobh seachtrach, baineann éiginnteacht shuntasach maidir leis an ionchas d'onnmhairí, i bhfianaise na luaineachta a bhaineann leis na sonraí is déanaí agus i bhfianaise éifeachtaí ionchasacha Brexit. Faoi réir na *caveats* seo, meastar go maolóidh an fás ar onnmhairí thar thréimhse na réamhaisnéise.

Ag féachaint do na forbairtí agus na hionchais ó foilsíodh an Fhaisnéis Ráithiúil dheireanach, meastar sa réamhaisnéis is deireanaí go mbeidh an fás ar OTI beagán níos ísle in 2016 agus go mbeidh sé gan athrú in 2017, i gcomparáid leis na réamh-mheastacháin roimhe seo. Meastar anois go mbeidh fás 4.5 faoin gcéad ar OTI in 2016, is é sin le rá 0.4 faoin gcéad níos ísle ná an réamh-mheastachán roimhe seo, rud a léiríonn an cion seachtrach níos ísle. Meastar go moilleoidh fás OTI go dtí 3.6 faoin gcéad in 2017, rud a léiríonn an coigeartú diúltach gan athrú arna chuimsiú san Fhaisnéis Ráithiúil dheireanach i ndáil le Brexit. Is léir gur rioscaí ar an taobh thíos iad na rioscaí do na réamh-mheastacháin seo, rud a léiríonn an fhéidearthacht go bhféadfadh tionchar níos dochraí a bheith ag Brexit ar gheilleagar na RA ná mar a mheastar faoi láthair, go bhféadfadh éifeacht iarmhartach níos mó a bheith aige ar an ngeilleagar idirnáisiúnta níos leithne nó go bhféadfadh éifeachtaí níos diúltaí a bheith aige ar an muinín intíre agus ar mhargadh an tsaothair ná mar a cuireadh san áireamh sna réamhaisnéisí seo.

I bhfianaise na rioscaí seo, ba cheart go ndéanfaí beartais a dhíriú ar bhonn taca a chur faoi chobhsaíocht agus ar éiginnteacht a laghdú. Tá Éire neamhchosanta mar gheall ar iarmhairtí na n-ardleibhéal fiachais san earnáil phoiblí agus san earnáil phríobháideach, mar gheall ar leochaileacht geilleagar beag oscailte i leith turraingí idirnáisiúnta agus mar gheall ar leochaileachtaí a bhaineann le Brexit. Sa cháil sin, tá straitéis fhioscach stuama riachtanach i bhfianaise na lúb aisfhotha idir cobhsaíocht fhioscach, cobhsaíocht airgeadais agus cobhsaíocht mhaicreacnamaíoch. Chun bonn taca a chur faoi straitéis den sórt sin, bheadh sé inmhianaithe spriocanna fadtéarmacha a bhunú, ar spriocanna iad a bheadh ag freagairt go cuí do neamhchosaintí na hÉireann

ar riosca, a bheadh stóinsithe ó thaobh saincheisteanna staidrimh agus lena bhféadfaí cinntí bliantúla buiséadacha a dhaingniú. Dá mhéad an tiomantas do ghnóthú na spriocanna sin is ea is fearr a fhéadfar beartas fhioscach solúbtha, fritimthriallach a chur ar bun chun freagairt do thurraingí sealadacha.

De thoradh luaineacht thomhais phríomha na gCuntas Náisiúnta, leagtar béim ar an tábhacht a bhaineann le hidirdhealú a dhéanamh idir tionchair shealadacha agus tionchair bhuana ar chonairí ioncaim agus caiteachais sa toadhcháil. Cé go bhfuil sé níos deacra an bhunchonair d'ioncam cánach a ríomh mar gheall ar na héiginnteachtaí a bhaineann le fás eacnamaíoch a thomhas, bheadh sé stuama glacadh leis go bhfuil codán éigin den bhorradh a chonacthas le déanaí faoin ioncam cánach corparáide sealadach.

Financing Developments in the Irish Economy

Overview

Financing conditions have seen a continued improvement over the course of 2016, reflecting the ECB's current accommodative monetary policy and an ongoing recovery in the Irish economy. The improved macroeconomic environment has led to a rise in the net wealth position of households, alongside growth in disposable incomes. These developments, coupled with a reduced repayments burden on households following interest rate declines and continued deleveraging has resulted in the lowest debt to disposable income ratio in over 10 years. Although the favourable financing conditions have been slow to translate into positive net borrowing by the Irish private sector, gross new lending increased further over 2016, with €2.5 billion advanced in new mortgages and €2.1 billion in small-to-medium enterprise (SME) loans. Nevertheless, the Irish private sector remains highly indebted compared to its European counterparts, and although declining, Irish borrowing costs are considerably higher. Additionally, longer term mortgage arrears cases, while falling slightly in recent quarters, remain elevated.

The Irish banking sector has seen improved conditions with widening margins between loan and deposit rates, coupled with continued strong private sector deposit inflows. Irish deposit inflows remained robust over 2016, despite the low interest rate environment, with credit institutions holding more in household deposits than in household loans. Debt securities financing for the banking sector decreased on aggregate, and reliance on borrowing from the Eurosystem fell further over the period. In terms of the non-bank financial sector, strong inflows and positive revaluations in Q2 2016 reversed the Q1 2016 trend in net asset value positions for both investment funds (IFs) and money market funds (MMFs). Positive revaluations in equity holdings of IFs were reported in Q2 despite global equity and currency market fluctuations after the Brexit vote.

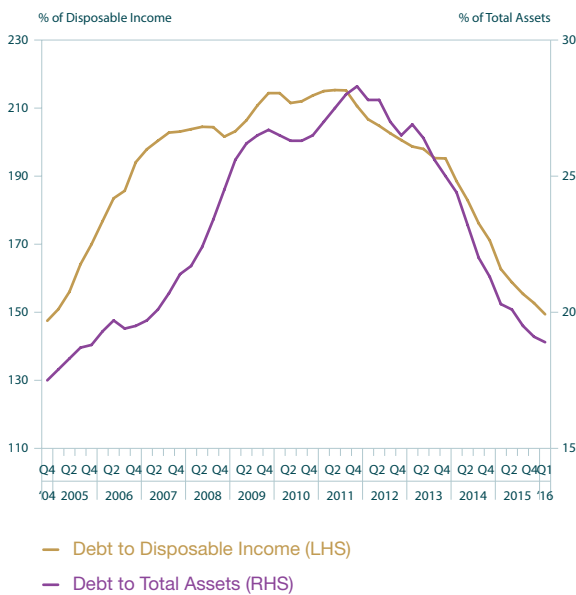
Household Sector

The ongoing recovery in the domestic economy, buoyed by improvements in employment and earnings, has seen further declines in household debt levels. At end-Q1 2016, Irish household debt stood at €148.5 billion, or €31,216 per capita, representing the lowest level in over 10 years. The most recent data indicates a 27 per cent fall in debt levels since its peak in Q3 2008. In addition, declining debt levels have been coupled with strong

growth in disposable incomes, accelerating the improvement in the debt to disposable income ratio. The ratio declined 3.3 basis points over Q1 2016, to 149.4 per cent; its lowest level since late 2004 (Chart 1).

Household net worth, calculated as the sum of housing and net financial assets, increased by €2.1 billion, to €628.7 billion, or €132,141 per capita, at end-Q1 2016. Rising property values were the main contributor to the improvement in net worth, with declines in

Chart 1: Household Debt Sustainability



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

household liabilities also recorded. Household investment in financial assets amounted to €1.7 billion over the first quarter of 2016, compared to €1.9 billion in the previous quarter. This primarily reflected valuation declines in insurance technical reserves. See Box A for an exploration of household financial assets across Europe. Conversely, holdings of deposits and currency increased over the same period. Household deposits continued to record strong annual growth, notwithstanding the current low interest rates on offer. Deposits held with banks are mainly in current and short-term demand accounts, while Q1 2016 saw increases in government deposits held by households.

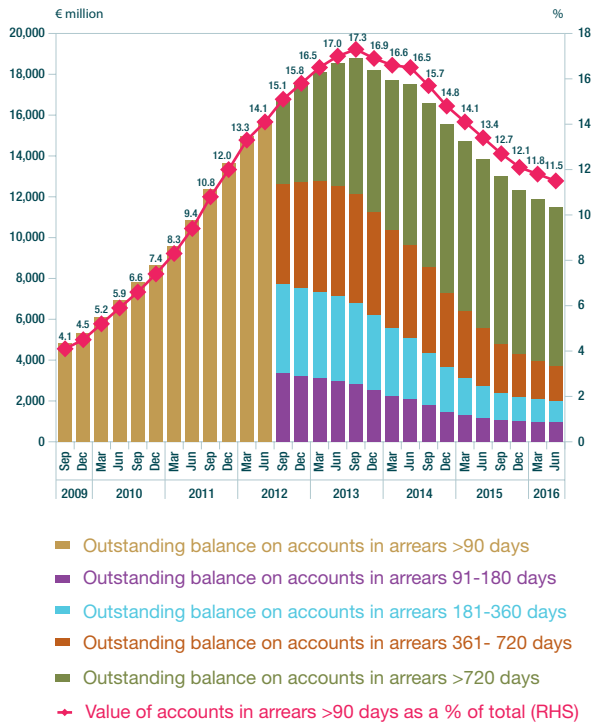
Despite overall improvements in the levels of net worth and indebtedness, Irish household debt levels remain high relative to other EU countries. This exposes Irish households to adverse movements in asset prices, incomes and a shift away from the current

accommodative monetary policy environment, particularly for mortgage holders. Currently, 40 per cent of the outstanding mortgage book serviced by Irish resident banks relates to standard variable rate (SVR) and short-term fixed rate mortgages. A further 50 per cent are tracker mortgages, with current average rates of just 1.02 per cent on outstanding debt. While tracker rates are no longer available for new mortgages, and therefore constitute a declining share of mortgage credit, these mortgage types follow ECB policy rates; and households debt servicing capacity are affected by changes to official policy rates.

The current monetary policy stance of low interest rates coupled with an improving economic and indebtedness outlook, have been slow to translate into positive net bank lending. Nevertheless, there has been encouraging developments over the last quarter. Irish interest rates on new mortgages, albeit the highest in the euro area, have declined consistently in recent months and stood at 3.49 per cent in July 2016. Similarly, new mortgage agreements have seen consecutive monthly increases since the beginning of 2016, and amounted to €2.5 billion in the seven months since the beginning of 2016. In contrast to outstanding mortgage debt, over one-third of new mortgages were agreed at fixed rates in July, with an average interest rate of 3.55 per cent, 9 basis points higher than new variable rate agreements. The volume of loans where borrowers renegotiate with their lender has remained stable over the year, and reached €2.7 billion over the year to end-July, signifying improved repayment terms and conditions for many households. Overall, however, annual mortgage lending declined by 1.9 per cent in July, as borrowers repaid €1.5 billion more than was advanced in new lending. Net repayments mainly related to tracker and variable rate mortgages, with fixed rate mortgages recording positive net lending.

In line with increases in macroeconomic indicators such as consumer spending and retail sales, Irish households drew-down €323 million more in new loans for consumer

Chart 2: PDH Accounts in Arrears over 90 Days



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

purposes than they repaid, in the seven months to end-July 2016. This may reflect the impact of improved euro area borrowing

conditions on the demand for consumer durables, which tend to be more 'interest-sensitive' domestic demand components of consumer durables.¹ The increased lending in July translates into the highest annual growth rate since early-2009, at 2 per cent. The positive trend was primarily owing to medium-term loans, typically reflecting car purchases. Box B further analyses recent developments in consumer credit. The cost of borrowing for consumer purposes fell 46 basis points over the year to an average rate of 8.16 per cent in July.

Declining debt levels are also reflected in the latest mortgage arrears statistics. The number of mortgage accounts for principal dwelling houses (PDH) in arrears continued to fall in the second quarter of 2016, marking the 12th consecutive quarter of decline. The decline in arrears continues in the over 720 days category, which recorded its fourth quarter of consecutive decline in Q2 2016 (Chart 2). An increasing number of mortgages in long-term arrears are now held by non-bank entities, comprising retail credit firms and unregulated loan owners. Within non-bank entities, 38 per cent of PDH accounts held by unregulated loan owners are in arrears of over 720 days, compared to 19 per cent of accounts held by retail credit firms.

Box A: Household Financial Assets across Europe: Boom, Bust and Recovery

By Kenneth Devine²

The financial crisis has had a significant impact on the wealth of households across the European Union (EU). The value of household assets fluctuated due to a period of growth, followed by an economic recession, and a subsequent recovery. This Box will examine the size and composition of household financial assets across 12 EU countries, to analyse developments that have taken place prior to the financial crisis, after the crisis began, and in the most recent quarter.

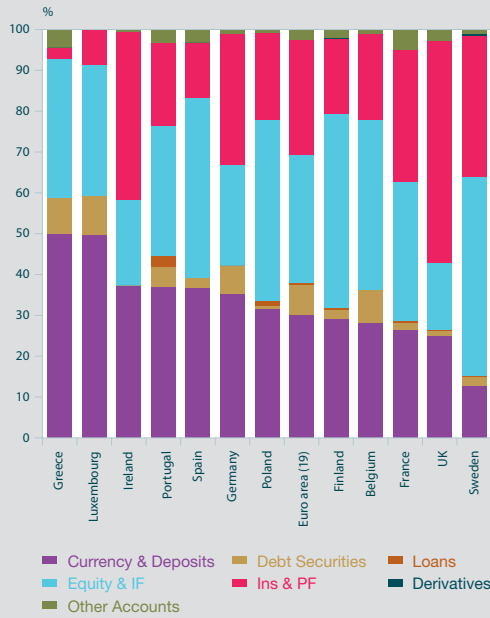
The value of aggregate EU household financial assets reached a historical peak in Q2 2007. Significant differences existed across countries in the size and the composition of households' financial asset portfolios (Box A, Chart 1) as previously detailed by Cussen, O'Leary and Smith (2012)³. Nonetheless, currency and deposits, equity and investment funds, and insurance and pension funds represented the three largest household financial assets in each country.

² The author is a Research Assistant in the Statistics Division of the Central Bank of Ireland.

³ Cussen, Mary, Brídín O'Leary, and Donal Smith. "The impact of the financial turmoil on households: a cross country comparison." Quarterly Bulletin 2 (2012): 12.

Box A: Household Financial Assets across Europe: Boom, Bust and Recovery
By Kenneth Devine

Box A Chart 1: Financial Assets Percentage Composition at Q2 2007



Source: Eurostat.

Box A Chart 2: Relative Per Capita Contributions of Transactions and Valuation Changes from Q2 2007 - Q1 2009



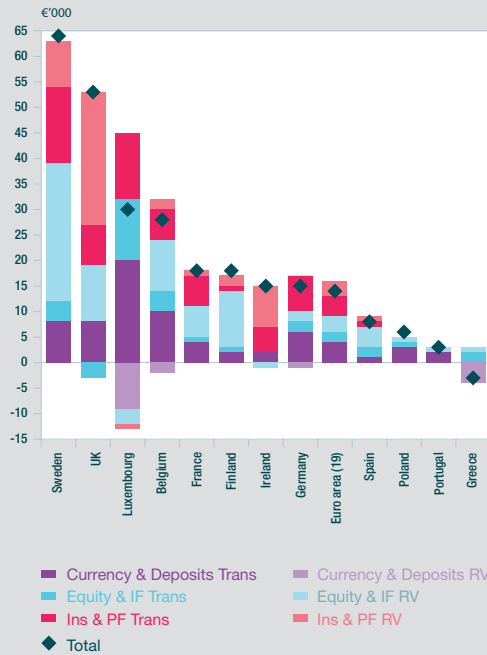
Source: Eurostat.

The onset of the financial crisis saw both the value and composition of households' financial assets change significantly. This was the case not only in countries severely impacted by the financial turmoil, but also in countries that had significant balance sheet exposure, either directly in equity or indirectly via pension funds or investment funds. Changes in the household balance sheet can come about due to transactions (e.g. new savings or spending) or changes in the valuation of assets. Box A, Chart 2⁴ decomposes the change in the three largest household financial assets between the peak in Q2 2007 and the trough in Q1 2009, into these two components. Valuation changes were the primary driver of the decline in the household balance sheet during this period as equity, investment fund and insurance and pension fund values declined, due to the turmoil in global markets. In monetary terms, households in the UK, Sweden and Ireland were the worst affected by these falls. The impact in the UK largely reflected their substantial holdings in insurance and pension funds, associated with their funded private pension sector (Blake 2002)⁵. Equity and investment funds were responsible for the decline in Sweden, with a high level of household equity holdings attributable to their tax structure on equity and the wide availability of mutual fund products (Calvet, Campbell and Sodini 2007)⁶. While all revaluations over the period were negative, transaction flows into currency and deposits across Europe remained positive, as households prioritised the security of their assets.

4 The terms Trans and RV refer to transactions and valuation changes, respectively.
 5 Blake, David. "The UK pension system: Key issues." *Pensions: An International Journal* 8, no. 4 (2003): 330-375.
 6 Calvet, Laurent E., John Y. Campbell, and Paolo Sodini. 2007. "Down or out: assessing the welfare costs of household investment mistakes." *Journal of Political Economy* 115(5): 707-747.

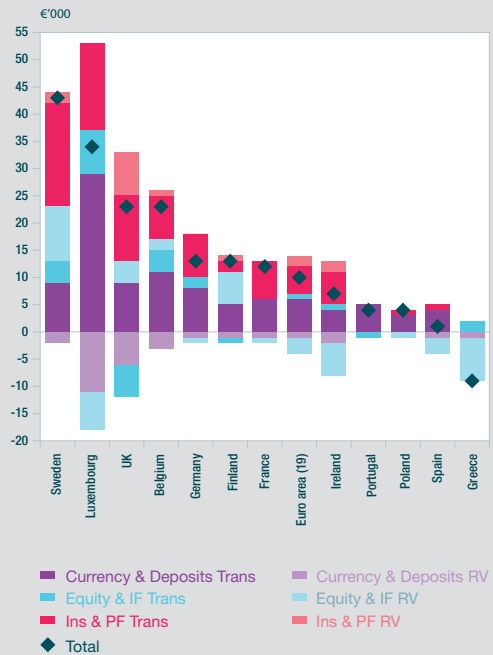
Box A: Household Financial Assets across Europe: Boom, Bust and Recovery
By Kenneth Devine

Box A Chart 3: Relative Per Capita Contributions of Transactions and Valuation Changes from Q1 2009 - Q1 2016



Source: Eurostat.

Box A Chart 4: Relative Per Capita Contributions of Transactions and Valuation Changes from Q2 2007 - Q1 2016



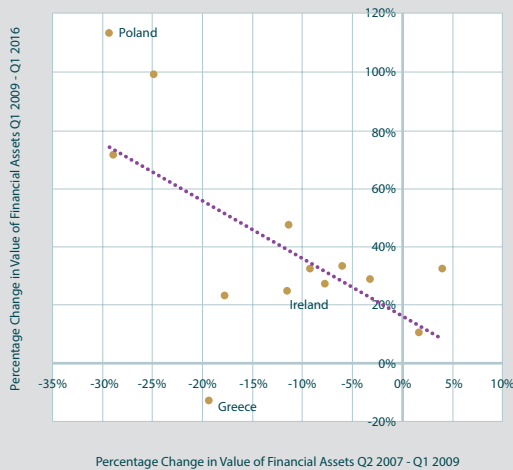
Source: Eurostat.

As the economic environment improved, household balance sheets began to recover back towards their pre-crisis financial asset positions. By Q1 2016, a series of positive valuation gains had occurred in both insurance and pension funds, and equity and investment funds (Box A, Chart 3). Due to their significant holdings in these instruments, Sweden and the UK were the prime beneficiaries of these revaluations. Unlike the previous period, transactions played a more sizeable role across the studied countries. Significant positive flows were evident over the three main asset categories as households opted to increase their holdings of both safe and more risky financial assets.

Despite the strong recovery in household balance sheets, residual effects of the recession are still evident for a number of countries (Box A, Chart 4). While the value of equity and investment funds held by Swedish and Finnish households have surpassed their Q2 2007 levels, the value of these assets have not fully recovered for households in some of the countries most severely impacted by the financial crisis. The revaluation gains in recent years in equity and investment funds held by Greek, Luxembourg and Irish households have not yet fully recovered the losses during the financial crisis. Box A, Chart 5 highlights the relationship between financial asset value movements over the first period, Q2 2007 – Q1 2009, and the second period, Q1 2009 – Q1 2016. Countries that experienced larger negative movements over the first period were more likely to have had significant positive movements in the second period.

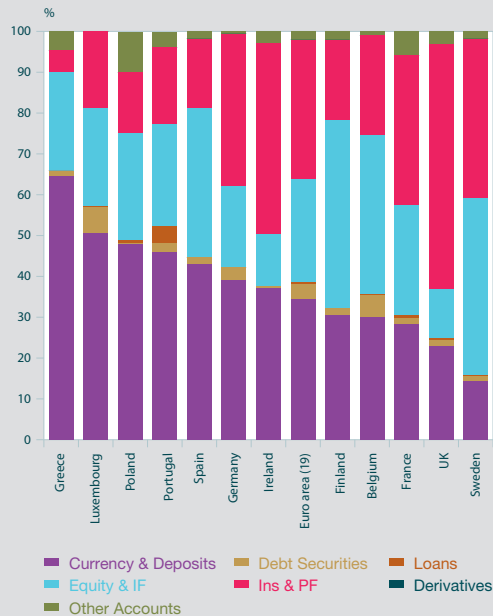
Box A: Household Financial Assets across Europe: Boom, Bust and Recovery

By Kenneth Devine

Box A Chart 5: Change in Household Financial Assets

● Q2 2007 -Q1 2009, Q1 2009 -Q1 2016
 ... Linear Q2 2007 -Q1 2009, Q1 2009 -Q1 2016

Source: Eurostat.

Box A Chart 6: Financial Assets Percentage Composition at Q1 2016

Source: Eurostat.

At Q1 2016, almost all nations held a higher share of their financial assets in currency and deposits (Box A, Chart 6) when compared with Q2 2007. A possible interpretation of this is that households have not yet felt the benefit of economic recovery to the point where they are willing to fully prioritise returns over the security of their assets. Greece was the only nation at this point in time to have financial asset holdings smaller than their pre-crisis Q2 2007 level. This follows a period of economic uncertainty in Greece and significant declines in Greek households' disposable income.

In conclusion, there are significant differences in the size and structure of household financial assets across Europe. Compositional differences can be affected by a number of factors, one of which is the structure of a country's financial system. Across the period Q2 2007 – Q1 2016, large movements, driven by transactions and valuation changes, took place as households' asset values were impacted by the financial turmoil and households adjusted to a pronounced economic cycle. Households in countries most impacted by the financial turmoil, as well as those who held much of their assets either directly or indirectly in equity, saw the biggest changes. Households in some countries have reverted back towards pre-crisis size and structure, while in other countries households now hold proportionately more of their assets in currency and deposits. Only Greek households' total financial assets have not reverted back to Q2 2007 levels.

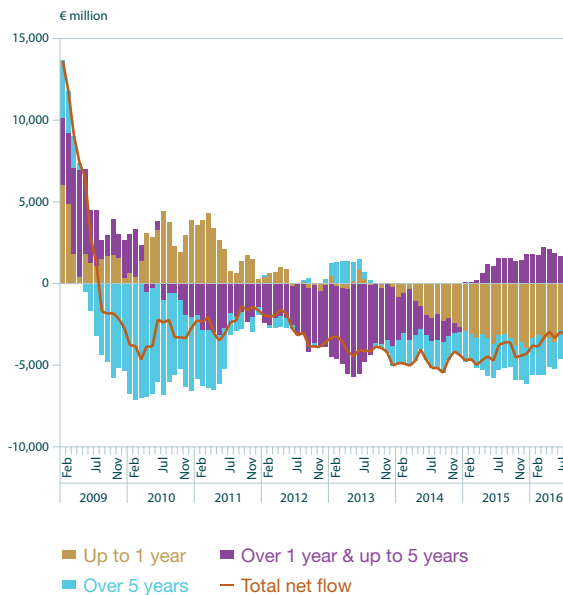
Non-Financial Corporation Sector

As noted in previous *Bulletins*, Ireland has a significant multinational corporation (MNC) presence. The recent revisions incorporated in the Central Statistics Office's internal investment position statistics, due largely to MNC activities, have particularly impacted

non-financial corporation (NFC) debt developments.⁷ Despite these substantial revisions, Irish NFC debt as a percentage of GDP continued to decline in Q1 2016, falling 10 basis points in the quarter and 70 basis points in the year to 257.3 per cent. This was due to an overall decline in NFC debt of €21.6 billion, along with an increase in

⁷ See *Quarterly Financial Accounts Release - Q1 2016*, and Box A: Recent Revision to the National Income and Expenditure Accounts, *Quarterly Bulletin July 2016*.

Chart 3: Loans to NFCs – Net Flows by Category of Original Maturity



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

annualised GDP. The decline in debt over the quarter mainly reflected valuation changes (€21 billion) due mostly to exchange rate movements, which were partially offset by net debt repayments. In comparison to other EU countries, Irish NFC debt was the second highest during the quarter. Luxembourg, which also has a lot of large MNCs relative to the size of its economy, had the highest debt to GDP ratio, at 349 per cent.

A fall in both foreign and domestic financing of NFCs contributed to the overall decline in NFC debt over the quarter. Holdings of loans by non-residents, which accounted for almost three quarters of NFC debt at end-Q1 2016, declined by €12 billion. As mentioned, this largely relates to MNCs activities, which have access to significant international funding sources and little interaction with the Irish banking system. Domestic financing of NFCs fell €10.4 billion to €168.1 billion in Q1 2016, mainly relating to loans held by other financial intermediaries (OFIs), which declined by €7.8

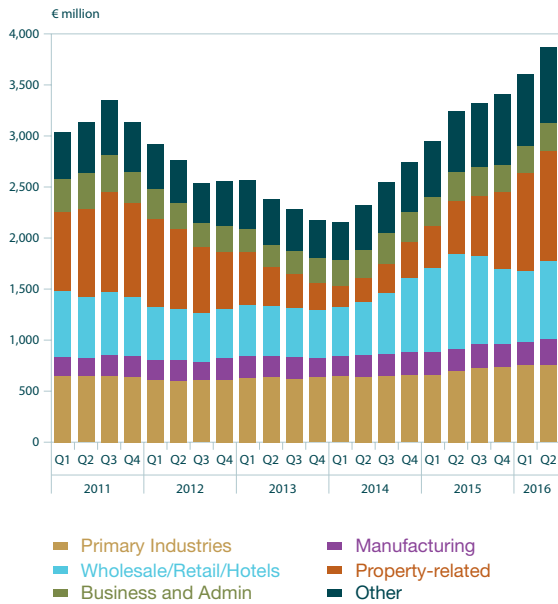
billion. The majority of OFI-held NFC loans are with financial vehicle corporations (FVCs). NFC loans held by Irish credit institutions continue to decline and accounted for only 7 per cent of all NFC loans at end-Q1 2016.

Direct investment by foreign-owned MNCs into their Irish operations decreased by €17 billion in the second quarter of 2016, reflecting primarily a decrease in other capital of €27.4 billion which was partially offset by increases in equity and reinvested earnings of €4.5 billion and €5.8 billion, respectively. Over the same period, direct investment income earned abroad by Irish-owned MNCs remained steady at €4.5 billion. Meanwhile, foreign direct investment (FDI) by Irish-owned MNCs abroad decreased by €2.8 billion in Q2 2016. FDI abroad by Irish resident companies and associated income flows predominantly reflect the operations of multinational NFCs who have established their corporate headquarters in Ireland.

In terms of bank lending to NFCs, there are many diverging trends masked within the overall annual decline of 6.4 per cent as per July 2016 data (Chart 3). At an aggregate level, loan repayments continue to outpace gross new lending as deleveraging by indigenous Irish firms, particularly SMEs, continues. However, there are contrasting developments in loan maturity terms being agreed, with a move away from overdrafts and shorter-term funding in favour of medium-term loans (1 to 5 years), which grew 11.4 per cent year-on-year in July. This may also reflect a move away from shorter-term working capital needs to credit for expansion purposes, which would indicate growing business confidence.⁸ Over the year to July 2016, NFCs drew-down €591 million more in new loans with an original maturity of between 1 and 5 years, than they repaid. Over the same period, €1.1 billion more was repaid than advanced in short-term loans of less than a year. Similarly, there were net repayments of €560 million for long-term loans of over 5 year's maturity. Diverging trends are also evident when looking at firms by size; quarterly data show that SMEs continue to deleverage at a quicker pace than larger

⁸ See SME Market Report and the Red C SME Credit Demand Survey for the Department of Finance.

Chart 4: Gross New Lending to SMEs by Sector (12 Month Moving Average)

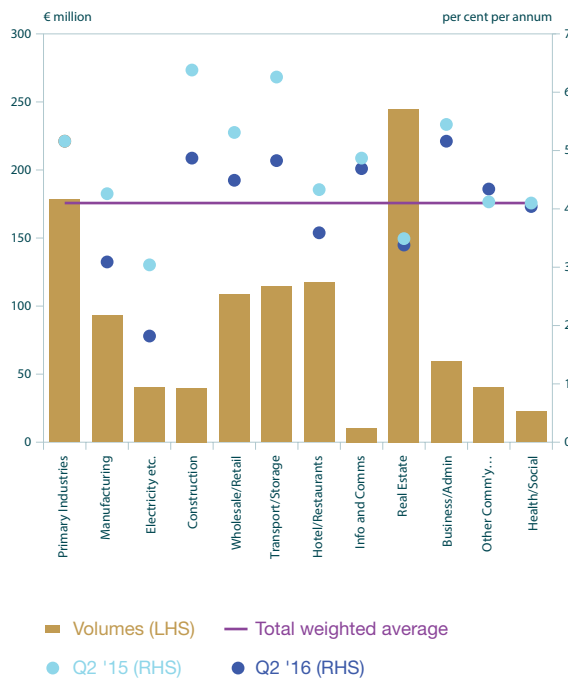


Source: Business Credit and Deposits Statistics, Central Bank of Ireland.

enterprises, and recorded an annual decline of 10.2 per cent in Q2 2016. Despite this decline, gross new lending to the SME sector reached its highest level since the series began in early 2010. In the six months to end-June, SMEs drew-down €2.1 billion in new non-financial credit, 28 per cent higher than the same period of 2015. SMEs engaged in the real-estate and agriculture sectors were the main drivers behind the increase over 2016 (Chart 4). However, in aggregate terms, the indebtedness of these SMEs continues to fall, with repayments outstripping new borrowing.

The cost of servicing NFC debt has remained broadly unchanged in recent years in Ireland. In the three years to July 2016, the average interest rate on outstanding NFC debt rose 11 basis points to 3.16 per cent, in contrast to the euro area, where the equivalent rate declined 88 basis points over the same period to stand at a lower rate of 2.42 per cent. The average cost of new NFC loans in July 2016 was also higher in Ireland compared to the euro area,

Chart 5: SME New Lending Interest Rates and Corresponding New Lending Drawdowns



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

with new loans attracting an average rate of 2.71 per cent, compared to 1.67 per cent, on average, in the euro area as a whole. However, the size and interest rate fixation of new loans strongly influences the agreed rate. Larger loans to NFCs of over €1 million, on a variable or short-term fixed rate attracted average rates of 2.20 per cent in July, while the equivalent figure for smaller loans was much higher at 4.65 per cent. As with mortgages, fixed NFC products generally attract a higher rate. While interest rates on new NFC loans have declined somewhat in recent years, rates on new SME drawdowns have declined significantly, albeit remaining high in comparison to NFC rates. The average interest rate on new non-financial SME loan draw-downs was 4.10 per cent in Q2 2016, 113 basis points lower than at end-2014, when the series began, and 61 basis points lower than twelve months ago. However, interest rates and the corresponding declines are quite heterogeneous across the various SME sectors (Chart 5).

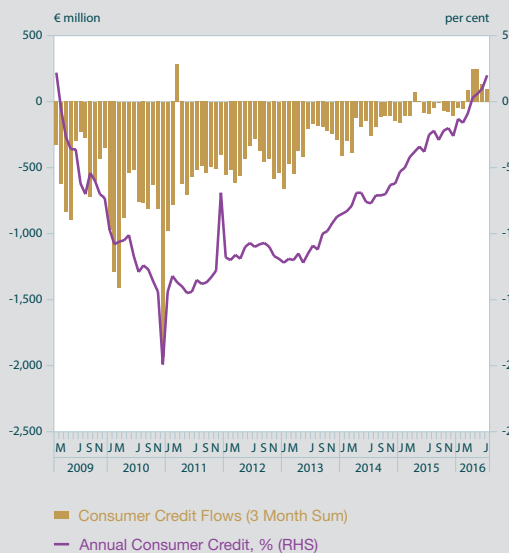
Box B: Developments in Consumer Credit – Evidence from Money and Banking Statistics

By Stephen Byrne & Ciaran Meehan⁹

Introduction

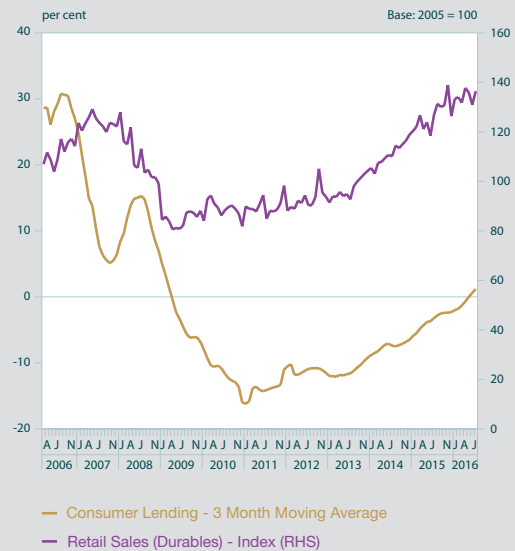
The financial crisis precipitated a marked drop in personal consumption expenditure (PCE) in Ireland. Between 2008 and 2012, PCE fell by 12 per cent. This reduction in spending was accompanied by sustained deleveraging by households as evidenced by the Central Bank of Ireland's *Credit, Money and Banking* statistics which showed that consumer credit extended by Irish resident credit institutions declined by 49 per cent between January 2009 and January 2016. While personal consumer expenditure in the National Accounts has been growing since 2012, this growth occurred alongside a continuing decline in credit outstanding as Irish households repair their balance sheets. Over the last four months however, the *Money and Banking* statistics have highlighted year-on-year growth in consumer credit for the first time since January 2009. This Box investigates these developments by linking them to recent growth in retail sales of consumer durables and by utilising the Central Bank's credit card statistics to assess the breakdown in spending.

Box B Chart 1: Consumer Credit - Developments in Net Flows, and Annual Rate of Change



Source: Table A.1, Money and Banking Statistics, Central Bank of Ireland.

Box B Chart 2: Retail Sales (Durables) and Consumer Credit – Annual Growth Rates



Source: Table A.1, Money and Banking Statistics, Central Bank of Ireland; CSO; and Authors' calculations.

Credit for Consumer Durables

In theory, individuals smooth their consumption over the life cycle by saving and borrowing. In reality, however, large falls in income accompanied by credit constraints during the financial crisis meant that there were large negative net flows of consumer credit (Box B, Chart 1) as households quickly deleveraged, repaying in excess of any new lending drawn down. Over the last four months however, there has been a return to growth in consumer credit, particularly with a medium term (over one and up to five year) maturity. The typical profile of lending in this category includes consumer durables such as cars, furniture, and large electrical goods.

Accordingly, we use a slightly modified version of the methodology in Clancy et al (2014)¹⁰ to construct a monthly series for spending on durable goods to help explain this return to growth in consumer lending. We categorise the subcomponents of the retail sales index into durables and non-durables. Then, using the volume changes in the retail sales indices for motor trades, furniture and lighting, and electrical goods we calculate an average growth rate for durables consumption for each year. These three categories match closely to items which reporting agents include in consumer credit. It is worth noting that motor trades represent the largest proportion of this measure of durables.

⁹ The authors are an Economist-Statistician and an Associate Data Specialist in the Statistics Division.

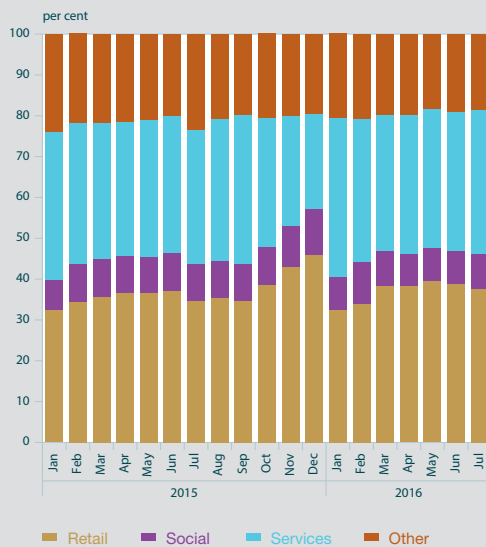
¹⁰ Clancy, D., Cussen, M. and Lydon, R., 2014. Housing Market Activity and Consumption: Macro and Micro Evidence. *Central Bank of Ireland Research Technical Paper*, 13.

Box B: Developments in Consumer Credit – Evidence from Money and Banking Statistics

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The annual growth rate of this index is presented alongside the annual growth rate of consumer credit in Box B, Chart 2. This simple exercise shows that as spending on durables declined in 2008, there was a concurrent sharp decline in consumer credit as households quickly began to deleverage. Further, as the sales of durables began to pick up in late 2012, the growth rate of consumer credit became steadily less negative during the period.

Box B Chart 3: Personal Credit Card Spending by Sectoral Contributions



Source: Table A.13, Money and Banking Statistics, Central Bank of Ireland.

We can further examine developments in consumer bank credit by using available data on credit cards. Credit cards represented approximately 20 per cent of outstanding consumer bank credit at end-July 2016. This is broadly unchanged over the past 12 months. Box B, Chart 3 shows that the majority of new credit card spending is related to the Retail and Services sectors, 37 per cent and 35 per cent respectively at end-July 2016. The proportion of new spending in the services sector has grown in recent months, 35 per cent of total new credit card expenditure in July 2016 compared with 33 per cent a year earlier. This increase in the proportion of new expenditure in the services sector can be attributable to an increase in spending on accommodation (Hotels etc.). New spending on accommodation in the first seven months of 2016 has increased by 5 per cent when compared with the same period in 2015.

To conclude, the pickup in consumer credit seen in the last four months of Money and Banking statistics mirror a pickup in spending on consumer durables like cars, furniture and electrical goods. The pickup in credit card spending is largely due to spending on services, in particular an increase in spending on accommodation.

Government

In line with previous months, financing conditions for the Irish Government continued to improve as bond yields remained on a downward trajectory. Yields on Irish Government 10-year bonds reached a record low of 0.34 per cent in August, with developments reflecting both domestic and external factors (Chart 6). The continuation of

the ECB's non-conventional monetary policy measures have depressed euro area sovereign yields generally, while ongoing volatility in equity markets has contributed to further downward pressure on Irish sovereign bond yields over the past year. Chart 6 shows how the NTMA recently availed of the low interest rate environment to raise funds and outlines how international developments have impacted on Irish bond yields over recent months.

Chart 6: Irish Government Ten-Year Bond Yields



Source: Thomson Reuters.

Financial Sector

The first seven months of 2016 have seen Irish resident credit institutions increase their private sector deposit holdings, with net inflows of almost €2 billion; two-thirds of which relates to non-euro area residents. While Irish households and NFCs continue to record strong annual deposit inflows, large outflows from Irish OFIs and insurance corporations and pension funds (ICPFs) mostly offset these increases. Irish residents' preference for overnight and short-term demand deposits continued, reflecting the current low interest rate environment, with households withdrawing from the agreed maturity products in favour of highly liquid overnight accounts. The liability position of resident credit institutions vis-à-vis the Eurosystem continued to fall, standing at €6.8 billion at the end of July, compared to €14.7 billion in July of the previous year. Irish credit institutions' have also benefitted from improving interest margins, with the spread between household loan and deposit rates averaging 368 basis points in the year to July 2016. This compares to 354 basis points one year earlier.

The net asset value of investment funds (IFs) resident in Ireland increased by 4.3 per cent (€61 billion) over Q2 2016, reaching €1,457 billion. This was driven by positive revaluations of €39 billion coupled with transactions of €22 billion. Over the quarter, IFs total assets experienced a positive revaluation of 3 per cent overall. Bond funds recorded a revaluation increase of 6.8 per cent, while hedge funds experienced a negative revaluation of 1.7 per cent and equity funds stayed broadly flat. Positive revaluations of €10.8 billion in equity holdings of IFs over Q2 2016 were reported, despite global equity and currency market fluctuations in the last days of the quarter, following the Brexit vote. Overall debt holdings experienced a 9 per cent increase over the quarter, driven by strong inflows of €33.5 billion. Holdings of government debt stood at €346 billion in Q2 2016, with €14 billion in inflows.

The net asset value of money market funds (MMFs) resident in Ireland increased by 6 per cent (€26 billion) to €460 billion in the second quarter of 2016, due to transaction inflows of €30 billion. Total debt securities held by MMFs in Q2 2016 amounted to €353 billion, a small increase from €344 billion reported in the previous quarter. This increase arose from transaction inflows of €12 billion over the quarter, which were somewhat offset by a negative revaluation effect. Equity liabilities of MMFs stood at €460 billion in Q2 2016. Equities issued by sterling denominated funds which accounted for around 45 per cent (€205 billion), experienced inflows of €8.6 billion over the quarter. MMFs rebalanced portfolios towards debt securities with shorter residual maturity in Q2 2016, partly reversing recent trends towards maturity extension.

Developments in the Euro Area Economy

Overview

The immediate impact of the recent vote by the UK to leave the EU (Brexit) appears to have been less disruptive than many anticipated. Much of the financial market turbulence was temporary and quickly reversed. The UK economy is expected to slow down in the second half of 2016 and into 2017, although the Bank of England has already provided additional stimulus. This, and the fact that the UK accounts for less than 10 per cent of euro area exports means that the immediate spillovers to euro area have been contained. Also, the ECB's latest projections for GDP growth and inflation are little changed from June. Nonetheless, longer term uncertainty over the outcome of Brexit negotiations represents the main downside risk to euro area activity. In particular, the current climate of uncertainty might lead to a postponement of investment by businesses.

Aside from the impact of Brexit, euro area growth continues to be supported by a combination of highly accommodative monetary policy, more supportive fiscal policy, and low energy prices. The latest sentiment and survey data for the third quarter suggest that activity has stabilised after a loss of momentum in the second quarter which coincided with a decline in domestic demand. Inflation and price pressures remain weak but continue to increase, albeit gradually. However, the ability of domestic demand to continue to support the euro area's recovery will be challenged if the decline in the unemployment rate starts to taper. Furthermore, geopolitical tensions and fragilities in emerging markets could weigh on growth, even if global trade picks up. Finally, the euro area's financial system remains fragile although credit conditions appear to have eased somewhat.

Section 1: Growth and Inflation

Euro Area Growth and Inflation Developments

The euro area's recovery slowed during the second quarter. GDP increased by 0.3 per cent quarter-on-quarter, compared with 0.5 per cent in the first quarter, the lowest quarterly growth rate in two years (See Chart 1). A more modest pace of growth was expected after first quarter GDP growth was boosted by a number of one-off factors but the slowdown in domestic demand in the second quarter is still notable. Having driven growth throughout

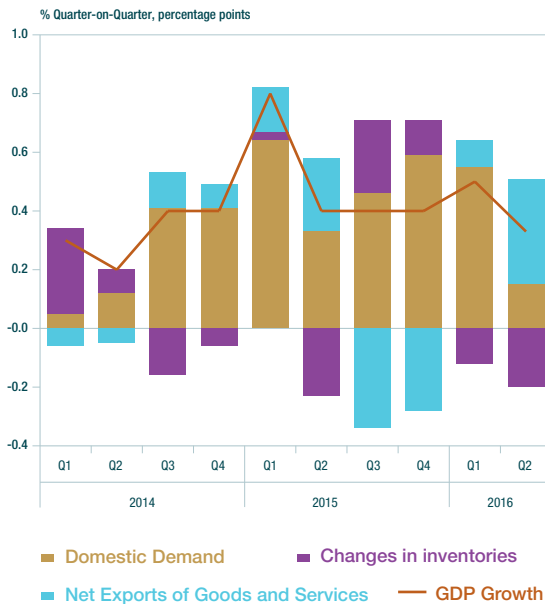
much of the recovery, private consumption dampened domestic demand in the second quarter. Indeed, without an unexpectedly large increase in net exports, growth would have been even lower.

While the unemployment rate has fallen 2 percentage points since its peak in 2012, in recent months, this decline has begun to taper. Since January 2016, unemployment has declined by just 0.3 percentage points, and it has remained unchanged at 10.1 per cent since May (See Chart 2). Moreover, wage pressures remain weak. Since the first quarter of 2015, annualised growth in negotiated

Table 1: Latest Forecasts of euro area Real GDP Growth and Inflation

	Date	2016		2017		2018	
		GDP	Inflation	GDP	Inflation	GDP	Inflation
ECB	Sept 2016	1.7%	0.2%	1.6%	1.6%	1.6%	1.6%
EU	May 2016	1.6%	0.2%	1.8%	1.4%	--	--
IMF	July 2016	1.6%	--	1.4%	--	--	--
OECD	Sept 2016	1.5%	--	1.4%	--	--	--

Sources: European Commission Spring Forecast 2016; ECB September 2016 Macroeconomic Projection Exercises; IMF World Economic Outlook Interim update, July 2016; OECD Interim Economic Outlook, September 2016.

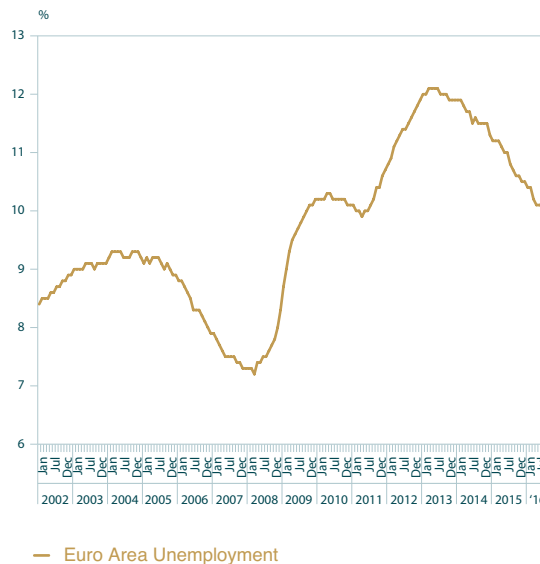
Chart 1: Contributions to Euro Area Real GDP Growth

Source: Eurostat.

Note: Domestic Demand is calculated as the sum of the contribution of (i) Final Consumption Expenditure of General Government (ii) Households and Non Profit Institutions of Serving Households Final Consumption Expenditure and (iii) Gross Fixed Capital Formation.

wages and in compensation per employee have averaged 1.5 per cent and 1.2 per cent, respectively. This implies that there continues to be slack in the labour market, even as the decline in the unemployment rate has slowed.

The slowdown in domestic demand growth and the low level of wage growth have contributed to ongoing muted consumer price pressures. According to Eurostat, HICP inflation was unchanged in August at 0.2 per

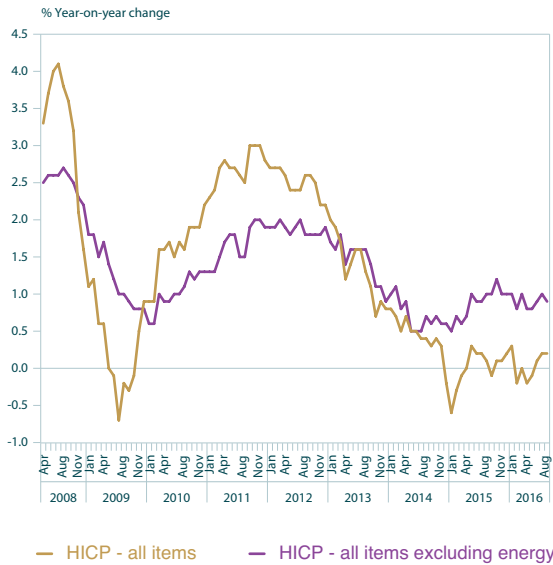
Chart 2: Euro Area Unemployment Rate

— Euro Area Unemployment

Source: Eurostat.

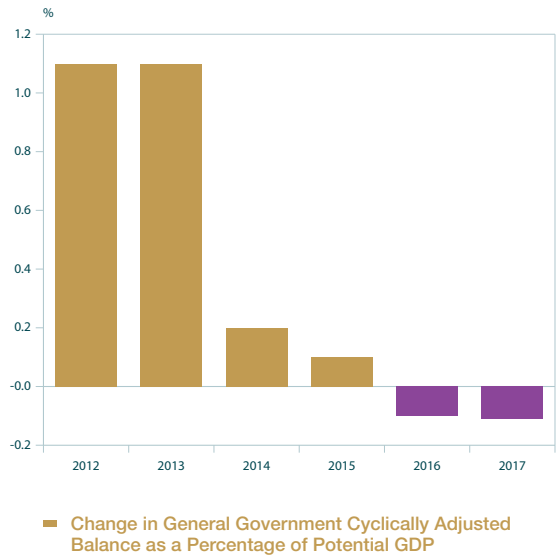
cent. Energy prices have generally acted as a drag on inflation in recent months, however HICP inflation excluding energy slowed to 0.9 per cent in August from 1.0 per cent in July (See Chart 3). Furthermore, producer price inflation slowed from 0.8 per cent month-on-month in June to 0.1 per cent in July, suggesting that any pass-through to consumer prices from this channel is likely to be limited.

Chart 3: Euro Area Inflation



Source: Eurostat.

Chart 4: Change in General Government Cyclically Adjusted Balance, as a Percentage of Potential GDP



Source: European Commission, AMECO.

Outlook for Growth and Inflation

Despite the slowdown in GDP growth in the second quarter, the latest sentiment data suggest that euro area activity stabilised in the third quarter. The European Commission’s Economic Sentiment Indicator decreased marginally to 103.5 in August from 104.5 in July although it remains in excess of its long run average of 100. At 52.9, the August composite PMI continued to indicate an expansion (denoted by a value in excess of 50), although it declined from 53.2 in July. Retail sales grew by 1.1 per cent in July, their strongest increase in almost two years.

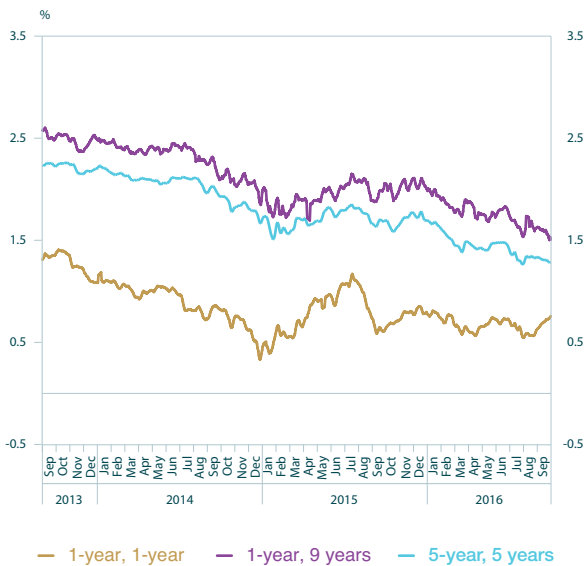
In addition, the European Commission anticipates that the euro area’s fiscal stance will become mildly expansionary during 2016 and will continue to be expansionary in 2017 (See Chart 4). This change is occurring because the requirement for fiscal tightening across most of the euro area has lessened, as countries

have exited Excessive Deficit Procedures (EDP). At present, only four countries – Greece, France, Spain, and Portugal – are still in EDP programmes¹.

Against this background, the ECB’s macroeconomic projections for September were broadly unchanged from June. GDP is still expected to grow by 1.7 per cent in 2016 before slowing marginally in 2017 to 1.6 per cent and continuing at this rate during 2018 (See Table 1). Underlying this forecast, the ECB anticipates that private consumption will pick-up after its poor performance in the second quarter, and stay resilient thereafter while the ongoing recovery in investment is expected to continue. In contrast, the forecast for euro area foreign demand has been revised down, largely driven by the weaker UK outlook. Turning to unemployment, both the European Commission and the ECB expect it to stabilise at just below 10 per cent in 2017.

¹ On 12 July, the European Council ruled that Spain and Portugal had failed to take effective action in response to the 2013 recommendations on the correction of their excessive deficits. Nonetheless, in August the council recommended that the fine both countries were to be liable for be cancelled and new fiscal adjustment paths were established for both countries. In Spain, the general government balance is now required to reach 2.2% of GDP by 2018. In Portugal, additional fiscal tightening of 0.25% of GDP this year is now considered sufficient to achieve a reduction in the headline deficit to 2.5% of GDP in 2016.

Chart 5: Market's Future Inflation Expectations Based on Implied Forward Inflation Swap Rates



Source: CBI staff calculations, data extracted from Bloomberg.

Note: The chart displays 5 days moving averages and the data extends up to the 9th September. "1 year, 1 year" refers to swap rates with a maturity of 1 year beginning in 1 year; "1 years, 9 years" refers to swap rates with a maturity of 1 year beginning in 9 years; and "5 years, 5 years" refers to swap rates with a maturity of 5 years beginning in 5 years.

In terms of inflation, the ECB still expects HICP to average 0.2 per cent in 2016 before rising to 1.2 per cent and 1.6 per cent in 2017 and 2018 respectively. The fading of the strong downward drag from past declines in oil prices will boost headline inflation in the beginning of 2017. Elsewhere, import price inflation is expected to turn positive in 2017 and wage growth is expected to pick up as labour market slack decreases.

The ECB's Survey of Professional Forecasters (SPF) published in July shows that inflation expectations for 2016 were unchanged at 0.3 per cent but were revised down marginally for both 2017 and 2018 to 1.2 per cent and 1.5 per cent respectively. Longer term inflation expectations (up to 2021) were unchanged at 1.8 per cent. Market-based expectations of short-term inflation (one-year in one-year ahead inflation swap rate) declined immediately

after the Brexit vote, but have since recovered. The one-year in nine-year forward inflation swap rate - the markets' expected inflation rate (plus risk premia) between 2025 and 2026 - declined further from 1.6% at the end of June to 1.54% in September. At the same time, the five-year in five-year forward inflation swap rate - the markets' expected inflation rate (plus risk premia) between 2021 and 2016 - was unchanged at 1.30% (See Chart 5).

Risks to the Outlook for the Euro Area

The main risks to the euro area's outlook include uncertainty as to when Article 50 - which sets out how an EU country might voluntarily leave the union - will be invoked by the British government, the arrangements that might be reached between the EU and the UK, and the fragile state of the euro area's financial system.

Although the Bank of England has moved to stabilise the UK economy in response to some of the short-term uncertainty, the new political and economic arrangements between the UK and EU will not be known for a number of years, leading to ongoing uncertainty in the euro area. One measure of uncertainty, the VIX index of equity market volatility, increased around the time of the referendum, although it remained well below the level reached in the immediate aftermath of the financial and sovereign debt crises. In contrast, the Index of Economic Policy Uncertainty, which captures broader economic uncertainty, has surpassed the levels reached at that time.

Despite no significant downward revision to euro area growth forecasts so far, were Brexit to prove more disruptive than currently anticipated, this could prove problematic for the outlook. For instance, it is anticipated that a slowdown in the UK economy in the second half of 2016 and 2017 will be led by a weakening in investment as businesses delay their expansion plans. The immediate effect of a slowdown in investment is likely to be a reduction in demand for intermediate goods and lower levels of job creation. Even

though the UK accounts for just 10 per cent of euro area exports, any further disruption to investment decisions will tend to act as a drag on euro area growth.

In this context, some sectors in the UK have been affected more than others. So far, the impact has fallen more heavily on the property, retail and construction sectors. However, there could be greater spillovers to the euro area were the effect to spread beyond these sectors, to the wider economy. In this regard, the financial sector is of particular interest. The financial linkages between the euro area and UK economies are strong, in part reflecting the importance of the City of London to financial services across the euro area. Any restriction on capital and financial flows between both economies could slow the euro area's recovery.

All risks related to Brexit are likely to play out gradually and may not materialise for a number of years. In addition, clear progress in any future negotiations could be followed by a rebound in UK investment reversing some of the drag in the euro area.

The impact of Brexit is not the only external risk weighing on the euro area's recovery. Elsewhere, a faster than expected pace of policy normalisation in the US²; a renewed slowdown in China as it attempts to re-balance activity away from investment; and a deterioration in the outlook for emerging markets; particularly Russia, would also weigh on euro area growth. Furthermore, ongoing geopolitical tensions that could prove disruptive to global oil supplies would also hamper the euro area's recovery.

Domestically, growth is expected to occur largely through improvements in domestic demand. While a number of factors feed into domestic demand, the tapering in the unemployment rate could delay the euro area's recovery. Even though the supportive stance

of fiscal policy during 2017 is likely to impart some boost to domestic demand, government indebtedness across the euro area economies remains high. Consequently, the scope for any fiscal stimulus is limited.

The publication of the EBA stress test results in July indicated fragility in banks' balance sheets and confirmed that the euro area's banking system continues to be characterised by low profitability and a high level of non-performing loans (NPLs). Combined with efforts to raise capital due to regulatory changes (see Box A for a discussion of one aspect of regulatory change), these high levels of NPLs are likely to impede lending to the real economy.

At the same time, the accommodative stance of monetary policy aims to counteract this effect and ensure a flow of credit. Indeed, recent data suggest that credit conditions have improved for enterprises and households. The responses to the July Bank Lending Survey indicated an easing of credit standards on new loans to enterprises and households during the second quarter of 2016 (See Chart 6) and this easing in credit standards was forecast to continue into the third quarter. At the same time, loan growth to enterprises and households continues to increase. Furthermore, the responses to the latest ECB Survey on Access to Finance of Enterprises (SAFE) shows that 'access to finance' is no longer the main concern for firms and ranks behind (i) finding customers (ii) availability of skilled labour (iii) costs of production and labour (iv) competitive pressures and (v) regulation. In addition, recent research from the Central Bank of Ireland has documented how small and medium enterprises (SME) are increasingly substituting bank borrowings with retained earnings as a source of finance.³ Overall, it appears that access to credit is now less constrained and that consumer demand is now the primary concern for businesses.

² If the Federal Reserve tightened policy faster than expected in response to a much more favourable outlook for the US, this risk would be somewhat mitigated.

³ Carroll, James; Paul Mooney and Conor O'Toole (2016): Irish SME Investment in Economic Recovery. Central Bank of Ireland, Quarterly Bulletin 2, 2016.

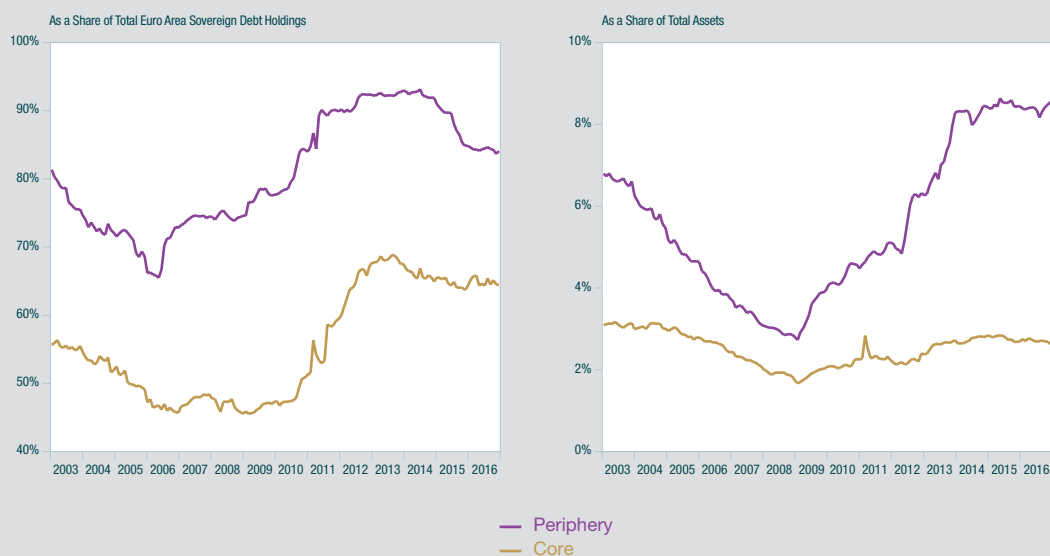
Box A: Reforming Banking Regulation for Sovereign Exposures: Implications for the Monetary Transmission Mechanism

By Giuseppe Corbisiero and Donata Faccia⁴

Sovereign debt portfolios of euro area banks became increasingly ‘home biased’ during the crisis. From October 2008 to December 2013, the domestic share of bank holdings of euro area government bonds rose from 46 to 67 percent in core countries and from 75 to 93 percent in periphery countries.⁵ This was coupled with domestic sovereign debt increasing from 3 to 8 percent as proportion of total assets held by periphery banks (Chart 1).⁶

The overall effect was to amplify a ‘negative feedback loop’ in a number of countries, whereby the health of the sovereign and the banking system became intertwined. As a result, policymakers are currently examining reforms to the banking regulation for sovereign exposures. While these measures are aimed at ensuring the resilience of the banking sector, they will undoubtedly have implications for the transmission of monetary policy. This box first briefly discusses these reforms and then turns to their potential implications for the transmission of monetary policy to bank lending in the euro area.

Box A Chart 1: Domestic Sovereign Debt Holdings of Euro Area Banks



Source: ECB Statistical Data Warehouse.

Note: The last observation corresponds to April 2016.

The current regulatory framework and the proposed reforms

Basel rules for financial regulation require banks both to have a capital base commensurate with the riskiness of their assets and to limit their exposure to a single borrower ('large exposure limits'). However, European regulation de facto envisages preferential conditions for euro area sovereign bond exposures,⁷ for which banks can apply a zero risk weight regardless

⁴ Monetary Policy Division.

⁵ Greece, Ireland, Italy, Portugal and Spain are referred to as 'periphery' countries, while Austria, Belgium, Finland, France, Germany and Netherlands as 'core' countries.

⁶ To explain these dynamics, the economic literature has proposed several hypotheses, including: the use of 'moral suasion' by governments encouraging domestic banks to support public issuance when demand is low (see e.g. Uhlig 2013); a 'carry-trade' strategy followed by undercapitalised banks purchasing distressed, high-yield public debt to bet on resurrection (Acharya and Steffen 2015).

⁷ See Directive 2013/36/EU (CRD IV) and Regulation 2013/575/EU (CRR). Such preferential treatment is explained, for instance, by the key role that sovereign debt, long regarded as a "safe asset", has for the functioning of financial market and for central bank liquidity operations. For the debate surrounding the shortage of safe assets for bank operations see e.g. Brunnermeier et al. (2011).

Box A: Reforming Banking Regulation for Sovereign Exposures: Implications for the Monetary Transmission Mechanism

By Giuseppe Corbisiero and Donata Faccia

of their risk profile; sovereign holdings are also exempted from the large exposure limit. Regulatory reforms to this framework are being discussed,⁸ including:

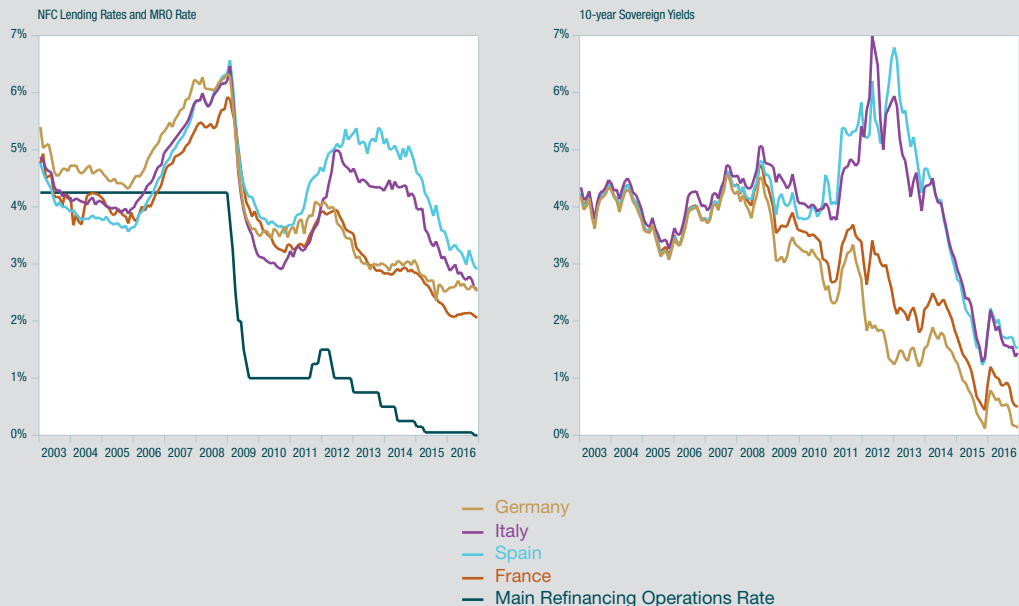
- 1) A non-zero weight risk regime requiring banks to hold a capital buffer against their exposure to euro area government bonds commensurate to their risk profile;
- 2) The introduction of a large exposure limit for euro area sovereign holdings.⁹

Other proposed measures¹⁰ include (i) performing stress tests aimed at assessing the risks deriving from sovereign distress, with further EU-wide guidance to the diversification of sovereign exposures, and (ii) enhancing banks' disclosure requirements on sovereign holdings to increase market discipline on banks.

Implications for the monetary policy transmission mechanism

During the crisis, despite significant loosening in the monetary policy stance, lending rates in periphery countries remained high and reflected developments in domestic sovereign yields more than changes in the ECB policy rate (Chart 2). As such, monetary policy could not operate as effectively as in normal times, and its transmission became least effective in countries which needed it most. In particular, excessive domestic sovereign holdings might have acted as an amplification mechanism in the transmission of sovereign stress to worsened credit conditions. Altavilla et al. (2016) show that periphery banks that were more exposed to the domestic sovereign experienced larger increases in solvency risk, sharper reductions in loans and more pronounced rises in lending rates.

Box A Chart 2: Lending Rates, MRO Rate and Sovereign Yields



Source: ECB Statistical Data Warehouse.

Note: Lending Rates: Loans to non-financial corporations up to €1 million, new business, maturity weighted. MRO Rate: ECB Main refinancing operations, fixed rate tenders. Sovereign Yields: 10-year government bond yields. The last observation in the above charts corresponds to April 2016.

⁸ See e.g. ECB (2016), ESRB (2015), and Juncker et al. (2015).

⁹ For private borrowers, the current regulation limits the bank's exposure to a single borrower within 25 percent of Tier-1 capital.

¹⁰ These options will not be explicitly considered hereinafter.

Box A: Reforming Banking Regulation for Sovereign Exposures: Implications for the Monetary Transmission Mechanism

By Giuseppe Corbisiero and Donata Faccia

It has been accordingly argued that ending the preferential treatment for sovereigns would make banking more resilient to sovereign stress.¹¹ Indeed, if the reforms encouraged banks to increase sovereign portfolio differentiation, this would reduce the extent to which a negative feedback loop could arise between the sovereign and its domestic banking sector. From a monetary policy perspective, this might result in bank lending rates more closely reflecting the MRO rate and thus in a smoother transmission of monetary policy.

On the other hand, other channels of transmission of sovereign stress would still be operating. First, if markets generally believe that there is an implicit sovereign back-stop to the banking system,¹² and indeed there is an explicit one for deposit insurance, then sovereign stress will still be transmitted through bank funding costs. Furthermore, sovereign stress can have implications for the domestic economic outlook and thus the health of domestic banks' loan portfolios.¹³

There are also short-run implications of introducing the proposed measures. Estimates¹⁴ show that the introduction of a non-zero risk weight regime would have caused a capital shortfall of €36.2 billion at end-2013, assuming unchanged exposures. Approximately 70 percent of the necessary additional capital should have been raised by banks in the periphery (Table 1). On the other hand, it is estimated that if a limit of 25 percent of Tier-1 capital was imposed, excess exposures would have amounted to €1,194 billion at end-2013. A less restrictive 50 percent limit would have still implied a selling of €857 billion of sovereign bonds overall.¹⁵

Box A Table 1: Proposed reforms and their quantity implications

Reform	Implications	Euro area	Periphery
Non-zero risk weight regime	Bank capital shortfall	approx. €36bln	approx. €25bln
Large exposure limit	Excessive exposures	approx. €1 194bln	approx. €500bln

Source: GCEE (2015) estimates based on the 2014 EBA stress test.

Forcing banks to raise additional capital would likely increase their financing costs, possibly leading to a reduction in lending. Furthermore, selling off such large quantities of periphery sovereign bonds – unless accompanied by a sufficient increase in demand from core countries, where banks would also need to partially replace domestic exposures – would likely lower their price. This could force additional losses on periphery banks and potentially trigger a new episode of sovereign stress. In this case, as the proposed reforms by themselves are unlikely to result in a full decoupling between sovereign risk and domestic banking, upward pressures on bank financing costs would likely follow, undermining the pass-through of monetary policy and worsening credit conditions.

¹¹ E.g. Korte and Steffen (2014), Acharya and Steffen (2015), Altavilla et al. (2016), Andritzky et al. (2016).

¹² Although this is limited by the Bank Recovery and Resolution Directive, which applies in the EU Member States since January 2015.

¹³ In addition, related to the 'moral suasion' hypothesis, it cannot be excluded that a regulation preventing banks to support domestic public issuance in times of sovereign stress could increase market expectations of sovereign default.

¹⁴ Estimates by the German Council of Economic Experts (see GCEE 2015) based on the 2014 European Banking Authority (EBA) stress test. As EBA stress test involved 77 percent of total euro-12 bank assets, the volumes in Table 1 constitute lower-bounds. Estimates are substantially unchanged using data from the 2015 EBA transparency exercise (see Andritzky et al. 2016).

¹⁵ More recent data would be unlikely to produce dramatically different estimates, given that domestic government bond holdings of euro area banks are currently larger on aggregate than in December 2013 (see 'Balance Sheet Items,' SDW; this despite the fact that the trend has slightly reversed most recently, also owing to the launch of the ECB Public Sector Purchase Programme).

Box A: Reforming Banking Regulation for Sovereign Exposures: Implications for the Monetary Transmission Mechanism

By Giuseppe Corbisiero and Donata Faccia

Conclusions

A revision to the banking regulatory framework is proposed to break the bank-sovereign loop. It is aimed at making banking more resilient to sovereign stress; as such, the revision could make the transmission of monetary policy smoother in the periphery countries, where it was less effective during the sovereign crisis.

Although the proposed reforms have theoretical appeal, they are unlikely to result in a full decoupling between sovereign risk and domestic banking; moreover they have short-term implementation issues. The risks highlighted are particularly pronounced in the current conjuncture, but concerns might remain valid even for less turbulent times.

Achieving sound public finances throughout the euro area, as well as a financial system more integrated and resilient to shocks, might be necessary to fully prevent such risks from emerging in the transition to a new regime.

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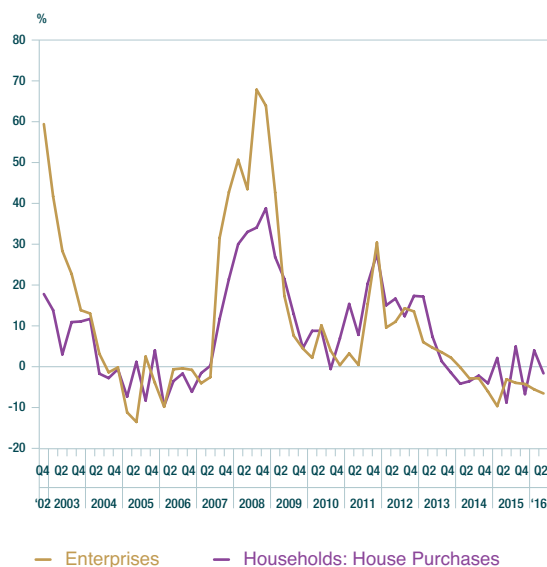
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Monetary Policy Developments

In response to the anticipated slowdown in the UK, which appears to be largely due to the Brexit decision, the Bank of England (BoE) introduced a package of measures in August. These measures included a reduction in the bank rate to 0.25 per cent, a new 'Term Funding Scheme' to provide banks with

£100bn of external reserves, and £70 billion of bond purchases. The purchase of bonds has proven to be a challenge to the BoE so far and this may be due to the continued structural demand for high-yielding bonds from pension and insurance funds. Nonetheless, this latest package of measures represents a considerable easing in policy.

Chart 6: Net Percentage of Banks Reporting a Tightening of Credit Standards on Loans to Enterprises and Households



Source: European Central Bank, Bank Lending Survey.

Note: The series in the above chart is based on the responses to the euro area Bank Lending Survey and is calculated using the percentage of banks reporting a tightening of credit standards on loans to enterprises (overall) as well as loans to households (house purchases) less the percentage of banks reporting an easing of credit standards on loans to enterprises (overall) as well as loans to households (house purchases).

In its two rate-setting meetings since the Brexit referendum result, the ECB left its asset purchase programme of €80bn per

month unchanged and reiterated that policy rates are expected to remain at current or lower levels long after the asset purchase programme has concluded. The account of the July monetary policy meeting (See Box B for a discussion of central bank minutes) notes that the initial purchases under the corporate sector purchase programme had proceeded smoothly, notwithstanding some reports of market scarcity. At the press conference following the September meeting, President Draghi noted that the Governing Council had tasked the relevant committees with evaluating the options to ensure a smooth implementation of the asset purchase programme.

Finally, the Federal Reserve's decision making body on interest rates - the Federal Open Market Committee (FOMC) - left their main policy rate unchanged during July. The minutes from the same meeting, alongside more recent comments by Fed Chair Yellen, have led markets to raise the probability of an increase in the Federal Funds rate later this year. In particular, the FOMC pointed to the strengthening of labour markets across the US, although they also noted the uncertainty associated with Brexit and the external vulnerabilities in some emerging market economies. Overall, most FOMC members indicate that gradual adjustments in the stance of monetary policy are likely to be appropriate.

Box B: A Comparative Study of the ECB's accounts of monetary policy meetings and Central Bank Minutes

By Barra McCarthy and Rebecca Stuart

At the beginning of 2015 the Governing Council of the European Central Bank (ECB) began publishing accounts of monetary policy-setting meetings.¹⁶ To understand how the ECB's accounts compare to the minutes of other central banks, this box presents a comparative study of the ECB's accounts and the minutes of other central banks.

Before proceeding, it is worthwhile to briefly review the reasoning and research surrounding the publication of such material.

The publication of minutes by a central bank fits within the strategy of so called 'open mouth operations', or the use of communication to influence the movement of financial markets and make central banks' monetary policy decisions more predictable, thus helping central banks achieve their objectives (Blinder et al., 2008).

The literature generally supports the view that central bank minutes contain information valuable to market participants. Minutes have been found useful in predicting movements in treasury yields (Boukas and Rosenbourg, 2006), asset price volatility (Rosa, 2013), interest rate futures (Chague et al., 2015; Jung and El-Shagi, 2015) and future monetary policy decisions (Apel and Blix Grimaldi., 2012).

¹⁶ These are referred to as 'accounts' rather than 'minutes' since full minutes are published with a 30 year lag.

Box B: A Comparative Study of the ECB's accounts of monetary policy meetings and Central Bank Minutes

By Barra McCarthy and Rebecca Stuart

Turning to the comparison of minutes, our sample contains 9 national central banks¹⁷ and the ECB, and collects their published minutes over the period 01.01.2015-26.08.2016. We compare across the categories of length, timeliness, attribution and dissent.¹⁸ Due to the small sample size, conclusions made about the ECB's accounts relative to the sample average of minutes should be taken as provisional rather than final. The results are presented in Table 1.

Generally, one would expect the relationship between minute length and the quantity of useful information contained to be positive, though it may be subject to diminishing marginal returns. The average length of the ECB's accounts is 7,279 words.¹⁹ This exceeds the sample average by approximately some 2,400 words, or nearly 50%. Of the other central banks in the sample, six publish minutes that are on average shorter than the ECB's, and three publish minutes that are longer: the Bank of Japan (8036 words), the Federal Reserve (8425 words), and the Sveriges Riksbank²⁰ (9823 words).

Policy discussion may be the most valuable part of minutes or accounts, as it contains information that was often not known to the public prior to publication. In the ECB's accounts, policy discussion has its own section, meaning they follow the same convention for structure that the majority of other central banks do in their minutes.²¹ The percentage of the total text focusing on policy discussion is similar to the sample average (ECB: 24%; sample average 23%). However, in absolute terms the ECB's section on policy discussion is the longest in the sample.

The period between the conclusion of a monetary policy meeting and publication influences whether information contained in the minutes or accounts remains relevant to the market. There are two metrics by which the timeliness of minute publication can be judged: the delay between meeting and publication and whether the minutes are published before the next meeting.

Regarding the publication delay, at a 31 day lag on average, the ECB's publication delay is exceeded by only the Bank of Japan (36 days) and is above the sample average of 18 days. Amongst banks with the same number of policy meetings during the sample period, who would have had less pressure to publish minutes as quickly as banks with more frequent policy meetings, it remains above the average of 19 days.

However, the ECB does publish its accounts in advance of its next policy meeting. This convention is followed by all other central banks in the sample, with the exception of Japan. This ensures that information relevant to predicting future policy decisions may be used by the market.

When considering attribution in minutes, it is important to remember that, unlike other central banks, the ECB is the central bank of a currency union of 19 nations. As Gersbach and Hahn (2013) note, attributing positions to individuals in such an arrangement would likely result in greater pressure being exerted on central bank governors to adopt a more nationalistic view, whereas in the euro area monetary policy should be set for the currency union as a whole.

¹⁷ Kedan and Stuart (2014) show that just 24 central banks published minutes in English or Spanish in 2014. The sub-sample here includes those banks which publish minutes in English, and which are located in developed economies since these are likely to be the closest comparators. As such the sample consists of the Bank of England, Federal Reserve, Bank of Japan, Reserve Bank of Australia, Sveriges Riksbank, Central Bank of Iceland, Hungarian National Bank, Narodowy Bank Polski and the Czech National Bank.

¹⁸ The same categories are used in Kedan and Stuart (2014).

¹⁹ Extraneous material, such as lists of attendees, executive summaries and appendices, was excluded from word counts.

²⁰ One anomaly in the sample was the Riksbank publishing of minutes for its extraordinary meetings in January 2016. These minutes were devoid of any actual information aside from the headings and lists of members who attended. As these outliers were the result of special circumstances, and not standard communication, they have not been included in the calculation of any figures mentioned below.

²¹ Of the ten only Hungary, the Czech Republic, Sweden (as of May 2016) and Poland do not.

Box B: A Comparative Study of the ECB's accounts of monetary policy meetings and Central Bank Minutes

By Barra McCarthy and Rebecca Stuart

Thus, unsurprisingly, attribution of comments and views do not appear in the accounts of the ECB. Instead the ECB presents different positions but does not attribute them, in a similar manner to 7 other banks in the sample.²²

Similarly, the ECB does not attribute votes to different participants in monetary policy meetings. Moreover, it omits the number of participants who voted for or against a proposal, rather using qualitative descriptions of how the motion was passed (e.g. unanimously, with a majority). This makes it unique among the sample; the majority of countries in the sample attribute votes to participants in policy meetings.²³

This practice could also be in part due to the fact that the ECB aims to reach decisions on monetary policy by consensus²⁴ which would result in the council not needing to take a vote²⁵. Nonetheless, there is legal provision for the Governing Council to vote on decisions. However, we do not know how often votes occur. If it is infrequently then, rather than the voting record being omitted, it may simply not exist for a specific meeting.

In conclusion, the ECB's accounts have above average length, contain much detail on policy discussion and are published before the next monetary policy meeting, although the publication delay is relatively long. The main difference between the ECB's 'accounts' and the minutes of other central banks is the omission of a record of voting behaviour, which can be attributed to some combination of the ECB's position as the central bank of a currency union and its aim to reach decisions by consensus.

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²² Only two central banks deviate from this policy in minute writing: Australia, which provides a generic commentary and Sweden, which attributes comments and positions to individuals.

²³ Though not amongst all central banks, as this form of minute writing is also practiced by Guatemala and Colombia (Kedan and Stuart, 2014).

²⁴ For further discussion regarding this possibility see Apel, et al., (2015).

²⁵ Before September 2012 the ECB maintained that all decisions were reached by consensus (Heyo and Meon, 2013).

Box B: A Comparative Study of the ECB's accounts of monetary policy meetings and Central Bank Minutes

By Barra McCarthy and Rebecca Stuart

Categories	Euro Area	United Kingdom	United States	Japan	Sweden	Iceland	Australia	Hungary	Czech Republic	Poland	Sample Average
Length (average over sample)											
Total pages (excluding cover/end/summary)	15	10	12	21	21	7	6	3	2	4	10
Total Word Count	7279	4808	8425	8036	9823	3439	2910	1159	1305	1954	4914
Separate section on policy discussion?	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No	n/a
Policy discussion section word count	1750	1414	1680	1500	n/a	1051	532	n/a	n/a	n/a	1321
% minutes focused on discussion	24	29	20	19	n/a	31	18	n/a	n/a	n/a	23
Timelines (average over sample)											
Publication Delay	31	5	21	36	15	15	14	15	8	16	18
Published before next meeting?	Yes, always	Yes, always	Yes, always	Yes, always	Yes, except for one occasion	Yes, always	Yes, always	Yes, always	Yes, always	Yes, always	n/a
Discussion											
Names to comments?	X	X	X	X	√	X	X	X	X	X	n/a
Different positions but anonymous?	√	√	√	√	X	√	X	√	√	√	n/a
Generic commentary no specific "views"	X	X	X	X	X	X	√	X	X	X	n/a
Votes											
Quantitative with names?	X	√	√	√	√	X	X	√	√	X	n/a
Quantitative anonymous?	X	X	X	X	X	√	X	X	X	X	n/a
Qualitative (e.g. majority, unanimous, etc.)?	√	X	X	X	X	X	X	X	X	X	n/a
Dissent											
Explanation (explicit)?	X	√	√	√	√	√	X	√	X	X	n/a
Minutes in sample (#)	13	20	13	18	9	12	18	18	13	18	15

Sample 01/01/2015-31/08/2016

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.

Rental markets, savings and the accumulation of mortgage deposits

Conor Kelly, Statistics Division and Fergal McCann, Financial Stability Division¹

Abstract

The ability of households to accumulate mortgage deposits has featured prominently in the public debate in Ireland in recent years, due in large part to increases in rental prices and house purchase prices which have been ongoing since 2011 in some markets. In this article we use publicly available information on rental and house purchase prices across sixteen geographic regions in Ireland to calculate the required down-payment for a First-Time Buyer (FTB) purchase of a three-bedroom property. We then utilise this down-payment requirement to estimate the number of years of saving required (*Time to Save*, *TTS*), given current prices, to purchase a three-bedroom property while renting a two-bedroom property, for a couple with no children. The Irish housing market can be divided into three segments: Dublin, where *TTS* as of 2016q2 is estimated between 2.5 and 4 years depending on area; other urban areas with *TTS* of 1 to 1.5 years; non-Dublin, non-urban areas where *TTS* is estimated below one year. Finally we show that, relative to mid-2014, *TTS* has increased in Dublin by between one and two years, and under one year in other areas.

¹ The views expressed in this paper are the views of the authors alone and not necessarily those of the Central Bank of Ireland or the European System of Central Banks. We thank Reamonn Lydon for providing percentile information from the national income distribution using SILC data. We thank Gordon Barham for his assistance in developing a tax calculation sheet for transforming gross to net incomes. We thank Yvonne McCarthy, Paul Lyons and participants at an internal seminar for helpful comments and suggestions. All remaining errors are our own.

1. Introduction

The ability of prospective First Time Buyer (FTB) house purchasers to accumulate down-payments has taken a prominent position in the public discourse in Ireland in recent times. At the heart of this discussion have been two issues: first a reduction in the capacity of some households to save due to a post-crisis recovery in rental values which has been increasing in momentum since 2013. This recovery was first felt in Dublin where year-on-year growth rates rose above five per cent in 2013q1 and peaked at 14 per cent in 2014q2. More recently many regions outside Dublin have experienced 10 per cent annual growth rates in each quarter in 2015 and 2016.² Second, the size of down-payments has been rising as house purchase prices grew rapidly in Dublin through 2013 and 2014 (with year-on-year price rises reaching 25.1 per cent in August 2014), and have undergone similar increases outside Dublin more recently (where year-on-year price increases of 8 to 11 per cent have been observed in every month from October 2014 to June 2016).³ In the case of both the rental and house purchase markets, these price increases have occurred concurrently with historically low levels of supply in both markets, and have significantly outstripped average income growth.⁴

Policy changes brought about by the introduction in February 2015 of the Central Bank's macroprudential mortgage market measures have given rise to an additional factor affecting mortgage down-payments. These rules, hereon referred to as "the Regulations", imply that an FTB purchaser must provide a minimum down-payment of 10 per cent of the first €220,000 and 20 per cent of the purchase amount over €220,000 when purchasing a home with mortgage finance. This rule implies that FTB Loan to Value Ratios (LTV) are maximised between 80 and 90, depending on the price of the property in question.⁵

In this article we combine average rental price and house purchase price data across sixteen regions in Ireland to study the interaction between rental price developments, house price developments, and the ability of households to accumulate a down-payment via savings. We construct an index which we denote the *Time to Save (TTS)*, which measures the number of years it would take to arrive at the down-payment for an average house in each region given the current situation in rental and purchase markets. To calculate *TTS*, we use information on a range of possible household income levels, reasonable non-housing expenditure amounts, and the cost of renting an average two-bedroom property. While we do not deploy a formal econometric model, we are the first to our knowledge to explicitly allow for changes in local rental market prices to affect the ability of households to accumulate down-payment savings. It is important to acknowledge that all data sources only allow for a representation of a hypothetical average FTB purchasing household, and that in reality a wide range of additional circumstances that cannot be modelled here will alter a household's *TTS*.

The economics literature has provided some answers to questions around the interlinkage between house price developments, down-payment savings behaviour and access to homeownership. Research from the USA (Talha-Yalta 2016) points to the possibility of a bifurcation in savings behaviour whereby house price increases lead some households to stop saving completely, while other households "double down" and increase their savings as a percentage of monthly income in order to accumulate the down-payment for increasingly expensive houses. Talha-Yalta also shows that, where households save, they react to higher down-payments via both an increase in their savings rate out of income, and a longer duration of saving. The possibility of both reduced and increased saving as a result of changing down-payment requirements has been suggested empirically by research from

² All rental growth figures from authors' calculations using daft.ie rental report data.

³ All house price growth figures taken from CSO house price index data.

⁴ Annual income growth across all NACE economic sectors was 1.5 per cent between 2014/2015 according to the CSO's "Average Annual Earnings and Other Labour Costs" series from the EHECS survey.

⁵ There are exceptions to this rule e.g. a proportion of a bank's total lending is allowable at levels above the Loan to Value and Loan to Income limits.

Yoshikawa and Ohtake (1988), Engelhardt (1994) and Chen, Kuan and Lin (2007).

On housing demand, Fuster and Zafar (2014) show that, using a hypothetical survey, the demand for homeownership increases from 44% to 61% to 72% as the down-payment requirement for a given house falls from 20 to 5 to 0 per cent, implying that the demand for housing is highly sensitive to changes in deposit requirement. Allen et al. (2015) show that in Canada, when down-payment requirements were loosened through regulation, borrowers responded by significantly increasing their leverage, purchasing more expensive houses and taking out additional mortgage finance. A large portion of previously restricted borrowers also entered the market once the required down-payment was lowered.

Engelhardt (1996) has also shown that those saving for a down-payment decrease their food consumption while still renters, providing suggestive evidence of a knock-on aggregate effect to economic activity from an increase in the time spent as a down-payment saver. Finally, both Chiuria and Jappelli (2003) and Mayer and Engelhardt (1996) have shown that as down-payment requirements rise (either due to increased house prices or due to higher proportional requirements set by lenders or regulators), households postpone house purchase in order to accumulate the required savings, thus entering the housing market at an older age.

The only economic research we are aware of that explicitly measures *TTS* reported by borrowers is Mayer and Engelhardt (1996) who show that in the USA in the 1990s, the average FTB purchaser saved for between 2 and 3 years to arrive at the down-payment required. Estimates from De Nederlandsche Bank (2015) suggest that a reduction in the LTV from 100 to 90 per cent in the Netherlands would increase the average *TTS* by two years.

While the above literature has dealt extensively with the behaviour of households saving for

down-payments, we believe that our current study is the first to explicitly examine how developments in the rental market are linked to the ability of prospective FTBs to accumulate their down-payment via savings. The aim of the current study is to provide a descriptive analysis of how *TTS* has evolved in recent years in Ireland, taking account of local variation in rental and house purchase prices, combined with changing proportional down-payment (DP) requirements. Given that housing costs represent the most important item of expenditure for renters (26.3 per cent, reported by the Central Statistics Office *Household Budget Survey* 2010), and the rental market is where most aspiring buyers are housed, the interaction between the rental and housing markets represents fertile ground for further research on how down-payment requirements affect access to homeownership.

A number of key findings emerge from our analysis. Firstly, we show that the absolute level of down-payment required to purchase a three-bed property in most areas outside Dublin has increased by less than €5,000 between mid-2014 and mid-2016. In Dublin however, there have been large increases in down-payments for the average three-bedroom house, with the down-payment in South County Dublin moving from €35,000 to €76,000 over the two years (with this change being the result both of increased regulatory down-payment requirements and house price increases). In other areas of the City and County of Dublin, increases of €10,000-€22,000 have been seen for the same property type over the same period. This highlights the different situation facing borrowers inside and outside Dublin.

Our estimates of *Time to Save (TTS)* indicate that for the average FTB purchaser income in 2015/2016 in each region, for a household purchasing an average three-bedroom property while renting an average two-bedroom property, savings times in 2016q2 are in line with those seen previously in academic research in the USA.⁶ Our baseline estimates for the six regions within Dublin range from

⁶ Mayer and Engelhardt (1996) have shown that the average *TTS* in the USA in the 1990s was between 2 and 3 years.

two and a half to four years, given current rent and purchase prices. In Dublin these figures have increased from estimates of between 1 and 2 years for 2014q2, reflecting increases in rents, purchase prices and proportional down-payment requirements. Outside of Dublin, the situation appears more favourable for a hypothetical household with the average 2015-16 FTB purchase income: in urban areas such as Galway and Cork and the Dublin Commuter Counties, *TTS* for 2016q2 is estimated at roughly 18 months, while in other non-urban areas *TTS* is estimated at less than one year.

We extend the analysis to observe fixed points in the national income distribution (60th and 80th for 2014, corresponding to gross annual household income of €50,853 and €83,678 respectively). If we take a hypothetical household at the 60th percentile of the national household income distribution, such a household has a *TTS* in most non-urban areas outside Dublin of under one year. In most areas in Dublin, however, savings cannot be accumulated at this income level in a period of less than five years. At the national 80th percentile income level, most regions' down-payment can be accumulated in under one year, while in Dublin the *TTS* is between one and a half and three years in most areas. The overarching message from this analysis is that households with the same income level will have different housing market experiences depending on their location.

Finally we construct a bilateral "moving matrix" which calculates a *TTS* for a household renting in each of the sixteen regions, saving to purchase a house in each of the sixteen regions. This analysis uncovers significant variation in savings durations across the country depending on desired location.

The paper proceeds with a discussion of the data sources and calculation methods (Section 2), followed by reporting of the euro value of down-payment requirements across regions and time (Section 3) and finally the *Time to Save* estimates (Section 4). Section 5 provides conclusions.

2. Data and Method

We obtain rental and house purchase price data from the website www.daft.ie (hereon "DAFT"). These datasets are reported on a quarterly basis since 2006q1, with the most recent report at the time of writing being 2016q2. Asking prices are reported across fifty-four geographic areas: all Dublin postcodes, all other cities outside Dublin, and all counties. For the purposes of the tractability of our analysis, data are aggregated in all cases to sixteen geographic regions which are regularly used by DAFT for aggregate analysis:

- Six within Dublin (City Centre, South City, North City, North County, South County, West County).
- Four other urban areas (Cork, Galway, Limerick and Waterford Cities).
- Six other non-urban areas (Dublin Commuter Counties, West Leinster, South-East Leinster, Munster, Connacht, Ulster).

In aggregating from the fifty-four DAFT areas to the sixteen regions outlined above, we use weights based on the number of properties in each area as of the 2011 national Census. The classification and weighting of each area is outlined in Appendix Table 1. Table 1 explains the counties and postcodes that fall into each region.

The aim of the analysis in this paper is to provide geographically-varying estimates of down-payment requirements and "*Time to Save*" (*TTS*). We choose two time periods upon which all calculations are based:

- 2014q2 (preceding the introduction of the Regulations on February 9th 2015).
- 2016q2 (the most recent time period at time of writing).

One caveat which must always be attached to the DAFT data is that they represent asking rather than closing prices for each property.

Table 1: Regions used in analysis and their constituent postcodes and counties

Region	Constituent areas
Dublin City Centre	Dublin 1, 2, 7, 8
North City	Dublin 3, 5, 9, 11, 13
South City	Dublin 4, 6, 6w, 10, 12, 14, 16, 18, 20, 22, 24
North County Dublin	
South County Dublin	
West County Dublin	
Cork City	
Galway City	
Limerick City	
Waterford City	
Dublin Commuter Counties	Kildare, Meath, Wicklow, Louth
West Leinster	Offaly, Laois, Longford, Westmeath
South-East Leinster	Kilkenny, Carlow, Wexford
Munster	Limerick County, Cork county, Waterford county, Kerry, Clare, Tipperary
Connaught	Galway county, Mayo, Roscommon, Leitrim, Sligo
Ulster	Cavan, Donegal, Monaghan

This means that it is possible that, in periods of market weakness, asking prices may in fact overstate the requirements facing potential FTB purchasers, given that sellers and landlords may have to accept offers below the quoted asking price where demand is sufficiently weak. Similarly, in a high-growth market, transacted prices may outstrip those advertised in cases where high demand leads to bidding among many potential buyers. Despite these potential drawbacks, we proceed to use the DAFT data as it provides a level of disaggregation, in terms of geography, property type and time variation that is unparalleled among Irish data sources.

Calculation of Mortgage Down-Payments

In calculating down-payment requirements facing FTB purchasers, we impose the macroprudential FTB housing rules when analysing the 2016q2 data. However, for the 2014 data, we must measure market-set maximum LTV ratios given that there were no regulatory limits on borrower leverage at the time. We extend the method of Kelly et al. (2015) in order to calculate market LTV limits. This involves analysis of the distribution of

LTV among loans originated in a given quarter using Central Bank of Ireland Loan Level Data (LLD) for lenders covering over two-thirds of the total mortgage market as of end-2014. The LTV available to FTB borrowers is proxied by the top end of the observed LTV distribution, in this case the 98th percentile. In 2014q2, we calculate that a LTV ratio of 92 was available to potential FTB purchasers.

The down-payment requirement is then given by:

$$\text{Downpayment} = HP * 10\% \\ \text{if } HP \leq 220,000 \text{ \& } \text{year} \geq 2015$$

$$\text{Downpayment} = 22,000 + 20\% * (HP - 220,000) \\ \text{if } HP > 220,000 \text{ \& } \text{year} \geq 2015$$

$$\text{Downpayment} = HP * 8\% \text{ if } \text{year} < 2015$$

In calculating *Time to Save*, *TTS*, the following equation is deployed:

$$TTS = \frac{\text{Downpayment}}{(\text{NMI} - \text{Expenses} - \text{Rent})}$$

Setting Income Levels

NMI is the household's net monthly income. In all calculations, NMI must be set by the researcher. In an ideal setting, information on average income in each of the geographic regions under study would be used. Such information is unfortunately not readily available in Ireland. We focus on three income levels in all analysis:

- (1) The average income in each region among observed FTB mortgage purchases that were "in-scope" of the Regulations. These are aggregated from granular Central Bank data on all mortgages issued since the introduction of the Regulations, as used in Keenan et al. (2016).
- (2) The 60th percentile of national gross annual household income in 2014 (most recent year for which the Survey on Income and Living Conditions micro data is available), equating to €50,853.
- (3) The 80th percentile of national gross annual household income in 2014, equating to €83,678.

The obvious advantage of income (1) is that these are the only income data available that vary at the level of aggregation corresponding to our rental and house price data. The disadvantage of using income (1) is that it by definition is restricted to the income of borrowers who have accessed the mortgage market in 2015 and 2016. However, given that we are calculating *TTS* as a function of *average* rather than *marginal* house purchase prices and rents, the average income among mortgaged borrowers is perhaps a more appropriate choice than an income level representing all households regardless of housing tenure. The advantage of taking income levels (2) and (3) from the national household income distribution is that in each case incomes are fixed across all regions, aiding comparability of *TTS* for a given household type. The disadvantage of looking at one fixed income point in isolation is that there are some regions which will have very few house purchasers around a particular percentile of the national distribution. For

example, an estimate of an extremely high *TTS* for a household at the 60th percentile of the national distribution may not be particularly meaningful if the majority of prospective FTB purchasers in some regions have income levels that are in the top national income quintile. Given that most mortgage originations are to households above the population median income (Lydon and McCann, forthcoming), we believe that the 60th and 80th percentiles of the overall population income distribution are useful representative benchmarks for mortgaged households.

In all cases, gross income levels are reported, given that this is what is referred to in the Regulations and on banks' mortgage applications. However for the purposes of *TTS* calculations, all gross incomes are turned to net incomes using a tax calculation sheet developed by the authors which assumes that the income of the household is evenly split across the two household members.

Setting an appropriate level of non-housing expenditure

In order to measure the cost of living excluding rental payments for a typical household, we refer to external work carried out by experts at the Insolvency Service of Ireland (ISI). The ISI's "reasonable living expense" varies for couples and as a function of the number of children in the household. It provides a detailed calculation of a reasonable standard of living, which is used when lenders and borrowers are negotiating on the restructuring of distressed mortgage debt. The largest expenditure items included in the ISI calculation are food, social inclusion and participation, and private transport. Other items include clothing, personal care, communications, home heating and savings / contingency. We include this latter item, which is calculated by the ISI to be €60 per month, in the monthly expenditure amount given that it is reasonable to assume that a household will aim to save separately for "rainy day" events and one-off large expenditure items at the same time as accumulating savings for a mortgage down-payment. We choose as the representative prospective FTB purchaser a couple with one

car, no children and no special circumstances, which is attributed a monthly non-housing expenditure of €1,486.62 by the ISI.⁷ A detailed breakdown of the expenditure items and amounts is given in Appendix Table 2.

Given that the ISI guidelines are aimed at households involved in debt restructuring arrangements and may be seen as a lower bound on the desirable level of expenditure for many households, we allow for a 20 per cent “top-up” to the ISI recommendation when modelling the behaviour of a household saving to purchase a home. This leaves the hypothetical household with a monthly expenditure of €1,783.94. It is crucially important to acknowledge that the aim of the analysis is to capture an average, hypothetical household in all cases, and that in practice families will have vastly differing sets of circumstances that will move *TTS* away from those estimated in our framework.

Caveats to the analysis

Behind the *TTS* calculation are a number of assumptions that must be outlined before interpreting results:

1. Calculations are based on current rents and house prices, meaning that this is a static analysis. No attempt is made to embed future price growth in either market into the *TTS* estimates.
2. All households, regardless of location, are attributed the same ISI reasonable expenditure. No adjustment parameter is available to account for the fact that the cost of living is higher in Dublin than other locations, for example. Further, no correlation between income levels and expenditure is modelled: regardless of the income level being inputted into a *TTS* calculation, the ISI expenditure level is always constant.

3. All households begin the analysis with zero savings. In practice many households beginning to save for a mortgage down-payment are likely to have a positive savings balance, meaning that *TTS* for such a household will be lower than that estimated in this setting.
4. In our framework, all down-payments are accumulated via savings out of monthly income, i.e. none of the down-payment is acquired via a gift from parents or other third parties. This is likely a restrictive assumption given prior research. In the UK, recent research from Legal and General⁸ suggests that 25 per cent of all mortgaged transactions are likely to involve a financial contribution from the parents of home purchasers, with the average contribution being £17,500. In the USA, Engelhardt (1996) has shown that 8.6 per cent of FTB purchasers finance their down-payment mostly or entirely from gifts from relatives. Mayer and Engelhardt (1996) further show that the average share of down-payments coming from gifts in the USA was 13.1 per cent in the early 1990s.

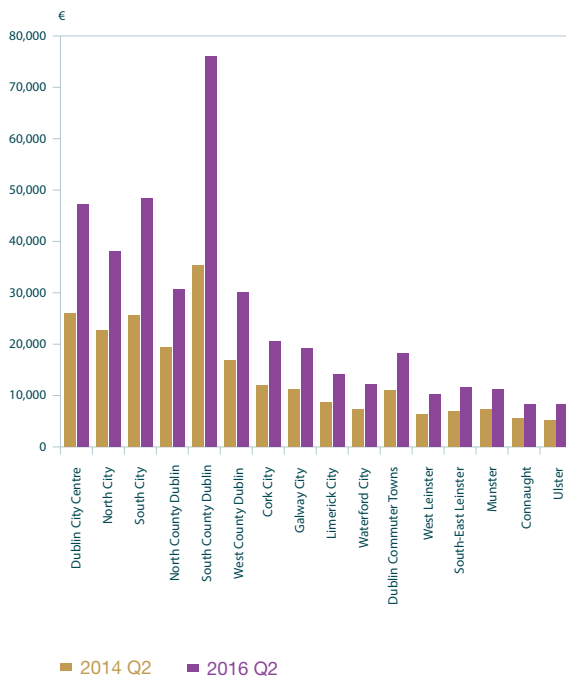
3. Down-payment requirements before and after the introduction of macroprudential housing policy

We begin by reporting the minimum down-payment amount, in euro, required to purchase an average three-bedroom property. In Chart 1 we plot the calculated down-payment for a three-bedroom property in two time periods: 2014q2 and 2016q2. The most striking change across the two periods has been in South County Dublin where the down-payment requirement has increased by over €40,000 in the two years from mid-2014 to mid-2016 (a €35,280 down-payment increasing to €76,000). Increases of €10,000-€22,000 have also been observed in other

⁷ Expenditure guidelines, published at July 2016, are contained at https://www.isi.gov.ie/en/ISI/RLEs_Guidelines_July_2016.pdf/Files/RLEs_Guidelines_July_2016.pdf

⁸ “The Bank of Mum and Dad”, Legal and General, 2016. http://www.legalandgeneralgroup.com/assets/portal/files/pdf_216.pdf

Chart 1: Down-payment requirement, average 3-bed



Source: daft.ie, authors' calculations.

Dublin areas. However, the picture is markedly different outside Dublin, where down-payment requirements have increased by less than €5,000 in the majority of other areas.

4. "Time to Save": The accumulation of down-payments while renting

The down-payment values reported in Chart 1 form the basis of our calculation of *Time to Save (TTS)*. The calculation is given by the following equation:

$$TTS = \frac{\text{Downpayment}}{(NMI - \text{Expenses} - \text{Rent})}$$

Where all input factors have been described in Section 2.

Table 2 reports *TTS* estimates for each region using average house price and rental data as of 2016q2. In all cases, the ISI reasonable

expenditure amounts are imposed, with a 20 per cent top-up. The household is assumed to be renting a two-bedroomed property in the region while saving to purchase a three-bedroom property in the same region. In all cases, we begin with a household having zero savings balances. All *TTS* greater than 5 years are grouped together in a "5+" category.

Columns (2) to (4) report the geographically-varying input factors in the *TTS* equation: the down-payment in euros for a three-bedroom property, the average rent on a two-bed property and the average income among 2015-16 FTB purchasers. Columns (5) to (7) report the *TTS* estimates for three income levels outlined in Section 2.

Column (5) reports that, for a household with the average FTB purchasing income in each region in 2015 and 2016, *TTS* varies across the six Dublin regions between 2.5 and 4 years. In urban areas outside Dublin, average FTB incomes are associated with one and a half years of saving for a down-payment given current prices and rents. Finally, in non-urban, non-Dublin areas, *TTS* is estimated to be under one year.

The income and house price disparity between Dublin and the rest of the country is apparent in Column (6), where the national 60th percentile income of €50,853 is used in calculating *TTS*. At this income level, an average household will not accumulate savings in Dublin for a 3-bedroom down-payment in under five years. Outside of Dublin however, such a household has a *TTS* between two and three years in Cork and Galway cities and in the Dublin Commuter Counties, while *TTS* is around or under one year in non-Dublin non-urban areas.

At the national 80th percentile household income, all regions outside Dublin have *TTS* estimates of under one year, indicating that down-payment accumulation is not an important barrier to accessing mortgage finance for the average property at these

Table 2: Time to Save (years) and key inputs across regions, 2016q2, under three income level scenarios

Region	Input factors			TTS under three income levels		
	Down-Payment (3 bed)	Rent (2 bed)	Average FTB income	Average FTB Income	National 60th	National 80th
Dublin City Centre	47,169	1,435	72,966	3.82	5+	2.70
North City	38,125	1,261	72,151	2.72	5+	1.95
South City	48,314	1,316	80,709	2.76	5+	2.56
North County Dublin	30,600	1,105	58,872	3.31	5+	1.43
South County Dublin	76,000	1,533	109,728	2.64	5+	4.66
West County Dublin	30,000	1,138	58,197	3.53	5+	1.43
Cork City	20,600	898	63,381	1.47	2.68	0.86
Galway City	19,200	773	59,813	1.40	2.09	0.76
Limerick City	14,100	687	57,331	1.04	1.38	0.53
Waterford City	12,100	592	55,460	0.88	1.07	0.44
Dublin Commuter Towns	18,200	904	65,020	1.23	2.39	0.76
West Leinster	10,210	546	53,756	0.76	0.86	0.36
South-East Leinster	11,667	566	56,616	0.80	1.00	0.42
Munster	11,218	549	54,319	0.82	0.94	0.40
Connaught	8,319	476	54,142	0.58	0.65	0.29
Ulster	8,313	463	51,766	0.62	0.64	0.29

Note: Income levels for North, South and West County Dublin are submitted to the Central Bank in a combined "County Dublin" category. In order to attribute varying income levels to these three regions, we assign the ratio of each region's house prices to the combined County Dublin average house price to the average income across the three regions.

income levels. In Dublin, the *TTS* ranges between 1.43 years in the North and West county regions, to between 2 and 3 years in the City Centre and South City regions, to 4.66 in South County Dublin.

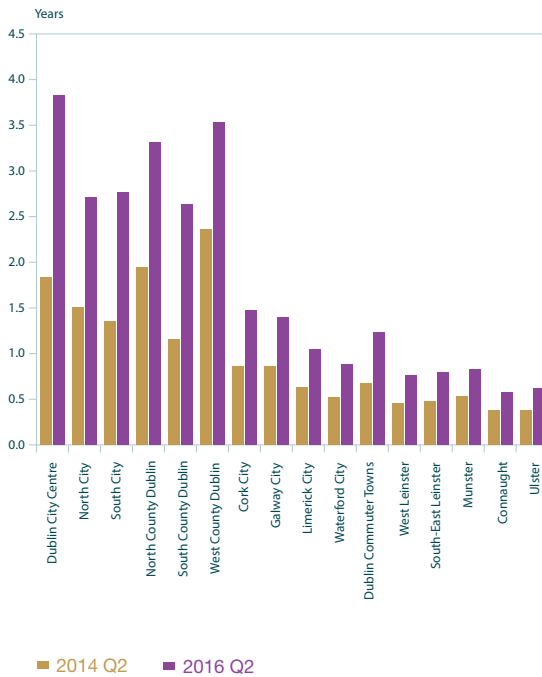
We extend the analysis by observing how *TTS* has changed over time. We calculate *TTS* using rental and purchase price information at two time periods as in Chart 1: 2014q2 and 2016q2. In all cases the same income level and the same ISI expenditure level are used.

Chart 2 reports that in most Dublin areas, the *TTS* levels seen in Table 2 represent increases of over one year relative to the situation in 2014q2. At that point, *TTS* in Dublin ranged between one and two years in all regions. In urban areas outside Dublin, *TTS* has increased by roughly six months in the two year period

under study. Increases have been smaller in non-urban, non-Dublin regions.

In Chart 3, we plot the *TTS* for a household at the national 2014 60th percentile (€50,853). In cases where *TTS* is calculated to be larger than five years, we cap the length of time at five years for expositional purposes. The figure shows that, in all areas of Dublin apart from the North and West County, 2016q2 rents are at a level that this hypothetical household cannot save to accumulate a housing down-payment in under five years. As with all data presented in this paper, the picture is markedly different outside Dublin. In all ten non-Dublin regions modelled, *TTS* has increased over the 2014 to 2016 periods, but in all cases the hypothetical household can accumulate the down-payment for a three bedroom property in under two and a half years, while renting a two-bedroom property in the same area. Increases in *TTS*

Chart 2: TTS; renting 2-bed, moving to 3-bed in same region. Average FTB in-scope income applied

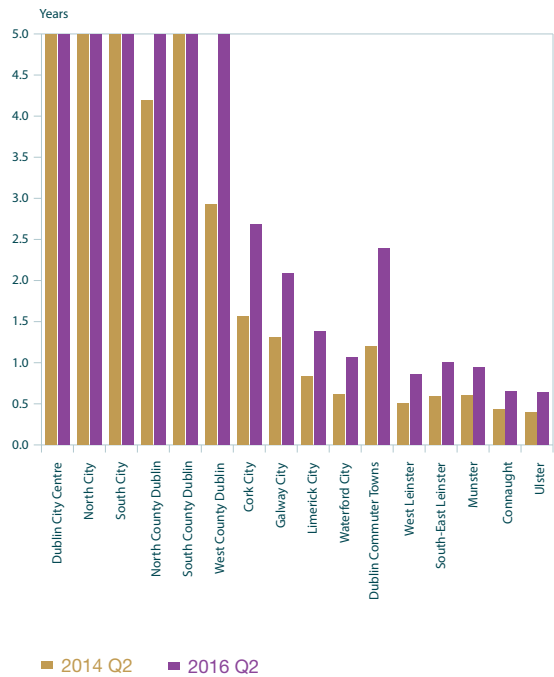


Source: daft.ie, authors' calculations.

over the two-year window of observation are in all cases below 6 months, implying that there has been only a small impact on the ability of such a household to save for a housing down-payment.

We now move to the 80th percentile household, earning €83,678. In Dublin, such a household can accumulate a down-payment for a three-bedroom property while renting a two-bed in the same area in under three years in all areas apart from South County Dublin (Chart 4). These numbers have all increased between 2014 and 2016, with the increase amounting to around one year of additional savings in many areas. Compared to the case of the household earning €50,853, there are substantial improvements in *TTS* estimates when moving twenty points up the household income distribution. Outside of Dublin, such a hypothetical household fares favourably, with *TTS* estimates of around six months in most areas in 2016. It must of course be acknowledged in all analysis in this section that households with income at the 80th percentile

Chart 3: TTS; Rent 2-bed, move to 3-bed in same area. National 2014 60th percentile income applied



Source: daft.ie, authors' calculations.

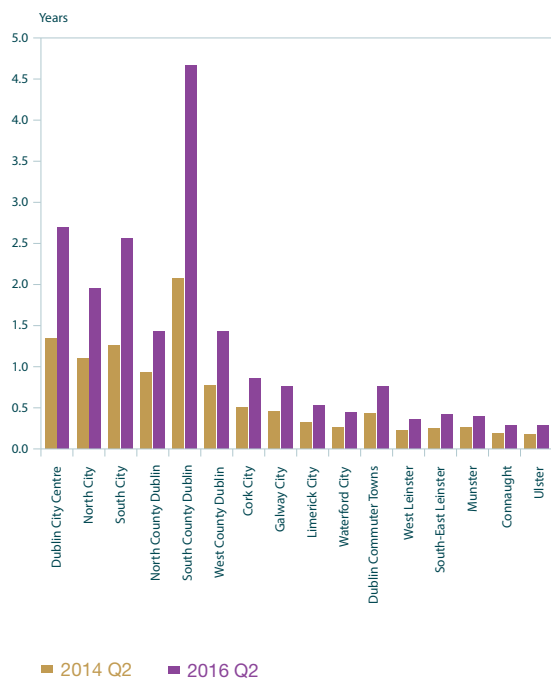
nationally are far more prevalent in Dublin than outside the capital.

4.1 Bilateral Moving Matrices

The DAFT data also lends itself to the calculation of *TTS* for cases where households are living in one region while saving for a down-payment in another region. The full combination of possible moves is reported in a sixteen-by-sixteen transition matrix in Table 3. The vertical axis (Y) in all cases represents the region in which the household is renting a two-bedroom property, while the horizontal axis (X) represents the region in which the household wishes to purchase a three-bedroom property.

We apply the income level of the average 2015-16 FTB purchaser for each region in which the household is assumed to be renting. This means that, when analysing a household leaving Dublin City Centre to move to a 3-bed in North County Dublin, we attribute the income level observed in the data for house

Chart 4: TTS; Rent 2-bed, move to 3-bed in same area. National 2014 80th percentile income applied



Source: daft.ie, authors' calculations.

purchases in the City Centre rather than in North County, as the expenditure and rental conditions are faced while the household is based in the City Centre.

The way in which bilateral *TTS* is calculated implies that the highest pairwise *TTS* estimates will be for prospective purchasers who are living in relatively high-rent yet low-income areas, saving to move to areas with the highest absolute purchase prices. Similarly, the lowest *TTS* should be found for those with the highest income to rent ratios, saving to move to the areas with the lowest absolute levels of house prices.

In practice, the highest *TTS* are observed for those living outside South County Dublin saving to move there, as well as to those in West and North County Dublin looking to save to move to the City Centre and South City regions. For most bilateral pairs in non-Dublin, non-urban Ireland, the estimates imply

that households with average FTB purchaser income can save to move to the average three-bed property in under one year. In urban areas outside Dublin, estimates generally range between one and two years. For those with average non-Dublin incomes, living outside Dublin, saving for a property in the capital is generally estimated to involve a *TTS* of three to four years.

Conclusion

Due to increases in rents, increases in house purchase prices, and changing proportional requirements following from recent Central Bank regulations, the ability of households to save to accumulate mortgage down-payments has featured prominently in public debate in Ireland in recent years. In this article we estimate an indicative *Time to Save (TTS)* for households renting two-bedroom properties while saving to purchase three-bedroom properties across sixteen regions in Ireland.

The estimates are based on average regional incomes among households accessing mortgages in 2015 and 2016, along with reasonable living expenditure amounts from the Insolvency Service of Ireland for a couple with a car and no children (with a twenty per cent top-up). The figures suggest that in Dublin, *TTS* as of 2016q2 was between 2.5 and 4 years depending on the locality for the average property. Such a savings time horizon appears to be in line with international evidence from academic literature in the USA. In other urban areas, *TTS* is estimated to be between 1 and 1.5 years, while in non-Dublin non-urban areas, *TTS* is under one year.

In looking at changes over time, we estimate that in Dublin over the period 2014q2 to 2016q2, *TTS* has increased by between one and two years depending on locality, while in the rest of the country *TTS* increases of between three and six months are more common.

Table 3: Time to Save (years) while renting a 2-bed property in area Y and accumulating down-payment for purchase of 3-bed in area X. Income set at the average 2015-16 FTB purchase income in the rental region (Y).

Renting In:	Moving to:															
	Dublin City Centre	North City	South City	North County Dublin	South County Dublin	West County Dublin	Cork City	Galway City	Limerick City	Waterford City	Dublin Commuter Towns	West Leinster	South-East Leinster	Munster	Connaught	Ulster
Dublin City Centre	3.8	3.1	3.9	2.5	5+	2.4	1.7	1.6	1.1	1.0	1.5	0.8	0.9	0.9	0.7	0.7
North City	3.4	2.7	3.4	2.2	5+	2.1	1.5	1.4	1.0	0.9	1.3	0.7	0.8	0.8	0.6	0.6
South City	2.7	2.2	2.8	1.7	4.3	1.7	1.2	1.1	0.8	0.7	1.0	0.6	0.7	0.6	0.5	0.5
North County Dublin	5+	4.1	5+	3.3	5+	3.2	2.2	2.1	1.5	1.3	2.0	1.1	1.3	1.2	0.9	0.9
South County Dublin	1.6	1.3	1.7	1.1	2.6	1.0	0.7	0.7	0.5	0.4	0.6	0.4	0.4	0.4	0.3	0.3
West County Dublin	5+	4.5	5+	3.6	5+	3.5	2.4	2.3	1.7	1.4	2.1	1.2	1.4	1.3	1.0	1.0
Cork City	3.4	2.7	3.5	2.2	5+	2.1	1.5	1.4	1.0	0.9	1.3	0.7	0.8	0.8	0.6	0.6
Galway City	3.4	2.8	3.5	2.2	5+	2.2	1.5	1.4	1.0	0.9	1.3	0.7	0.8	0.8	0.6	0.6
Limerick City	3.5	2.8	3.6	2.3	5+	2.2	1.5	1.4	1.0	0.9	1.3	0.8	0.9	0.8	0.6	0.6
Waterford City	3.4	2.8	3.5	2.2	5+	2.2	1.5	1.4	1.0	0.9	1.3	0.7	0.9	0.8	0.6	0.6
Dublin Commuter Towns	3.2	2.6	3.3	2.1	5+	2.0	1.4	1.3	1.0	0.8	1.2	0.7	0.8	0.8	0.6	0.6
West Leinster	3.5	2.8	3.6	2.3	5+	2.2	1.5	1.4	1.1	0.9	1.4	0.8	0.9	0.8	0.6	0.6
South-East Leinster	3.2	2.6	3.3	2.1	5+	2.1	1.4	1.3	1.0	0.8	1.2	0.7	0.8	0.8	0.6	0.6
Munster	3.5	2.8	3.5	2.2	5+	2.2	1.5	1.4	1.0	0.9	1.3	0.7	0.9	0.8	0.6	0.6
Connaught	3.3	2.6	3.4	2.1	5+	2.1	1.4	1.3	1.0	0.8	1.3	0.7	0.8	0.8	0.6	0.6
Ulster	3.5	2.9	3.6	2.3	5+	2.2	1.5	1.4	1.1	0.9	1.4	0.8	0.9	0.8	0.6	0.6

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Appendix

Appendix Table 1: Aggregation of 54 DAFT areas to 16 regions for analysis

DAFT area	National Weight	Region
Dublin 1	0.0053	Dublin City Centre
Dublin 2	0.0032	Dublin City Centre
Dublin 3	0.0082	Dublin North City
Dublin 4	0.008	Dublin South City
Dublin 5	0.0093	Dublin North City
Dublin 6	0.0059	Dublin South City
Dublin 6W	0.0057	Dublin South City
Dublin 7	0.0118	Dublin City Centre
Dublin 8	0.0117	Dublin City Centre
Dublin 9	0.0106	Dublin North City
Dublin 10	0.0024	Dublin South City
Dublin 11	0.0128	Dublin North City
Dublin 12	0.0107	Dublin South City
Dublin 13	0.0086	Dublin North City
Dublin 14	0.0128	Dublin South City
Dublin 15	0.0298	Dublin North City
Dublin 16	0.0037	Dublin South City
Dublin 17	0.0009	Dublin North City
Dublin 18	0.01	Dublin South City
Dublin 20	0.0027	Dublin South City
Dublin 22	0.0092	Dublin South City
Dublin 24	0.0149	Dublin South City
North County Dublin	0.0397	North County Dublin
South County Dublin	0.02	South County Dublin
West Dublin	0.0195	West Dublin
Cork City	0.0331	Cork City
Galway City	0.0207	Galway City
Limerick City	0.0124	Limerick City
Waterford City	0.0102	Waterford City
Meath	0.0401	Dublin Commuter Belt
Kildare	0.0458	Dublin Commuter Belt
Wicklow	0.0298	Dublin Commuter Belt
Louth	0.0268	Dublin Commuter Belt
Longford	0.0085	Midlands
Offaly	0.0167	Midlands
Westmeath	0.0188	Midlands
Laois	0.0176	Midlands
Carlow	0.0119	South-East
Kilkenny	0.0208	South-East
Wexford	0.0317	South-East
Waterford county	0.0146	Munster
Kerry	0.0317	Munster
Cork county	0.08	Munster
Clare	0.0255	Munster
Limerick county	0.0294	Munster
Tipperary	0.0346	Munster
Galway county	0.0339	Connacht
Mayo	0.0285	Connacht
Roscommon	0.014	Connacht
Sligo	0.0143	Connacht
Leitrim	0.0069	Connacht
Donegal	0.0351	Ulster
Cavan	0.016	Ulster
Monaghan	0.0132	Ulster

Note: Weights are derived from the share of total national properties in the 2011 Census.

Appendix Table 2: Components of ISI reasonable living expense

Category	Monthly Amount
Food	369.37
Clothing	67.00
Personal Care	73.70
Health	49.39
Household Goods	30.71
Household Services	40.87
Communications	61.70
Social Inclusion & Participation	232.47
Education	38.13
Transport	238.26
Household Electricity	73.30
Home Heating	106.65
Personal Costs	1.93
Home Insurance	12.25
Car Insurance	25.82
Savings and Contingencies	65.07
Total	1,486.62

New Data Collection on Special Purpose Vehicles in Ireland: Initial Findings and Measuring Shadow Banking

Dominick Barrett, Brian Godfrey and Brian Golden¹

Abstract

The non-bank financial sector has attracted increasing global attention in the years following the financial crisis of 2007-2008, particularly in the context of monitoring shadow banking activity. International organisations have highlighted special purpose vehicles (SPVs) as a significant area requiring more information sources, improved data coverage and monitoring, in order to identify risks. This focus has highlighted data gaps across jurisdictions, with very limited global data coverage of non-securitisation SPVs. For the purposes of this article, SPVs refer to vehicles that are primarily engaged in activities other than securitisation. This article provides first results and initial analysis of a new survey undertaken by the Central Bank of Ireland to enhance information on resident SPVs. The new database, which covers 822 SPVs with aggregate assets of €324 billion in Q4 2015, fills an important data gap and improves oversight of these vehicles. The initial findings point to the diversity and complexity of the activities undertaken in the SPV sector and the wide range of country and sector linkages. The new SPV data also allow for a more refined measurement of shadow banking activity in Ireland.

¹ The authors work in the Statistics Division and the Markets Supervision Directorate 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 Donald Maclean, Eduardo Maqui, Grainne McEvoy, Joe McNeill, Kitty Moloney and Gareth Murphy for their helpful comments.

1. Introduction

The years since the financial crisis of 2007-2008 have seen an increased focus on closing gaps in available statistical data on financial intermediation outside the banking sector. In particular, the lack of information on certain non-bank financial intermediaries highlighted gaps for financial stability analysis both on linkages within and between institutional sectors, and exposures to both domestic and foreign counterparties. In this respect, international organisations such as the International Monetary Fund (IMF) and the Financial Stability Board (FSB) highlighted three inter-related areas requiring more information sources, namely, the build-up of risk in the financial sector; cross-border financial linkages; and the exposure of the domestic economy to shocks (International Monetary Fund and Financial Stability Board (2009)).

Ireland is a globally significant location for non-bank financial intermediaries whose activities are mainly with non-residents. Financial vehicles engaged in securitisation and various other activities are an important component of this. The Central Bank has collected comprehensive data at a granular level on securitisation vehicles (known as financial vehicle corporations, or FVCs) since Q4 2009, following the introduction of Regulation ECB/2008/30.² However, information has been limited on special purpose vehicles (SPVs) engaged in activities other than securitisation.³ These SPVs are often part of complex financial structures that span a number of countries, which creates particular challenges in developing a comprehensive database on their activities and structures.

SPVs are legal entities created by a sponsoring financial or non-financial entity in order to fulfil narrow, specific purposes, typically in the areas of taxation, risk management, funding and liquidity. These purposes can include tax neutrality, the isolation of risks or exposures from the sponsor, lower funding costs through

issuing debt collateralised by ring-fenced assets, and improving liquidity management through the issuance of debt securities collateralised by non-liquid assets (such as trade receivables). Securitisation is a particular form of these activities, whereby contractual debt is re-packaged into debt securities to be sold on to investors.

Against this background, the Central Bank extended its FVC reporting requirements to SPVs in Q3 2015, with the objective of closing data gaps, enhancing information on exposures and identifying potential financial stability risks. The new SPV data also aims to enhance knowledge on the types of activities undertaken by these entities, including who sponsors them, and whether they are stand-alone entities or consolidated into larger group structures. The data also allows for a better estimation of the size of non-bank financial activity (and, within this, shadow banking) in Ireland. The SPV data collection builds on analysis carried out by the Central Bank using company accounts data for 2011-12 (Godfrey, Killeen and Maloney, 2015).

SPVs are often part of complex financial structures that span a number of jurisdictions. They can potentially pose risks to financial stability, and have consolidator and sponsor links across a wide range of countries and economic sectors. However, understanding these risks requires in-depth analysis, on a vehicle-by-vehicle basis, to understand the interaction of the SPV with the domestic economy and its linkages with financial markets overseas. The new SPV data reveals the initial SPV links to other jurisdictions but in order to get a more complete picture of SPV structures and their potential risks, further international data sharing and co-operation is necessary. This further analysis is in line with the Central Bank's strategic responsibilities in the areas of financial stability, policy development, and high quality financial statistics.⁴

² https://www.ecb.europa.eu/ecb/legal/pdf/l_01520090120en00010013.pdf

³ SPVs are also known as special purpose entities (SPEs).

⁴ See "Our Strategic Responsibilities" on <http://www.centralbank.ie/about-us/Pages/default.aspx>

The SPV data also have important implications for the measurement of shadow banking in Ireland. The measurement of shadow banking activity has been led by the FSB, which defines shadow banking as “credit intermediation involving entities and activities outside of the regular banking system” (FSB, 2015). The FSB conducts an annual shadow banking monitoring exercise, where non-bank entities are included within shadow banking unless a clear rationale can be presented for their exclusion. Ireland took part for the first time in 2015, based on data up to end-2014. Statistics on Ireland’s non-bank financial sector includes a significant residual, for which a component breakdown is not available. In line with the FSB methodology, this other financial intermediaries residual (or OFI residual) was included in its entirety in the FSB exercise. The new SPV data will facilitate better informed measurement of shadow banking according to the FSB definition in future exercises.

The remainder of the article is structured as follows: Section 2 outlines how these new data help to plug data gaps of international concern and our progress towards collecting the data. Section 3 focuses on the different types of activities of SPVs and their international and domestic links, while Section 4 presents three selected case studies. Section 5 analyses the implications of the new SPV data for measuring shadow banking in Ireland. Section 6 looks at next steps, and Section 7 concludes.

2. New data collection on Irish SPVs

The total assets of the Irish non-bank financial sector amounted to €3,848 billion at the end of 2015, or over 15 times Irish GDP.⁵ These figures are based on balance sheet data compiled by the Central Statistics Office (CSO). The Central Bank collects granular data on major components of the non-bank financial sector, namely investment funds (IFs), money market funds (MMFs), FVCs and insurance corporations (ICs). A residual ‘other’ category, or OFI residual, remains after the known components of the non-bank financial sector are deducted from the CSO control total.⁶ This residual amounted to €626 billion in terms of total assets at end-2015. This residual covers largely unregulated entities, including financial leasing firms, treasury operations of non-financial corporations, holding companies, as well as special purpose entities engaged in securitisation and other activities. Much of the OFI residual is derived using statistical techniques due to data limitations, with data on non-securitisation SPVs especially limited. The new Central Bank SPV reporting requirements represents a significant step in closing these data gaps.⁷

The new SPV data, collected for the first time in the Q3 2015 reporting period, covers 822 vehicles reporting assets of €324 billion at the end of Q4 2015. A key challenge to extending reporting requirements to these SPVs was in defining a reporting population for vehicles not engaged in securitisation activity. Various SPV definitions exist, but they are either very narrowly focused or straddle multiple types of financial activity.⁸ A pragmatic approach was undertaken in

⁵ Calculated as total financial corporations minus banks and central bank from data available on the Central Bank website at: <http://www.centralbank.ie/polstats/stats/qfaccounts/Pages/Data.aspx> and <http://www.centralbank.ie/polstats/stats/cmab/Pages/Money%20and%20Banking.aspx> (Tables A.2 and A.4).

⁶ This residual sector is calculated by subtracting all known non-bank sectors (money market funds, investment funds, insurance, pension funds, broker dealers, securitisation vehicles) from the non-bank financial sector total.

⁷ The IMF called on Ireland to pursue this work in its recent Financial System Stability Assessment, specifically under key recommendation 7 ‘*Improve data coverage and monitoring of all special purpose vehicles*’, and more generally under key recommendation 4, ‘*Close data gaps on cross-border exposures, the non-bank financial sector, the commercial real estate market, and the non-financial corporate sector*’.

⁸ The European System of Accounts (2010) describes typical characteristics rather than requirements (<http://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-02-13-269>), the BIS focuses on securitisation (<http://www.bis.org/publ/joint23.pdf>) and the concept of bankruptcy remoteness features in the academic literature (Gorton and Souleles, 2007).

this light, confining the reporting population to all SPVs availing of 'Section 110' of the Taxes Consolidation Act 1997.⁹ Securitisation vehicles (or FVCs) also qualify as Section 110 companies and already report to the Central Bank under Regulation ECB/2008/30.¹⁰ The existing FVC reporting template was applied to the remaining Section 110 companies not meeting the criteria for reporting under the FVC Regulation. This approach provides a clear definition of what entities are included in the extended reporting framework. However, it is understood that some vehicles operate outside this designation, and are, therefore, outside the current reporting population.¹¹

Each reporting SPV provides details on whether the vehicle is consolidated into another entity, the sponsor of the vehicle, and whether another entity has a noted interest in the vehicle.¹² This information is critical to identifying who creates and sustains the SPV, which is often not obvious from balance sheet information. Information from certain SPVs' financial accounts is also used in addition to the information reported to the Central Bank to get a clearer understanding of links and structures of resident SPVs, as analysed in the following sections.

3. Results

This section analyses SPVs according to two features. Firstly, SPVs are classified according to the primary activity undertaken by the vehicle. Secondly, linkages at the jurisdiction and sector level are examined, focusing on whether the SPV is consolidated into another entity, the sponsor of the SPV (sometimes known as the parent entity) and immediate balance sheet links to other entities, both globally and within Ireland.

3.1 Activities

A diverse range of activities are identified in the SPV sector (Table 1), often taking place within a chain of entities which facilitates intermediation activity elsewhere in the chain. Fourteen different types of activity are identified for SPVs, although the top three categories account for 70 per cent in terms of total assets, namely intra-group financing, external financing, and fund-linked asset management (Chart 1). Intra-group financing is dominated by non-financial sponsors, mostly reflecting the treasury operations of multinational corporations. External financing also reflect such activities while there is a sizeable presence of financial entities from emerging economies issuing debt through various stock markets, including the Irish Stock Exchange (ISE). Fund-linked asset management vehicles are used mainly by US and UK investment managers for investing in a range of different asset classes. Other activities involve repackaging illiquid assets or receivables to generate new funding sources. Among the considerations that might support the location of SPVs in Ireland are the highly developed servicing network, bankruptcy remoteness, and the double taxation agreements which are in place between Ireland and around 70 other jurisdictions.¹³ This paper does not address the rationale underlying SPVs' decisions to locate in Ireland; instead it concentrates on the complexity and international linkages of resident SPVs.

Analysis of the SPV data can help assess any financial stability risks arising from the activities of resident SPVs. As an example, the activities of SPVs involved in loan origination and in bank-linked asset management could have potential financial stability implications. In this context, it is important to understand the specific features of SPVs set up by sponsors to extend loans, and whether these might be

⁹ See: <http://www.irishstatutebook.ie/eli/1997/act/39/section/110/enacted/en/html>

¹⁰ https://www.ecb.europa.eu/ecb/legal/pdf/l_01520090120en00010013.pdf

¹¹ Industry contacts suggest that Section 110 vehicles cover the SPV population for the most part.

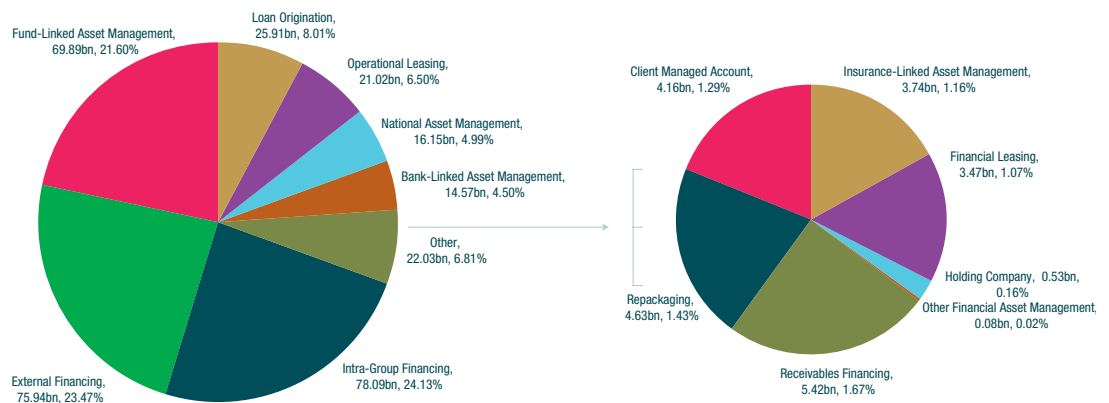
¹² IFRS12 requires an entity to make disclosures about significant judgements and assumptions in determining whether it controls another entity and specific disclosure of interests in unconsolidated structured entities.

¹³ For more information on tax treaties, see: <http://www.revenue.ie/en/practitioner/law/tax-treaties.html>

Table 1: Identified Irish SPV Types and Activities¹⁴

Vehicle Type	Activity Description
Intra-Group Financing	Loan funding from, and to, intra-group companies
External Financing	Funding obtained from external sources and provided to the parent as a loan
Fund-Linked Asset Management	Linked to investment funds/firms, which hold debt, equity, loans, or other financial assets with the goal of capital appreciation, interest or dividend income
Loan Origination	Funding obtained from the parent and furthered to external sources
Operational Leasing	Hold fixed assets, such as plant and machinery, for the purposes of leasing them out
National Asset Management	Set up by national authorities to resolve insolvent financial institutions (incl. NAMA)
Bank-Linked Asset Management	Linked to deposit-taking corporations, which hold debt, equity, loans, or other financial assets with the goal of capital appreciation, interest or dividend income
Receivables Financing	Funding secured by trade/other receivables, furthered to the parent/external sources
Repackaging	The proceeds and/or capital gains/losses from the SPV's financial assets are structured so that investors obtain different exposure than had they simply purchased the assets
Client Managed Account	Set up by financial institutions on behalf of clients which hold debt, equity, loans, or other financial assets with the goal of capital appreciation, interest or dividend income
Insurance-Linked Asset Management	Primarily hold insurance-linked securities such as catastrophe bonds, or investments in life settlement policies
Financial Leasing	Engaged in lease-in lease-out agreements, or as a financial intermediary in a chain of vehicles in which the end vehicle is involved in the leasing of equipment or fixed assets
Holding Company	Owens enough voting stock in another company to control its policies and management and exists for this sole purpose
Other Financial Asset Management	Not linked to banks, client accounts, or investments funds/firms, but hold debt, equity, loans, or other financial assets with the goal of capital appreciation, interest or dividend income

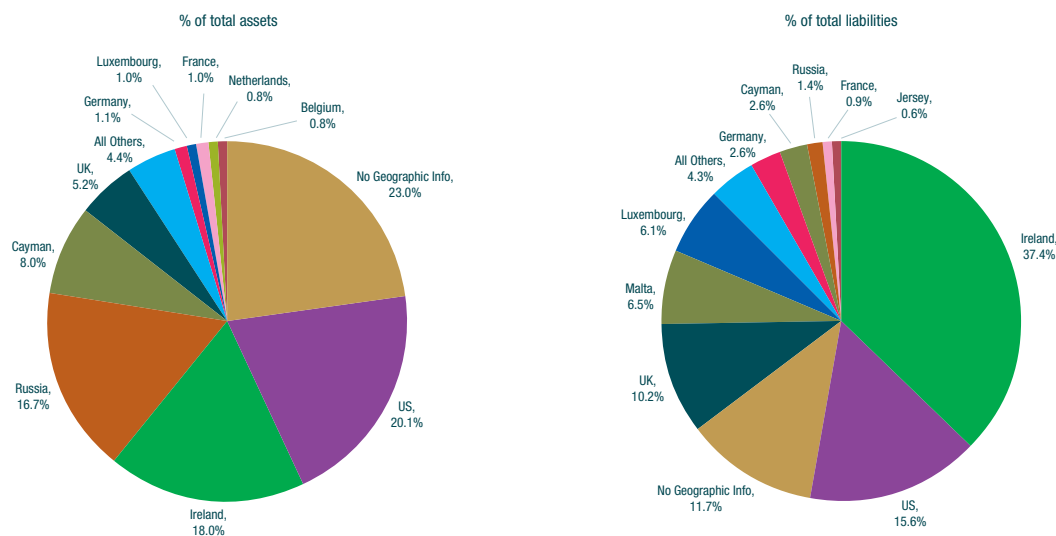
Chart 1: SPV Types by Total Assets (total €324 bn)



Source: Central Bank of Ireland.

¹⁴ The only instances where an SPV could undertake more than one activity is for the operational and financial leasing categories and, in these cases, the vehicle is assigned to the predominant activity in terms of assets held.

Charts 2a, 2b: Geographical Location of Irish SPV Assets and Liabilities



Source: Central Bank of Ireland.

vulnerable to sudden deleveraging in periods of market stress. Similarly, for bank-linked asset management, there is a need to understand the ultimate risk borne by the bank.¹⁵ This type of analysis will be developed by the Central Bank as part of ongoing research, both domestically and in international forums, on enhancing knowledge of shadow banking activities.

3.2 Jurisdiction and sector linkages

3.2.a Global and sector linkages

Direct cross-border exposures for both assets and liabilities on SPVs' balance sheets simply provide the first link in a potential chain of geographical linkages, as many vehicles are part of complex multi-vehicle structures (Charts 2a and 2b). The main immediate asset and liability SPV links are with the US, the UK and Russia. Despite not featuring in consolidator

or sponsor links, Luxembourg, the Cayman Islands and Malta also stand out in terms of immediate cross-border linkages of Irish SPV assets and liabilities.¹⁶ While the balance sheets of resident SPVs show some direct links to Ireland, the consolidators and sponsors of these entities are largely outside the country. For example, an Irish SPV may be immediately linked to an Irish-resident fund, which in turn is consolidated into a foreign entity controlled by a fund manager.

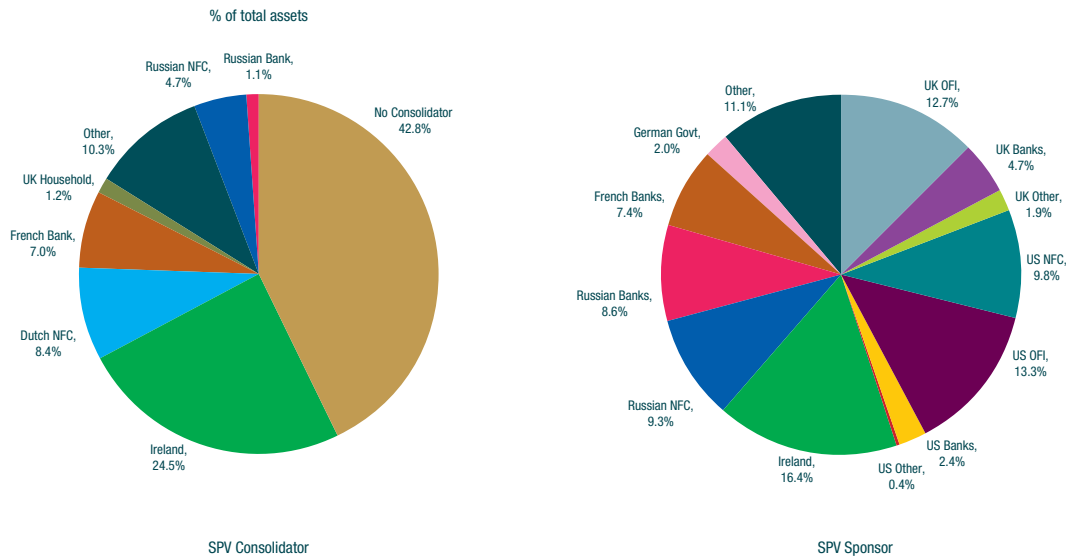
Consolidation data helps identify whether potential risks are attributable to stand-alone entities or to the parent vehicle in the case of consolidation. Unlike FVCs, which are generally non-consolidated vehicles, over half of Irish resident SPVs are consolidated into other entities.¹⁷ The main external consolidator links are to the Dutch and Russian non-financial corporation (NFC) sectors and the French banking sector (Chart 3a). Links to Russian NFCs largely reflect external financing activity

¹⁵ The BIS recently completed a public consultation on the "Identification and measurement of step-in risk" for banks: <http://www.bis.org/bcbs/publ/d349.pdf>

¹⁶ The data only provide geographic linkages on a first counterpart basis.

¹⁷ Consolidation is defined according to IFRS10 or Local GAAP.

Charts 3a, 3b: SPV Consolidator and Sponsor by Country and Sector



Source: Central Bank of Ireland.

by energy and transport companies listing debt securities on various stock markets, including through the ISE, with the SPVs consolidated directly into the sponsor.¹⁸ There are also linkages for the non-consolidated entities, with around one-sixth declaring a noted interest by another entity. The extent of the geographic and sector linkages are highlighted by the fact that the ‘Other’ sector in Chart 3a has 37 consolidator links to sectors in 22 countries, reflecting relatively small SPVs engaged in a diverse range of activities.

For sponsor links, four countries stand out, in terms of their percentage share of total assets, namely the UK, US, Russia and France. While the range of SPV sponsors is quite diverse (Chart 3b), typically the same type of sponsor tends to concentrate in similar activities. A broad overview of sponsor activity includes the following:

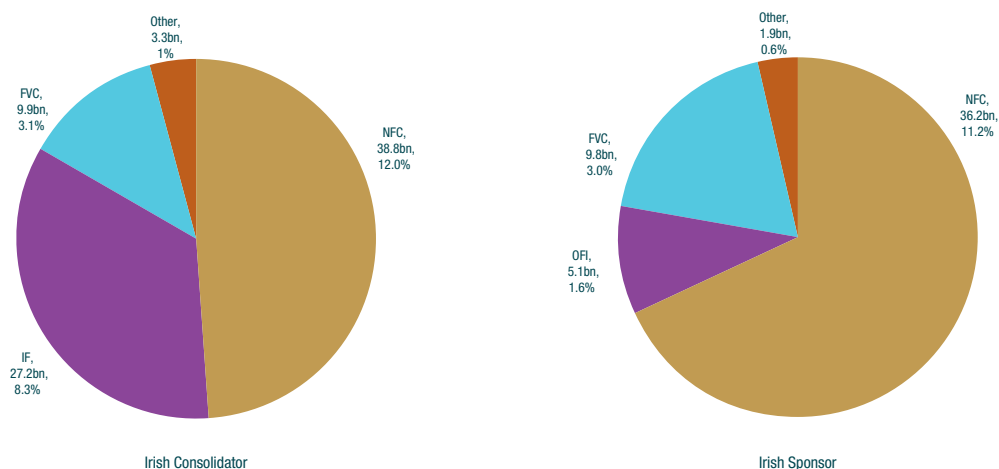
- Banks, OFIs and NFCs are the most prominent sponsors of SPVs;

- For Russian banks and NFCs, external financing is the predominant activity.¹⁹ These SPVs obtain funding through European markets;
- For US OFIs and NFCs, intra-group finance is the largest activity, although this is heavily concentrated in a small number of vehicles;
- US OFIs are largely fund managers employing SPV structures;
- US banks mainly employ investment strategies for capital appreciation, interest or dividend income, though repackaging activity is also prominent;
- UK OFIs mainly engage in fund-linked asset management though these are often consolidated into other entities;
- UK banks engage in a diverse range of activities though the majority involve investments for capital appreciation or dividend income.

¹⁸ An SPV proposing to have debt securities admitted to trading on a regulated market, such as the ISE, or offer debt securities to the public within the European Economic Area must first have its prospectus approved by the Central Bank.

¹⁹ EU Regulation 960/2014, effective from the 1st of August 2014, sets out a list of entities for which aiding in the issuance of certain transferable securities and money market instruments is prohibited in the EU. Only entities expressly named in the Regulation are affected and we have found no evidence that any Irish SPV is in breach of these sanctions.

Charts 4a, 4b: SPV Consolidator and Sponsor by Irish Sector



Source: Central Bank of Ireland.

Finally the 'Other' sector in Chart 3b has 66 sponsorship links to sectors in 35 countries, a significantly larger number than for consolidation linkages.

3.2.b Linkages within Ireland

The contribution from domestic SPVs to Irish GDP is very limited. They are generally designed to be tax neutral and most are established as companies with Irish directors but no dedicated employees. Their contribution arises indirectly through fees to resident professional services, primarily in the legal and financial sectors. Estimates by the Central Bank suggest that fees paid in Ireland were less than €100 million in 2015.

Irish SPV exposures are mainly loan claims on NFCs and OFIs. While NFC loan claims largely reflect corporate financing activity, OFI loans often reflect multi-vehicle structures. Irish assets could potentially exist in non-resident vehicles or entities within these structures. However, as exposures are reported to the Central Bank on a first counterparty basis, these cannot be identified within the data.

Consolidation and sponsor links to domestic entities are primarily vis-à-vis NFCs, IFs, and FVCs (see Charts 4a and 4b). Irish NFC links largely reflect a small number of SPVs sponsored by multinational companies domiciled in Ireland as part of intra-group funding activities for their global operations. A significant portion of the remainder is accounted for by external financing activities carried out by large multinationals and SPVs undertaking operational leasing activities involving aircraft.²⁰ In most cases, the SPV is both sponsored by and consolidated into the Irish NFC. Links to the Irish investment fund industry reflect international vehicle structures, mainly sponsored by funds located in the US, Europe and Ireland. Finally, the link to the Irish FVC sector includes a large SPV which is part of the NAMA structure, highlighted in Charts 4a and 4b.²¹

4. Case studies

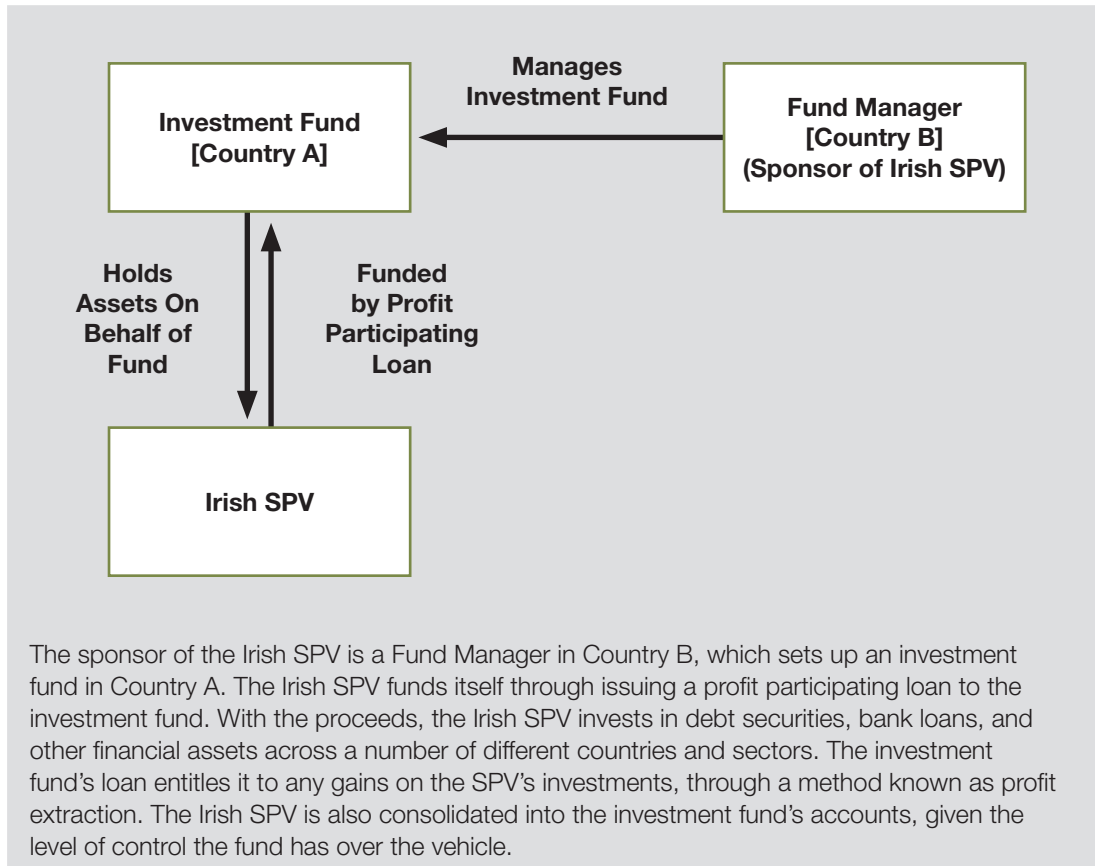
This section presents case studies of three typical categories of SPVs²²: (i) fund-linked asset management; (ii) loan origination; and (iii) external financing. These case studies highlight the complexity of SPV structures. In order to fully understand these structures, further international co-operation is necessary given their extensive cross-border linkages.

²⁰ Aircraft leasing is included with NFCs within Irish national and financial accounts statistics.

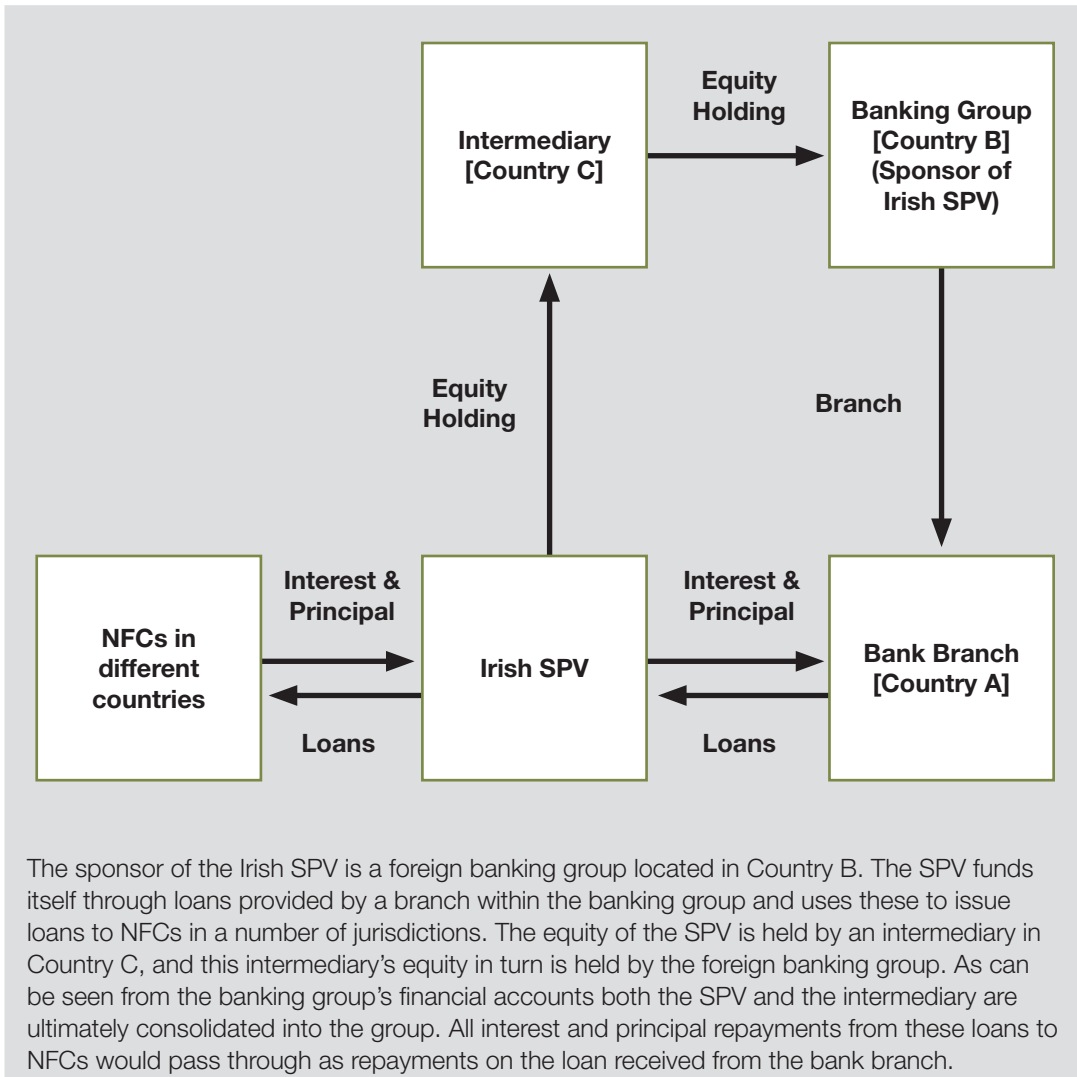
²¹ NAMA is a vehicle holding bank stressed assets following the crisis. It is structured so that vehicles dealing with specific areas, such as loan management, property management or management services are 100 per cent owned by a master vehicle.

²² See Table 1 for categorisation of SPVs by activity.

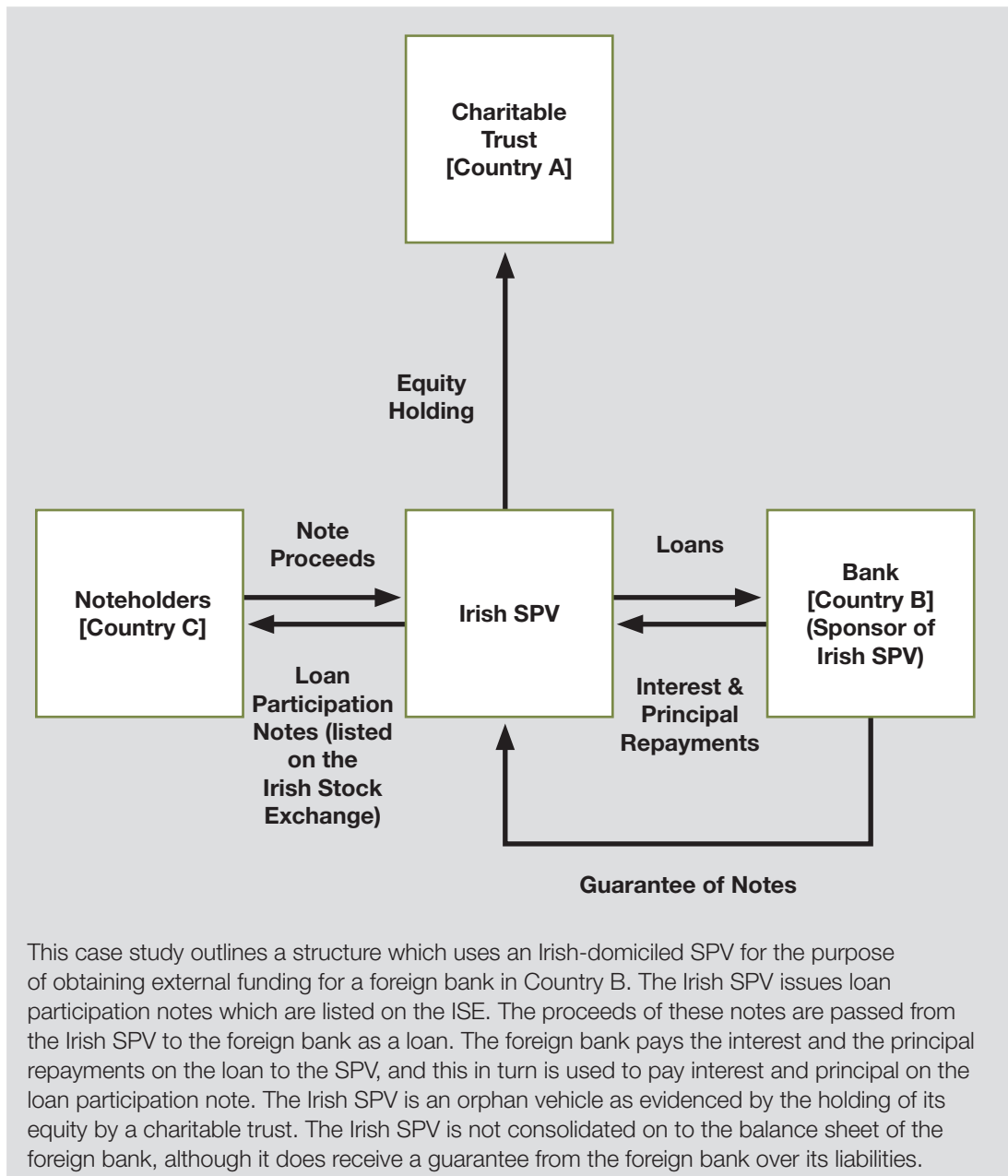
Case Study 1: Fund-Linked Asset Management



Case Study 2: Loan Origination



Case Study 3: External Financing



5 Enhanced measurement of shadow banking for Ireland

The FSB conducts an annual shadow banking monitoring exercise, where non-bank entities engaged in credit, are included within shadow banking unless a clear rationale can be presented for their exclusion. Ireland took part for the first time in 2015, providing

results based on data up to end-2014. The FSB defines shadow banking as “credit intermediation involving entities and activities outside of the regular banking system” (FSB, 2015). Alternative definitions have been published in academic studies but for the purposes of this article, the FSB methodology is used.²³ The FSB’s definition is based on shadow banking activities covering credit

²³ McCulley (2007) refers essentially to non-bank financial institutions engaged in maturity transformation, where liabilities mature on average before asset holdings. Alternative academic definitions of shadow banking tend to focus more on specific areas, such as money market funds, wholesale funding, deposit taking or lending activity, securitisation products or securities financing (Pozsar (2014), Gennaioli, Shleifer & Vishny (2011), Gorton & Metrick (2012) and Claessens & Ratnovski (2014)).

Table 2: Irish SPV Shadow Banking Total Asset Estimates based on the FSB's 2015 Methodology

Consolidated? If Yes, consolidator by sector. If No, sponsor by sector.		Included in shadow banking?	(1) Total Assets of all Irish SPVs	(2) Total Assets of Credit SPVs	(3) Amount included in measure of shadow banking	(4) Amount excluded from measure of shadow banking
YES	Bank	NO	33.5	30.1	-	33.5
	Other financial corporation*	YES	57.9	46.2	46.2	11.7
	Non-financial corporation	NO	93.8	84.8	-	93.8
NO	Bank	YES	46.6	40.1	40.1	6.5
	Other financial corporation*	YES	70.7	65.4	65.4	5.3
	Non-Financial Corporation	NO	21.1	16.1	-	21.1
			323.6	282.7	151.7	171.8

Source: Authors' calculations.

Note: Figures in € bn.

* All SPVs linked to non-bank financial corporations are included in the adjusted shadow banking estimate following a prudent approach. It also includes a very small number of vehicles linked to non-profit entities that undertake similar activities to investment funds.

intermediation involving significant maturity/liquidity transformation, leverage or credit transfer. The FSB measure of shadow banking is part of an evolving process, which looks to improve the definition and methodology behind the FSB's measurement. These improvements are driven through co-operation and dialogue amongst the participating jurisdictions and the FSB.²⁴

The new SPV data allow for a more comprehensive assessment of the contribution of SPVs to the FSB's measurement of the Irish shadow banking sector. The 2015 FSB shadow banking monitoring exercise estimated the Irish shadow banking sector at €2.25 trillion for end-2014, including the entire OFI residual (€498 billion at end-2014) (FSB, 2015).

As stated earlier, all Irish SPVs were included, under the OFI residual, on the basis that no breakdowns by type of activity were available. The new SPV data, including data on credit instruments (issuing/holding of debt securities or originating loans) and SPV consolidator and sponsor links, allow for a more refined approach to measuring shadow banking based on the FSB's 2015 methodology.

Table 2 provides estimates of the size of SPVs within the shadow banking sector in terms of total assets, based on the 2015 FSB methodology (Column 1).²⁵ SPVs are included where they are part of a shadow banking credit intermediation chain. This means that SPVs are excluded where the balance sheet contains no credit instruments, or where they

²⁴ For example, to improve the 2015 methodology, the FSB introduced the classification of non-bank financial entities under five economic functions, namely, (i) mutual funds susceptible to runs, (ii) lending dependent on short-term funding, (iii) intermediation dependent on short-term funding or secured funding of client assets, (iv) facilitating credit creation, and (v) securitisation (FSB, 2015).

²⁵ It should be noted, however, that the FSB definition is subject to refinement on an annual basis and estimates are based on the methodology used in the 2015 FSB shadow banking monitoring exercise.

are consolidated into a bank or linked to an NFC. The new data facilitates a more refined measurement after taking account of these adjustments. These adjustments reduce the measurement of shadow banking by €172 billion, as shown in Column 4 of Table 2.

6. Next steps

The diversity and complexity of the SPV population raises challenges in terms of further data development and analysis. On data development, work is ongoing within the Central Bank to build on the SPV database to further improve coverage of the residual non-bank financial sector. The Central Bank is liaising closely with the CSO to integrate the data within Ireland's macroeconomic statistics. The first challenge is to develop a comprehensive register of all SPV-type activities, including those not covered by Section 110.

Further analysis of SPVs is also planned to fully understand the rationale underlying SPV activities, with particular focus on those entities with potential financial stability implications, both domestic and international. Areas of particular focus include the potential to bypass controls on parent entities from regulations, or deficiencies in other oversight mechanisms. In particular, funding, liquidity, and loan origination provided by SPVs could dry up during periods of market stress, exacerbating existing stresses in these areas and increasing market uncertainty.²⁶ The work also feeds into international initiatives at the European Systemic Risk Board (ESRB), the FSB and the International Organization of Securities Commissions (IOSCO) to address data gaps. The Central Bank intends to assess the potential to link the new SPV data with existing regulatory information to derive better insights into shadow banking in Ireland and to inform international analysis on the global financial services landscape. However, given the cross-border nature of SPV activities, maximising these data for policy purposes requires close co-operation at an international level. In addition, the Central Bank intends to publish

regular statistical releases and analysis of SPV activity in Ireland.

7. Conclusion

This article explores a new database of SPVs collected by the Central Bank and provides some initial findings and analysis. The database covers 822 SPVs with aggregate assets of €324 billion at end-Q4 2015, improving oversight of these vehicles and filling data gaps. Key findings point to the diversity and complexity of the activities undertaken in the SPV sector, and the range of geographical and institutional sector linkages. The analysis of the new SPVs database has resulted in a more refined measurement of the size of Irish shadow banking activities, with a €172 billion reduction in this measure arising from the new information on consolidation and linkages. Moreover, case studies developed in this article investigate a selected number of SPV models in-depth to draw out the typical complexity of the structures in which SPVs operate.

The new database addresses a significant data gap on SPV activities, and enhances the Central Bank's ability to assess any financial stability risks arising from these. The new data will also help inform discussions at international level, as the availability of granular data for non-securitisation SPVs is extremely limited. Irish resident SPVs are often part of multi-vehicle operations operating across borders. In this context, the need to co-operate across borders and to improve data sharing capabilities is essential to fully understand the rationale underlying SPV activities and any associated risks. The Central Bank is fully supportive of initiatives at international level to enhance data sharing. The new data also enhance information on Ireland's non-bank financial sector and the Central Bank is working closely with the CSO to integrate these within macroeconomic aggregates. While the new data represent a significant step forward, further work is required, both domestically and at international level, to develop a full understanding of SPV activities and to inform policy making in this area.

²⁶ In terms of the potential risks within SPVs, BIS (2009) presents a comprehensive overview.

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Option Implied Probability Density Functions: Methodology and Use in Understanding Investor Sentiment

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Abstract

The following paper presents a modelling approach which estimates risk neutral option-implied probability density functions (PDF) from market traded options. An option-implied PDF depicts estimates of future movements of an asset price, as priced by investors. Such an approach is of benefit as it incorporates information from the full distribution of investor beliefs, rather than relying just on the mean expectation. Based on market prices, PDFs indicate the distribution around the mean at various probability bands in graphical form, which can in turn provide insight into how markets are pricing in future movements in the price of an asset and the volatility around these expectations. The purpose of this article is to demonstrate the benefits of such models and provide guidance on how they may be constructed and interpreted.

The article presents an overview of the methodology as well as somewhat more intuitive explanations of the process and outputs. Guidance is also given on the interpretation of model outputs, using options written on Brent Crude Oil as sample PDFs. Finally, a more in-depth study is provided on market expectations for the EUR/USD exchange rate out to March 2017, as at 15 August 2016, with outputs from this tool informing the analysis.

¹ The views expressed in this article are those of the authors and are not necessarily those held by the Central Bank of Ireland. The authors would like to acknowledge, with thanks, the helpful comments and suggestions of William Molloy, Brian Gallagher, Patrick Haran, David Doran, Thomas Brophy, Maurice McGuire and other colleagues in the Financial Markets Division of the Central Bank of Ireland.

Introduction

One of the primary ways in which market participants hedge against the risk of movements in asset prices is through the use of derivatives, such as options contracts. Options are financial instruments that give the buyer the right (but not the obligation) to buy or sell an asset at a point in time in the future, at a price agreed at the time of purchase. Through their pricing, information can be extracted which can provide insight into market expectations of the future movements in the price of an asset, in particular, the mean estimate at a point in time and the distribution around the mean within which the asset is expected to fluctuate at a given confidence interval.

In recent years, there has been a great deal of research dedicated to the extraction of information from the options market. One development through this research is the methodology used to construct option implied risk-neutral PDFs. An option-implied PDF provides the expected value of an asset price, as perceived by investors, normally presented in graphical form; a series of PDFs can be linked together to form a fan chart, which illustrates expected values priced in by investors at future points in time. Through these two graphs, a large amount of market information embedded in option pricing can be depicted in two relatively intuitive forms.

The following paper outlines a modelling approach which constructs these two outputs. The method applied follows that described by Bliss and Panigirtzoglou (2000), and the approaches taken by the Bank of England's Clews, Panigirtzoglou and Proudman (2000), the European Central Bank's (ECB) Vincent-Humphreys and Gutierrez (2010) and Wright (2016).

The purpose of this article is to demonstrate the effectiveness of such a modelling approach and provide guidance on how they may be constructed and interpreted. In order to demonstrate the benefits associated with the development of an option implied PDF

approach, two studies on Brent Crude Oil prices and the EUR/USD exchange rate are also presented.

Section 1 provides an overview of the methodology applied, Section 2 outlines the outputs from the model and the manner in which they may be interpreted using a study on Brent Crude Oil, and Section 3 provides a study on market expectations for the value of the euro versus the dollar as implied by market options, demonstrating the benefits of constructing option implied PDFs.

1. Model Overview

A market based forward rate is the market's aggregate expectation of the future value of a variable, e.g. the Euribor forward curve is the market's mean expectation for the future rates of Euribor at different time horizons. Other derivatives, such as options, can provide additional information regarding investors' expectation of the future movements of assets prices, such as the probability distribution of different future prices around the mean. As previously mentioned, an option gives the buyer the right (but not the obligation) to buy (call options) or sell (put options) an asset at a point in time in the future, at a price agreed at the time of purchase. The agreed price is known as the strike price. The price of an option is also called the option premium.

One of the main factors driving this cost is the 'moneyness' of the option, i.e. the strike price relative to the current price of the underlying asset. For example if the EURUSD is currently at 1.10, and you are seeking to purchase a call option with a strike price of 1.09 this holds value to the option buyer, given that if it were exercised now the option buyer will have the right to buy the asset at less than its current value, and thus must pay for this privilege. This option is therefore considered to be 'in-the-money'. In contrast if the option's strike price were 1.11, it would be of less value given that it does not hold any immediate value, other than the speculative value of potential future price changes.

The premise of any model which constructs option implied PDFs is that the relationship between the expected value of a variable and the amount investors are willing to pay for this option is indicative of the probability assigned to the price matching the strike price.

While all models will be underpinned by this assumption, there exists a range of possibilities regarding the conversion of options data into probabilities. The approach followed here uses the non-parametric method for estimating fixed date expiry PDFs described in Bliss and Panigirtzoglou (2000) and Cooper (2000), with this approach following the result derived by Breeden and Litzenberger (1978). Presented as follows is the modelling approach and technical model overview. A glossary of terms is also provided in Annex 1 which defines a number of terms used throughout.

Modelling approach

The relationship between the value of the underlying asset and the options strike price and premium is used to extract the market assigned probability to a given outcome. The starting point in the modelling process is the collation and sorting of these variables into respective premium-strike pairs.² Once these pairs are identified it is possible to calculate the market implied probabilities for each pair from this information.

However, the methodology followed does not infer probabilities directly from the available premium-strike pairs. This has been found to lead to unwanted instability in results given small changes in data inputs i.e. a small change in the cost of one option may lead to a large distortion in the entire distribution, as described by Bliss and Panigirtzoglou (2000). In order to construct a more robust distribution, the Black-Scholes option pricing model is used to transform the collected premium-strike pairs into implied volatility-strike pairs. Implied volatility is the expected degree of variation of the price of the underlying asset, derived from the price of the option, as described by Black and Scholes (1973).

Following this transformation, a discrete set of implied volatility-strike pairs is available for each maturity. In order to depict a full range, and not just this set of discrete points, it is required to firstly interpolate between these data points; this is done through a cubic smoothing spline, as described by Campa et al. (1997). The benefit of using a smoothing spline is that it is a non-parametric approach which produces robust outputs. Subsequently, in order to extend this range beyond the range of traded options (i.e. the last available data points at either side); a quadratic curve is used to extrapolate the data beyond the available data points. This full range now represents what is known as a 'volatility smile' given the changing slope of the curve as options move either further in or out of the money at the extremities of the distribution.

The interpolated implied volatility-strike values (volatility smile) are then transformed back into premium-strike pairs. This is done by using the inverse of the Black-Scholes equation previously discussed to convert the implied volatilities into premiums. Finally, using partial differentiation (as outlined in more detail below), probabilities can be implied based on these strike-premium pairs. The results are then graphed in order to produce a series of PDFs which are then used to create a fan chart depicting the distribution of probabilities assigned by the market to a given variable over a range of maturities.

Technical modelling approach overview

For this paper, the non-parametric method for estimating fixed date expiry PDFs described in Bliss and Panigirtzoglou (2000) and Cooper (2000) is used. This method is based upon the result derived by Breeden and Litzenberger (1978), whereby the PDF can be extracted by calculating the second partial derivative of the call price function, extracted from contemporaneous option prices, with respect to the strike price. Unlike other models, this method does not make any assumptions about the probability distribution of the data.

² European style options are used as data inputs throughout our analysis. European style options can only be exercised on their expiration date (i.e. at a single predefined point in time in the future).

Using the Cox and Ross (1976) stochastic pricing model, the call option price at time t , C_t , is defined as the risk neutral expected payoff of the option at the time of the option's maturity, T , discounted back using the risk-free rate;

$$C(S, K, \tau) = e^{-r\tau} \int_K^{\infty} (S_T - K)g(S_T)dS_T \quad (1)$$

Where, S_T is the price of the underlying asset at time T , $g(S_T)$ is the risk neutral PDF, K is the strike price of the option, r is the risk-free rate and $\tau = T - t$. A put option price is defined as;

$$P(S, K, \tau) = e^{-r\tau} \int_0^K (K - S_T)g(S_T)dS_T \quad (2)$$

The PDF can now be inferred directly from these elements; however, as detailed in the previous section, following the results derived from Shimko (1993), it is suggested that better results can be obtained if we use the option premia to calculate implied volatilities at each strike. In order to complete this transformation the Black-Scholes equation is employed. Firstly, implied volatilities are computed by solving numerically the implied value of sigma for each option, as all other values are observable, using the Black-Scholes equation:

$$C(S, \tau) = N(d_1)S - N(d_2)Ke^{-r\tau} \quad (3)$$

where;

$$N = \text{standard normal cumulative distribution function} \quad (4)$$

and;

$$d_1 = \frac{1}{\sigma\sqrt{\tau}} \left[\ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)\tau \right] \quad (5)$$

and;

$$d_2 = \frac{1}{\sigma\sqrt{\tau}} \left[\ln\left(\frac{S}{K}\right) + \left(r - \frac{\sigma^2}{2}\right)\tau \right] \quad (6)$$

Taking the range of implied volatilities, the discrete set of observations is interpolated across to obtain a larger number of observations along the volatility smile. The Black-Scholes equation is then used once again to transform the interpolated strike-sigma pairs back into strike-premium pairs.

As shown in Breeden and Litzenberger (1978), the risk neutral PDF can be calculated as the second partial derivative of the call price function (1) with respect to the strike price, K ;

$$\frac{\delta^2 C}{\delta K^2} = e^{-r\tau} g(S_T) \quad (7)$$

While this derivation implies continuous strike-price pairs, empirically there are a finite number of observations and cubic spline interpolants are used in order to estimate the PDF across a larger number of strikes. This is done through transformation of the observed values into sigma-strike pairs to form a 'volatility smile' and then interpolating across this smile to obtain more observations for the PDF, as outlined above.

Finally, in order to construct the fan charts, the appropriate interpolated values are found for each specific probability band across each future maturity date. The respective values are joined together to form the fan charts, which can then be used to interpret the implied expectations of the evolution of the path of the underlying variable and associated volatility over time.

Key modelling assumptions

The primary assumption made relates to that of risk-neutrality. Risk neutrality is the assumption that the prices taken from options reflect investors' true expectations of future asset prices. In reality, however, it is likely that some level of non-neutral risk behaviour (risk

aversion or seeking) exists in pricing. Therefore this could distort the shape of a PDF; the extent to which this is true is likely dependent on a number of factors, including the asset class considered, the time to maturity, etc. No correction is made within the described model, and so this should be noted when interpreting outputs.

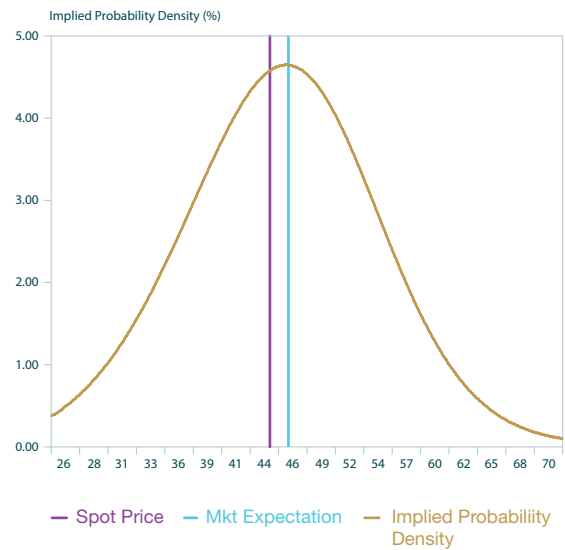
Finally, clarity should be given relating to the use of the Black-Scholes equation within the model. Readers familiar with the equation will be aware that a number of assumptions are made within this quantitative process relating to the relationship between the underlying asset and market efficiency. However, these assumptions do not affect our analysis; the formula is solely used as a transformation process, which is later reversed, thereby imposing none of these assumptions on estimated PDFs.

2. Model Output and Interpretation

The primary model outputs are the respective PDFs and fan charts. Chart 1 illustrates a sample PDF constructed from options written on Brent Crude Oil with a maturity of December 2016 (with the options recorded as at 15 August 2016). The PDF therefore depicts investor estimates for the price of oil in December 2016. Three parameters define this chart. First, the chart is labelled by the date at which the options expire, in this instance December 2016. Second, the chart's x-axis denotes the investor perceived price of the asset. Here the blue line equates to the mean expectation of the future value, with the central expectation for oil to equal \$46 in December 2016. Finally, the chart's y-axis equates to the density at which expectations are observed. The density is measured in probability percentage, with the full area under the curve equalling 100%.

Chart 2 depicts a fan chart of option implied expectations relating to Brent Crude Oil (again

Chart 1: Brent Crude Oil option implied PDF, Dec 2016



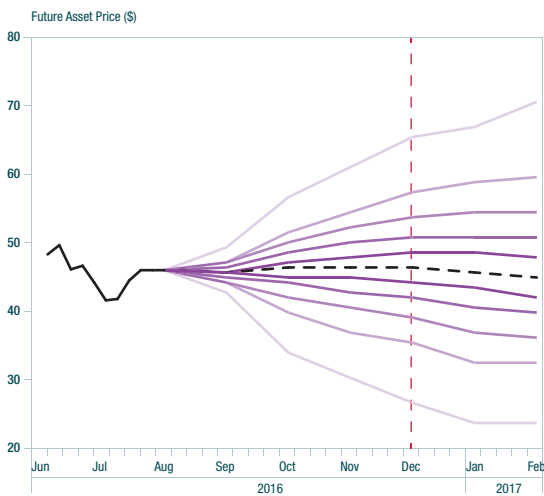
Source: CBI calculations.

with the options recorded as at 15 August 2016). While Chart 1 relates to an individual point prediction, Chart 2 is constructed from a series of PDFs, tying together market expectations across a range of time horizons (from September 2016 out to February 2017), and thus charting the implied path of the underlying asset price, surrounded by 10 per cent probability bands. At each separate time horizon depicted, there is a corresponding PDF being captured. In this instance the red dashed line is the distribution relating to the PDF above, i.e. December 2016. As the time horizon increases, the probability bands widen, which makes sense intuitively given increased uncertainty.

Here again three parameters define the graph. Firstly, the y-axis equates to the maturity of the set of options written. Secondly, the x-axis now equates to the expected price of Brent Crude Oil. Finally, the density at which expectations are observed is captured by the width between each coloured line within the chart. Each

purple line, equates to a 10 per cent implied probability band, with the two outside lines equalling the 1st and 99th percentile of the distribution and the black dashed line representing the mean (i.e. 50 per cent probability band). The width between each of these lines is indicative of the level of uncertainty. Here it is evident that in the tails of the distribution, there is a greater dispersion of estimates.

Chart 2: Brent Crude Oil option implied fan chart to Feb 2017



Source: CBI calculations.

A number of summary statistics relating to both the PDFs and fan charts are of particular interest when attempting to draw conclusions, including a distribution's standard deviation, which can be interpreted as the volatility expected by the market in relation to the evolution of the price. Further, the skewness of a distribution reflects the balance of risks around the aggregate expectation of the evolution of a price. If the skew is to the downside, on balance, the market has a greater expectation of downside risks to the price and vice versa.

The analysis of these summary statistics can provide analysts with a significant level of information relating to market expectations. For example, it is evident from Chart 1 above that there is an expectation for oil to remain little changed out to December 2016, with the spot lies only slightly below the mean expectation. However, equally as evident is that there is a large degree of uncertainty around this view, with the range of expectations between \$26 and \$70 at the respective 1st and 99th percent confidence interval. The skew of the distribution at December 2016 equates to 0.28, meaning that there is a slightly greater weight of expectation for oil to exceed this mean expectation, but not to a great extent. If we look at Chart 2, however, we can see that the expected oil price falls below the spot value beyond the last observation period, with the skew moving towards zero.

3. Market Outlook for the EUR/USD Exchange Rate as at 15 August 2016

The EUR/USD exchange rate plays an important role in economic developments. There are a range of factors which affect the exchange rate between two currencies including interest rate differentials, current account deficits, debt profiles, growth expectations, which can all contribute to exchange rate pricing. With so many contributing factors, it can be very difficult to isolate one driving factor at a particular point in time.

Over the past two and a half years, the euro has seen significant depreciation in value against the dollar. In mid-2014, the euro traded at close to \$1.40. However, beginning in May 2014 the euro fell sharply for ten months, depreciating by close to 25 per cent against the dollar from peak to trough (Chart 3). Monetary policy expectations were one likely catalyst for these moves, with a divergence in policy occurring between the Federal Reserve and ECB, as rates were expected to be raised

in the US while policy easing was expected to continue in the euro area. More recently, the euro has tended to remain relatively range bound, having recovered somewhat from its March 2015 low.

Chart 3: EUR/USD Spot Rate



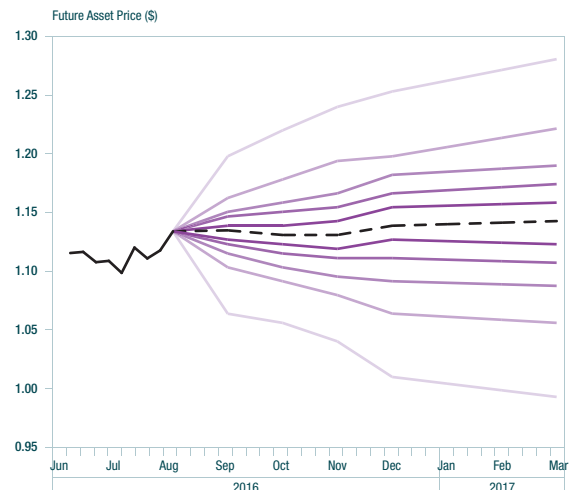
Source: Bloomberg.

In order to assess the likely path of the currency pair, as seen by market participants, we are able to look beyond the EUR/USD spot price, and take a forward looking perspective on the cross from the currency options market. This forward looking perspective is likely to encompass a range of variables which would weigh upon the exchange rate out to each respective maturity date. Chart 4 below depicts the fan chart for the EUR/USD pair out to March 2017, as constructed using the approach presented, using data from 15 August 2016. Here it is evident that the central market expectation, marked by the black dashed line, is for the euro to appreciate slightly against the dollar out to the last maturity date. With regards to the balance of risks, across the majority of maturities the distribution is relatively balanced. Each distribution is only marginally positively skewed, indicating that the market sees a

slightly greater chance of the euro appreciating beyond its central expectation, rather than falling short of it.

With this outlook in mind, it appears that, all other things being equal, the market expected the euro to increase slightly against the dollar over the coming months. However, in the recent past there has been significant re-evaluation in expectations reflecting a range of factors, including expectations of monetary policy action, illustrating that this type of analysis is very much focused on a point in time.

Chart 4: Euro option implied fan chart to March 2017



Source: CBI calculations.

4. Summary

Presented in this paper is an approach that constructs PDFs and fan charts from market traded options. These are intuitive graphical representations of information extracted from market options, which provide insight into market expectations of the future movements of financial asset prices, and will complement current market analysis conducted. The purpose of this note is to demonstrate the

effectiveness of such models, and provide guidance on the manner in which they are constructed and may be interpreted.

Examples of applying the method were also provided. Firstly, options written on Brent Crude Oil, as at 15 August 2016, were taken to demonstrate the manner in which the model outputs can be interpreted, and how information in the probability bands of a distribution can be extracted in order to complement information regarding the market's mean expectation. A second study of the market's expectation of the EUR/USD exchange rate, as at 15 August 2016, is also presented which demonstrates how outputs from the model can be used in practical application.

Annex 1: Glossary of Terms

Underlying Asset: is the asset which is to be bought or sold on the future date, against which the option is written.

Strike price: a strike price is the price at which an option can be exercised, i.e. the agreed price at which the underlying asset can be bought/sold.

European options: can be exercised only upon an agreed exercise date. Options which grant the right to sell the underlying asset are known as “puts”, with options which grant the right to buy the underlying asset called “calls”.

Non-parametric: means that no assumption has been made in relation to the parameters of the frequency distribution in the fitting process. Inversely a parametric approach makes some assumptions in regards the structure of the probability distribution of the data, and imposes this structure when fitting data.

Skewness: is the third moment of a distribution measuring the asymmetry of the probability distribution. A normal distribution has a skewness of 0; negative scale indicates that there is a longer or fatter tail on the left side of the distribution, and vice versa.

Implied volatility: is that value of the volatility of the underlying instrument which, when input in an option pricing model will return a theoretical value equal to the current market price of the option.

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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

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