QUARTERLY ECONOMIC COMMENTARY

SPRING 2019

**KIERAN MCQUINN, CONOR O'TOOLE, MATTHEW ALLEN-COGHLAN
AND PHILIP ECONOMIDES**

EVIDENCE FOR POLICY

ESRI ECONOMIC & SOCIAL
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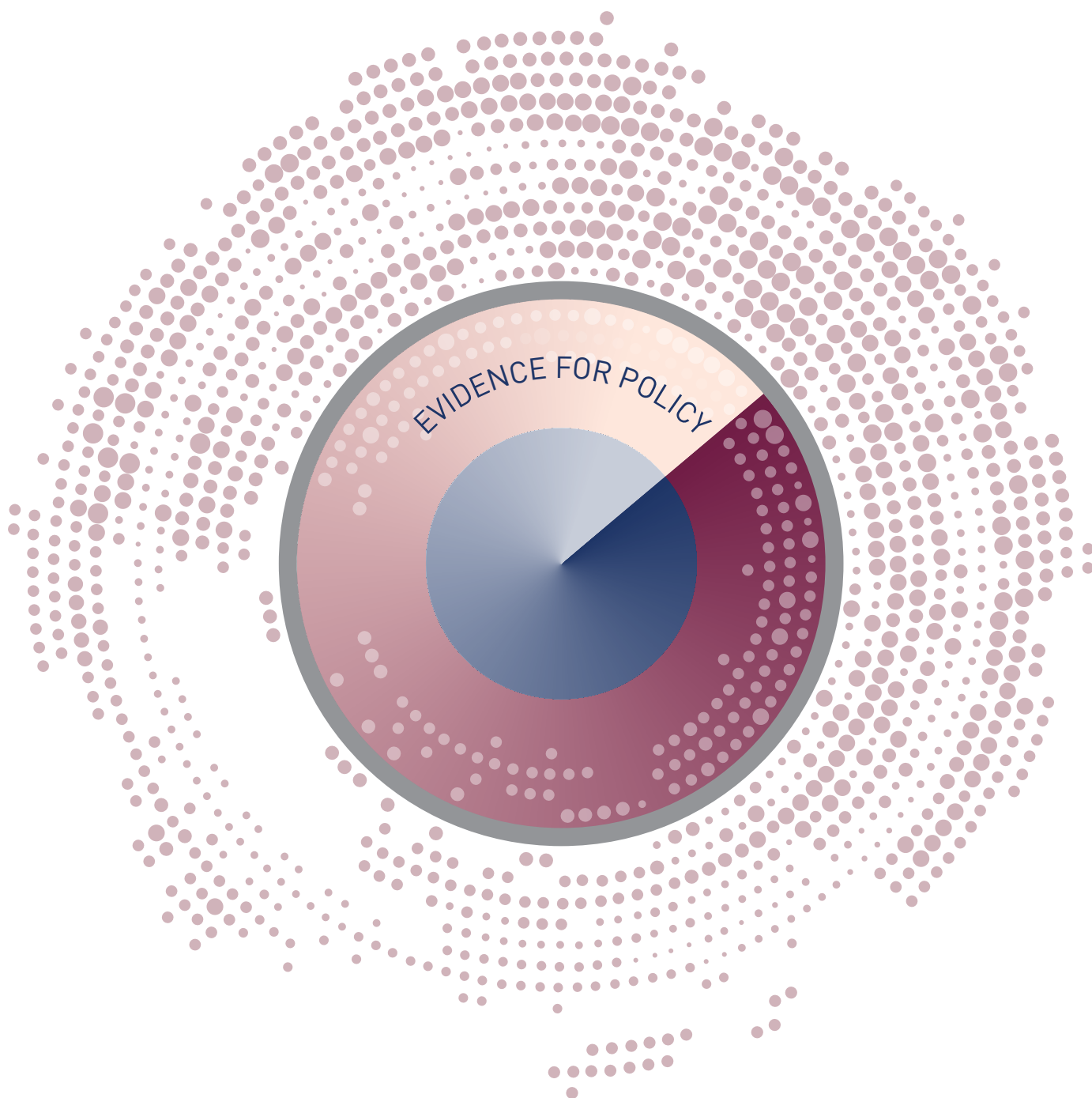
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Kieran McQuinn
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Spring 2019

The forecasts in this *Commentary* are based on data available by 14 March 2019

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THE AUTHORS

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SUMMARY TABLE

	2016	2017	2018	2019	2020
Output (Real Annual Growth %)					
Private Consumer Expenditure	4.0	1.6	3.0	2.3	2.2
Public Net Current Expenditure	3.5	3.9	6.4	6.5	5.3
Investment	51.7	-31.0	9.8	7.5	8.0
Exports	4.4	7.8	8.9	4.3	4.4
Imports	18.5	-9.4	7.0	6.3	6.1
Gross Domestic Product (GDP)	5.0	7.2	6.7	3.8	3.2
Gross National Product (GNP)	11.5	4.4	5.9	3.4	3.0
Prices (Annual Growth %)					
Consumer Price Index (CPI)	0.0	0.3	0.6	1.0	1.4
Growth in Average Hourly Earnings	2.5	1.5	3.0	3.2	3.4
Labour Market					
Employment Levels (ILO basis ('000))	2,132	2,194	2,250	2,307	2,356
Unemployment Levels (ILO basis ('000))	195	158	145	126	120
Unemployment Rate (as % of Labour Force)	8.4	6.7	5.7	5.2	4.8
Public Finance					
General Government Balance (€bn)	-1.5	-0.8	0.4	-0.9	-1.5
General Government Balance (% of GDP)	-0.5	-0.4	0.1	-0.3	-0.4
General Government Debt (% of GDP)	73.4	68.4	64.7	63.1	58.3
External Trade					
Balance of Payments Current Account (€bn)	-11.4	24.9	29.0	17.0	12.1
Current Account (% of GNP)	-5.1	10.7	11.5	6.5	4.4

Note: Detailed forecast tables are contained in an Appendix to this *Commentary.*

NATIONAL ACCOUNTS 2018

A: EXPENDITURE ON GROSS NATIONAL PRODUCT

	2017	2018	Change in 2018		
	€ bn	€ bn	Value	Price	Volume
Private Consumer Expenditure	99.9	104.3	4.4	1.4	3.0
Public Net Current Expenditure	29.6	32.0	8.1	1.5	6.4
Gross Fixed Capital Formation	69.0	79.4	15.1	4.8	9.8
Exports of Goods and Services	352.6	383.8	8.9	0.0	8.9
Physical Changes in Stocks	3.5	1.6			
Final Demand	**554.6**	**601.1**	**8.4**	**0.9**	**7.4**
less:					
Imports of Goods and Services	263.3	316.7	8.7	1.0	7.7
Statistical Discrepancy	2.8	1.8			
GDP at Market Prices	**294.1**	**318.5**	**8.3**	**1.5**	**6.7**
Net Factor Payments	-61.0	-66.6			
GNP at Market Prices	**233.1**	**251.8**	**8.0**	**1.9**	**5.9**

B: GROSS NATIONAL PRODUCT BY ORIGIN

	2017	2018	Change in 2018	
	€ bn	€ bn	€ bn	%
Agriculture, Self Employed Income	3.5	3.8	0.3	9.4
Agriculture, Employee Remunerations	0.7	0.7	0.0	0.0
Non-Agriculture, Employee Remunerations	85.7	90.7	5.0	5.9
Other	113.3	118.3	5.0	4.4
Adjustments: Stock Appreciation	0.0	0.2		
Statistical Discrepancy	-2.8	-3.0		
Net Domestic Product	**250.6**	**271.9**	**21.3**	**8.5**
Net Factor Payments	-61.0	-66.6	-5.7	9.3
National Income	**189.6**	**205.2**	**15.6**	**8.2**
Depreciation	72.0	74.8	2.8	3.9
GNP at Factor Cost	**261.6**	**280.0**	**18.4**	**7.0**
Taxes less Subsidies	-28.4	-28.2	0.3	-1.0
GNP at Market Prices	**233.1**	**251.8**	**18.7**	**8.0**

C: BALANCE OF PAYMENTS ON CURRENT ACCOUNT

	2017	2018	Change in 2018
	€ bn	€ bn	€ bn
X – M	89.3	99.5	10.2
F	-59.8	-65.4	-5.6
Net Transfers	-4.6	-5.1	-0.5
Balance on Current Account	**24.9**	**29.0**	**4.1**
as % of GNP	10.7	11.5	1.6

NATIONAL ACCOUNTS 2019

A: EXPENDITURE ON GROSS NATIONAL PRODUCT

	2018	2019	Change in 2019		
	€ bn	€ bn	Value	Price	Volume
Private Consumer Expenditure	104.3	108.5	4.0	1.7	2.3
Public Net Current Expenditure	32.0	35.3	10.5	3.8	6.5
Gross Fixed Capital Formation	79.4	87.4	10.0	2.4	7.5
Exports of Goods and Services	383.8	404.7	5.4	1.1	4.3
Physical Changes in Stocks	1.6	3.0			
Final Demand	601.1	638.9	6.3	1.6	4.6
less:					
Imports of Goods and Services	284.4	306.3	7.7	1.3	6.3
Statistical Discrepancy	1.8	-0.1			
GDP at Market Prices	318.5	332.4	4.4	0.5	3.8
Net Factor Payments	-66.6	-71.0			
GNP at Market Prices	251.8	261.4	3.8	0.4	3.4

B: GROSS NATIONAL PRODUCT BY ORIGIN

	2018	2019	Change in 2019	
	€ bn	€ bn	€ bn	%
Agriculture, Self Employed Income	3.8	3.9	0.1	2.6
Agriculture, Employee Remunerations	0.7	0.7	0.0	0.0
Non-Agriculture, Employee Remunerations	90.7	96.2	5.5	6.1
Other	118.3	123.3	4.9	4.1
Adjustments: Stock Appreciation	0.2	0.2		
Statistical Discrepancy	-3.0	-3.0		
Net Domestic Product	271.9	284.0	12.1	4.5
Net Factor Payments	-66.6	-71.0	-4.4	6.5
National Income	205.2	213.0	7.8	3.8
Depreciation	74.8	77.5	2.7	3.6
GNP at Factor Cost	280.0	290.5	10.5	3.7
Taxes less Subsidies	-28.2	-29.0	-0.9	3.1
GNP at Market Prices	251.8	261.4	9.6	3.8

C: BALANCE OF PAYMENTS ON CURRENT ACCOUNT

	2018	2019	Change in 2019
	€ bn	€ bn	€ bn
X – M	99.5	98.3	-1.2
F	-65.4	-75.6	-10.3
Net Transfers	-5.1	-5.6	-0.6
Balance on Current Account	29.0	17.0	-12.0
as % of GNP	11.5	6.5	-4.6

NATIONAL ACCOUNTS 2020

A: EXPENDITURE ON GROSS NATIONAL PRODUCT

	2019	2020	Change in 2020		
	€ bn	€ bn	Value	Price	Volume
Private Consumer Expenditure	108.5	113.0	4.1	1.9	2.2
Public Net Current Expenditure	35.3	37.6	6.5	1.1	5.3
Gross Fixed Capital Formation	87.4	97.3	11.3	2.5	8.0
Exports of Goods and Services	404.7	427.5	5.6	1.5	4.4
Physical Changes in Stocks	3.0	3.0			
Final Demand	638.9	678.4	6.2	2.0	4.5
less:					
Imports of Goods and Services	306.3	329.8	7.7	1.7	6.1
Statistical Discrepancy	-0.1	-0.1			
GDP at Market Prices	332.4	348.4	4.8	1.9	3.2
Net Factor Payments	-71.0	-74.5			
GNP at Market Prices	261.4	274.0	4.8	1.6	3.0

B: GROSS NATIONAL PRODUCT BY ORIGIN

	2019	2020	Change in 2020	
	€ bn	€ bn	€ bn	%
Agriculture, Self Employed Income	3.9	4.0	0.1	2.6
Agriculture, Employee Remunerations	0.7	0.7	0.0	0.0
Non-Agriculture, Employee Remunerations	96.2	101.7	5.4	5.6
Other	123.3	128.4	5.1	4.1
Adjustments: Stock Appreciation	0.2	0.2		
Statistical Discrepancy	-3.0	-3.0		
Net Domestic Product	284.0	298.1	14.1	5.0
Net Factor Payments	-71.0	-74.5	-3.5	4.9
National Income	213.0	223.7	10.7	5.0
Depreciation	77.5	80.1	2.6	3.4
GNP at Factor Cost	290.5	303.7	13.3	4.6
Taxes less Subsidies	-29.0	-29.8	-0.8	2.6
GNP at Market Prices	261.4	274.0	12.5	4.8

C: BALANCE OF PAYMENTS ON CURRENT ACCOUNT

	2019	2020	Change in 2020
	€ bn	€ bn	€ bn
X – M	98.3	97.6	-0.7
F	-75.6	-79.4	-3.7
Net Transfers	-5.6	-6.1	-0.5
Balance on Current Account	17.0	12.1	-4.9
as % of GNP	6.5	4.4	-1.8

The Irish Economy – Forecast Overview

2018 saw the Irish economy register another sizeable increase in activity with GDP estimated to have risen by 6.7 per cent. While some of this increase is due to the disproportionate activities of a select number of multinational firms, the underlying performance of the economy is still remarkably strong. Increases in taxation receipts, even aside from corporation taxes and the ongoing dynamic performance of the labour market, are compelling evidence of this.

However, the present year has seen international sources of growth cool; the underlying weaknesses in the Chinese economy along with the deterioration in the trade relationship between the US and China have contributed to a reduction in the global outlook. The recovery in the Euro Area has also stalled somewhat. Inevitably, this will impact on the domestic economy, with the contribution of the trade balance to growth set to decline. These developments have led us to revise downwards our forecast of real GDP growth in 2019 from 4.2 per cent in the previous Winter *Commentary* to 3.8 per cent for 2019. It should be noted that all forecasts in the *Commentary*, unless otherwise stated, assume that the United Kingdom remains a member of the European Union.

The importance of Brexit for the Irish economy has seen the Department of Finance commission a joint research project with the ESRI to examine various different Brexit scenarios using COSMO – the structural model of the Irish economy. Other empirical work completed by researchers at the Institute (Lawless, 2016a; Lawless, 2016b; Lawless and Morgenroth, 2018)[1] examining the Brexit issue from a microeconomic persective has also been used in this exercise. The results of this analysis, which are published in a paper with the *Commentary* (Bergin et al., 2019), are used in the *Commentary* to examine the implications for the short-run growth outlook of the different scenarios. Therefore, like the previous *Commentary*, we produce a baseline set of forecasts under a no-Brexit scenario and complement this with a set of forecasts associated with certain Brexit outcomes.

Overall, this results in a baseline real GDP forecast of 3.8 per cent for the Irish economy in 2019 and 3.4 per cent in 2020. However, under a no-deal exit for the

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[1] Lawless, M. (2016a). *Intermediate goods inputs and the UK content of Irish goods exports*, Economic and Social Research Institute (ESRI).
Lawless, M. (2016b). 'Irish-UK Services Trade and Brexit', Working Paper No. WP595, Economic and Social Research Institute (ESRI).
Lawless, M. and E. Morgenroth (2018). 'Brexit and Irish Consumers', *Quarterly Economic Commentary*: Special Article, Economic and Social Research Institute (ESRI).

UK with significant disruptions, Irish GDP is expected to grow by just 1.2 per cent in 2019 and 2.5 per cent in 2020.

In the medium term, another challenge to the Irish economy is the prospect of monetary policy normalisation at the Eurozone level. In a Special Article to the present *Commentary*, Fahy et al. (2019), using micro-level data, examine the impact of a rise in ECB policy rates on the Irish mortgage market. Their findings illustrate that the mortgage market is more resilient than in the past and better able to withstand shocks. However, interest rate rises would affect certain cohorts of the Irish mortgage market.

The International Economy

The global economy appears poised for continued but slower growth in 2019 and 2020, however there are significant downside risks. Negotiations around the US-China trade dispute have intensified in Q1 2019, although no increases in tariff rates have, as yet, materialised. Furthermore, the Chinese economy is showing additional signs of economic uncertainty coming mainly through lower activity in the housing market and increased concern about domestic lending practices. These uncertainties have been incorporated into the IMF's *World Economic Outlook* as of January 2019, which revised world output growth down from 3.7 in its October issue to 3.5 per cent for 2019.[2] From a domestic perspective, these broad-based declines in growth rates across large economies suggest a weakening of global demand for Irish exports.

The European Union continues to display signs of an economic slowdown. According to preliminary estimates of year-on-year real GDP growth, economic activity among the EU28 fell from 1.8 per cent in Q3 2018 to 1.4 per cent Q4 2018. Using the same seasonally adjusted measure, France, Germany and Italy experienced a 0.9, 0.6 and 0.1 per cent annual rise in real GDP, respectively, in Q4 2018. This is a clear sign of deteriorating economic conditions in the Euro Area. However, the European labour market remains robust: as of December 2018, EU28 unemployment fell to 6.6 per cent, ranging from a low of 2.1 per cent in the Czech Republic to a high of 18.5 per cent in Greece. The ECB has ended its asset purchases programme as of January 2019 and recently announced that rate hikes are off the table until 2020 at least due to recent weakness in economic performance. Inflation in the Euro Area averaged 2.0 per cent in Q4 2018, though price increases have moderated in the first months of 2019.

This slowdown in the Euro Area has led a number of commentators to query the underlying strength of the European recovery. Whelan (2018) suggests that the recovery to date is cyclical in nature and the recent sluggishness reflects underlying weak productivity growth and demographic factors.[3] The combination of these issues is likely to result in slow average growth rates for the Euro Area in the coming decades. Amongst the many other implications of this trend, Whelan (2018) notes that slower future growth rates are likely to lead to the ECB setting lower interest rates in the future which are likely to be lower than average rates during the pre-crisis era. With Irish growth rates set to exceed those of the Euro

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2   International Monetary Fund (2019). *World Economic Outlook: A Weakening Global Expansion*, Washington, D.C.: International Monetary Fund, January 2019.

3   Whelan, K. (2018). 'Monetary Policy in an Era of Low Average Growth Rates', Monetary Dialogue November 2018, Directorate-General for Internal Policies of the Union (European Parliament).

Area over the short to medium term, domestic policymakers cannot expect monetary policy at the European level to 'lean against the wind' in terms of cooling demand-side pressures in the Irish economy. In this context, the use of countercyclical tools for both fiscal policy and macro-prudential policy will be critical in preventing any overheating which may occur.

As highlighted in Figure 1, real GDP growth in the UK had been trending downwards since well before the EU withdrawal referendum. Using measures of gross value added as a proxy for monthly changes in GDP, the ONS has highlighted a sudden loss of activity in both the production and manufacturing sectors. In Q4 2018, production contracted by 1 per cent while manufacturing contracted by 1.5 per cent relative to the same period last year. However, unemployment has continued to remain low throughout the year and is estimated to be 4.0 per cent in December 2018.

FIGURE 1   KEY UK ECONOMIC INDICATORS, YEAR-ON-YEAR CHANGE (%)
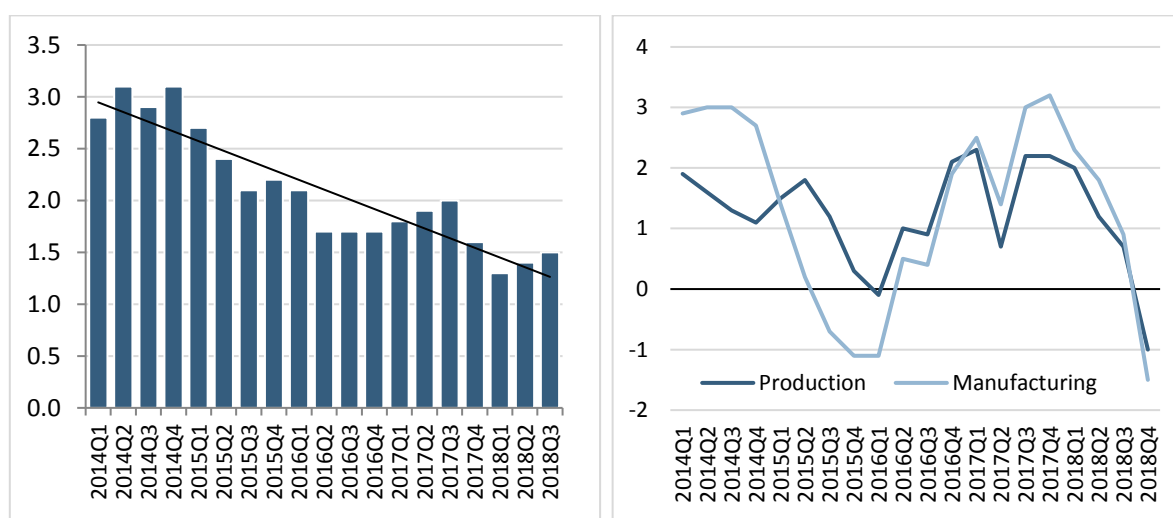
Sources: ONS, gross domestic product, percentage change, latest quarter on corresponding quarter of previous year (LHS); ONS, monthly GDP based on GVA (Gross Value Added), percentage change, latest three months on same three months a year ago (RHS).

As the key withdrawal date of 29 March approaches, much of the impact of Brexit already experienced by the UK economy has centred on exchange rate developments and slowdowns in investment activity. Between Q2 2016 and Q4 2018, the Pound lost 11.3 per cent of its value against the Euro. As displayed in Figure 2, the real economy experienced a broad-based disinvestment in Q4 2018. Among UK financial institutions, historically high levels of disinvestment have resulted in a net outflow of £26 billion worth of assets across the first three quarters of 2018. While developments in the real economy and financial markets are not always entirely correlated, both items appear to signal the recent manifestation of major uncertainty.

FIGURE 2   UK BUSINESS INVESTMENT YEAR-ON-YEAR GROWTH (%) AND UK FINANCIAL INSTITUTION NET INVESTMENT (£ BILLION)
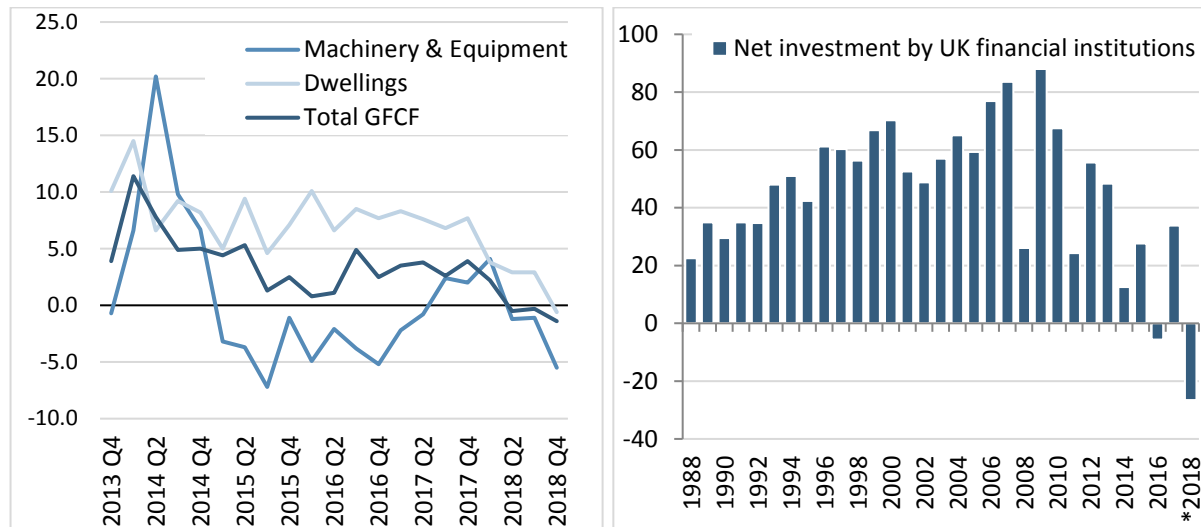
Source: ONS, Business investment real-time database (LHS), ONS, Investment by insurance companies, pension funds and trusts (RHS).
Note: *Net investment for 2018 captures the first three quarters of 2018 and hence is not an annual figure.

As Breinlich et al. (2019) conclude, signs of UK firms offshoring production to the EU are already present and can be expected to accelerate should there be increased barriers to trade and migration introduced in April 2019.[4] A number of studies have assessed the long-term effects of Brexit on the UK economy; predictions for a 'soft' Brexit in the form of a free trade agreement averages a 3.7 per cent fall in GDP relative to the baseline scenario of 'remain', whereas a 'hard' Brexit involving defaulting to WTO tariff rates averages a 6.0 per cent decline (Bergin et al., 2019). Given the uncertainty around Brexit, the ESRI undertook joint research with the Department of Finance to consider the economic implications of different Brexit scenarios. These are summarised in a paper included in the *Commentary* and the impacts for the short-term forecasts of the Irish economy are summarised in Box 1.[5]

The US economy grew at an annual rate of 3.5 per cent in Q3 2018. Personal consumption contributed 2.7 percentage points towards this increase. As of October 2018, the US unemployment rate declined to 3.7 per cent. Growth rates in Q4 2018 and Q1 2019 are expected to be slightly weakened by the recent government shutdown. Estimates indicate this is likely to amount to a 0.65 percentage point reduction in economic growth in Q1 2019.[6] As was widely anticipated, the Federal Reserve raised the official US interest rate to a range of

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[4]   Breinlich, H., E. Leromain, D. Novy and T. Sampson (2019). 'Voting with their Money: Brexit and Outward Investment by UK Firms', Centre for Economic Performance, the London School of Economics and Political Science.

[5]   Bergin, A., P. Economides, A. Garcia-Rodriguez and G. Murphy (2019). 'Ireland and Brexit: modelling the impact of deal and no-deal scenarios', *Quarterly Economic Commentary* Spring 2019, Special Article.

[6]   According to the White House Council of Economic Advisors, each week of the shutdown was estimated to result in a 0.13 percentage point reduction in quarterly economic growth. This shutdown saw a record high of 35 days in length.

2.25 to 2.5 per cent in December 2018. Given the US treasury yield curve's tepid response to ongoing monetary policy measures, balance sheet reductions of $50 billion in securities are expected to continue with less frequent adjustments being made to the official interest rate.

The trade balance for the US weakened in the latter half of 2018, with a 4 per cent year-on-year decline in goods exports and a 7 per cent increase in goods imports. Between January and November, the overall US trade deficit in 2018 increased by 9 per cent relative to the same period last year. Following the implementation of bilateral trade tariffs with China between July and September, Figure 3 highlights a significant decline in US exports contributing to this trade balance effect. These frictions in US-China trade have contributed to an 11 per cent rise in the trade deficit between January and November of 2018 relative to the same period last year.

FIGURE 3   US-CHINA SEASONALLY ADJUSTED IMPORTS AND EXPORTS, Y-O-Y GROWTH (%)
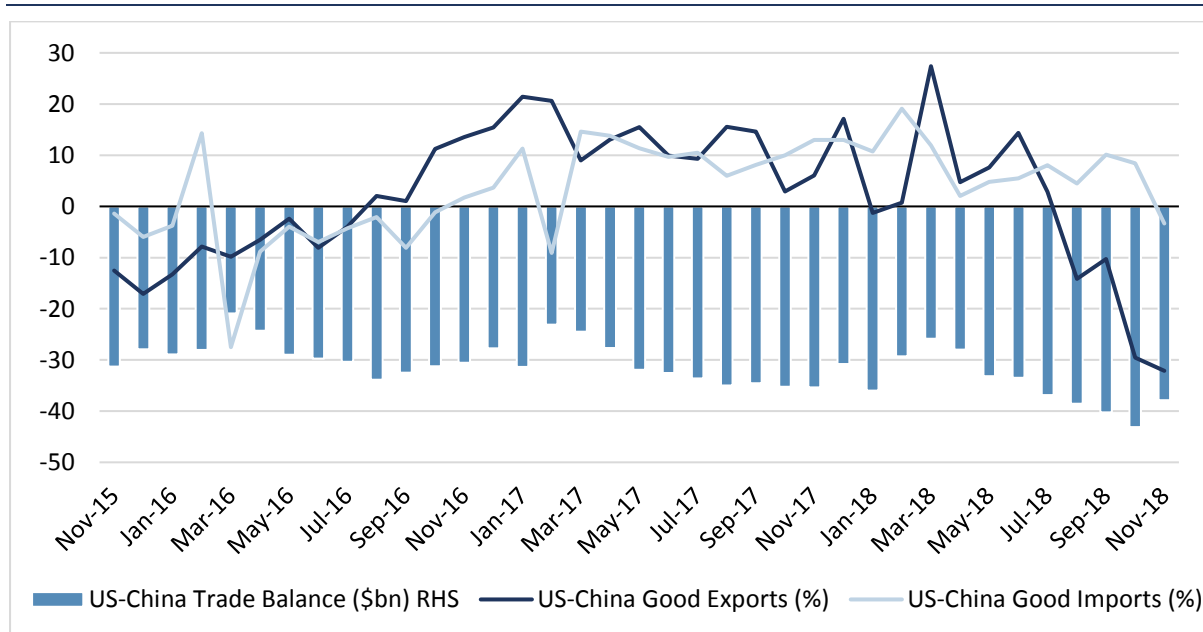
Source: United States Census Bureau, US Export and Import data for goods.

Real GDP in China grew year-on-year by 6.6 per cent in 2018, down from 6.8 per cent in 2017. Though the risk of increased tariff rates has been postponed, the economy is still struggling to cope with the burden of imposed restrictions both on the banking system and housing market.[7] As previously noted in the Winter *Commentary*, the moderation observed in Chinese real estate prices in recent

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[7]   In October 2018, the Reserve Bank of Australia's Financial Stability Review noted that these policy measures have attempted to reduce indirect lending in the non-bank sector, simplify complex interconnections within the financial system, and reduce high levels of corporate leverage.

months comes as price caps on new apartments and limitations on the resale of real estate purchases are introduced.

Real GDP in Japan remained flat year-on-year for Q4 2018, following further declines in net exports and private residential investment. As of August 2018, final estimates suggest there has been a 9.1 per cent decline in the size of the working population over the past ten years. Among others factors, this lessens the prospect of sustained growth in Japan. With gaps continuing to widen in the labour market, there are now an estimated 16 jobs available for every ten individuals seeking employment. Unemployment remains fixed at 2.3 per cent while weak economic activity has resulted in persistently low inflation.

Developments in oil prices

As displayed in Figure 4, trends in global oil prices reversed following October 2018. Between this period and January 2019, average oil prices have fallen by approximately 27 per cent for both Brent crude and WTI crude. This is likely the result of a slowdown in global demand and continued increases in US shale-oil production over the past year. OPEC has responded to such trends by requesting cutbacks in oil production among members. Though the majority of members have not adhered to such cutbacks, continued low levels of supply from Angola and Venezuela are allowing OPEC to meet targets on an aggregate level. Non-OPEC members however, such as Russia and Kazakhstan, have responded by increasing production to near record levels. From an Irish perspective, given the economic reliance on imported fossil fuels, low oil prices may lead to an extended period of low inflation and lower pressures on household expenses.

FIGURE 4   CRUDE OIL PRICES, NOT SEASONALLY ADJUSTED ($ PER BARREL)
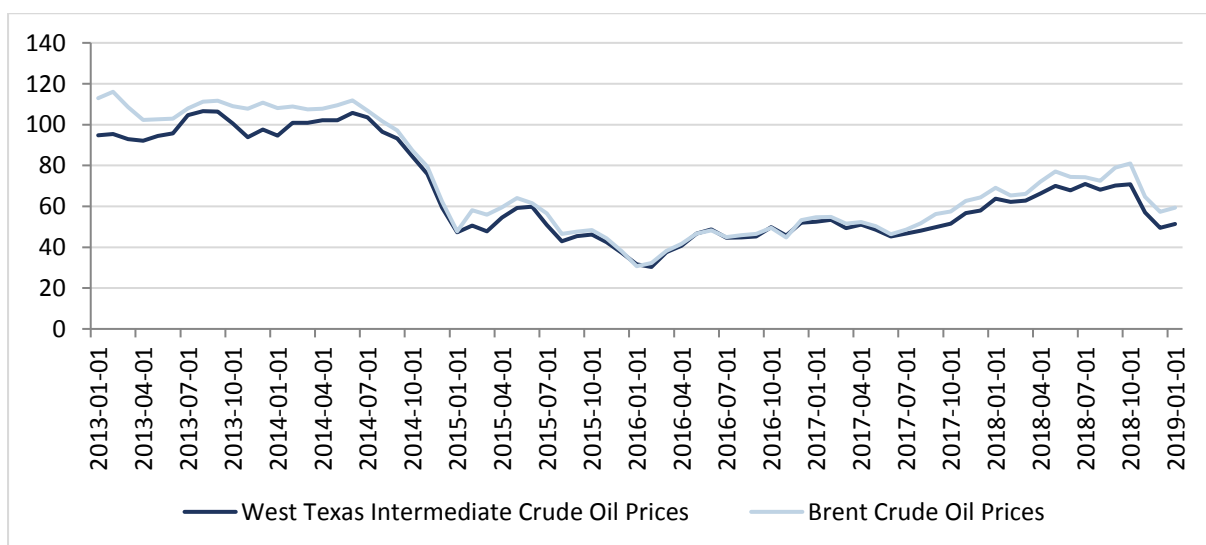
Sources: Federal Reserve Bank of St. Louis.

Figure 5 summarises the forecasts for GDP growth produced by the major institutions of their respective economies. Each forecast for 2018 signals minimum and maximum forecasts with point values identifying the median of forecasts. These forecasts signal a broad-based expectation of a moderation in economic growth across the majority of developed economies.

**FIGURE 5   REAL GDP GROWTH (% CHANGE, YEAR-ON-YEAR)**
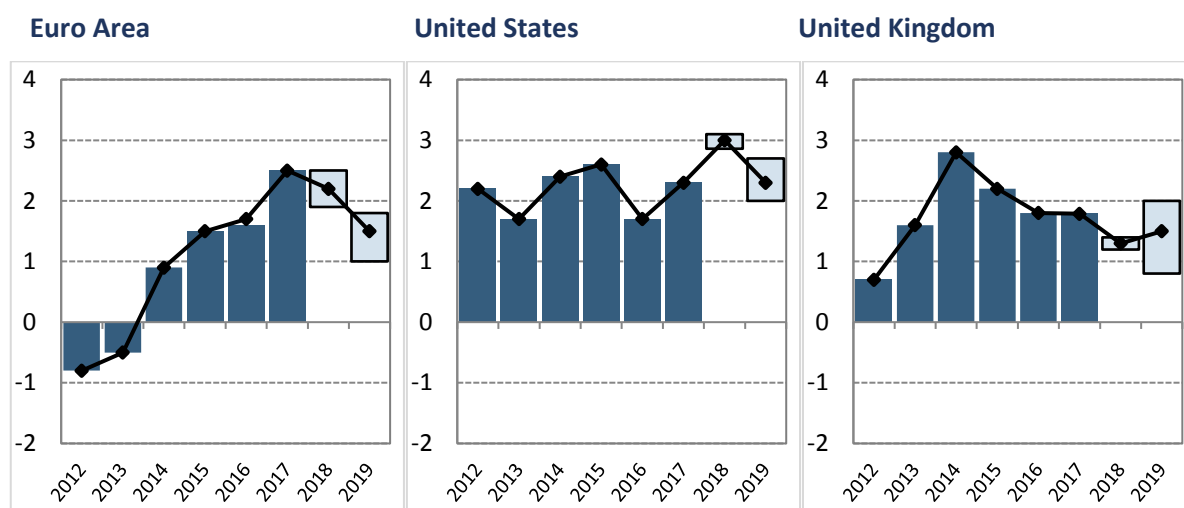
Sources: FocusEconomics, IMF, OECD, HM Treasury and Federal Reserve.

IMPLICATIONS FOR IRISH EXPORTS, IMPORTS AND THE BALANCE OF PAYMENTS

Goods

Trade continues to drive economic growth in the Irish economy. As denoted in Figure 6, goods trade in Q4 2018 saw exports grow at an annual rate of 7.9 per cent while imports increased by 23.3 per cent. Over the past four quarters, for every €1 worth of goods imported to Ireland, the economy exported €2.33 worth of goods.

FIGURE 6   ANNUAL GROWTH RATE (%) IN TOTAL IRISH EXPORTS AND IMPORTS OF GOODS
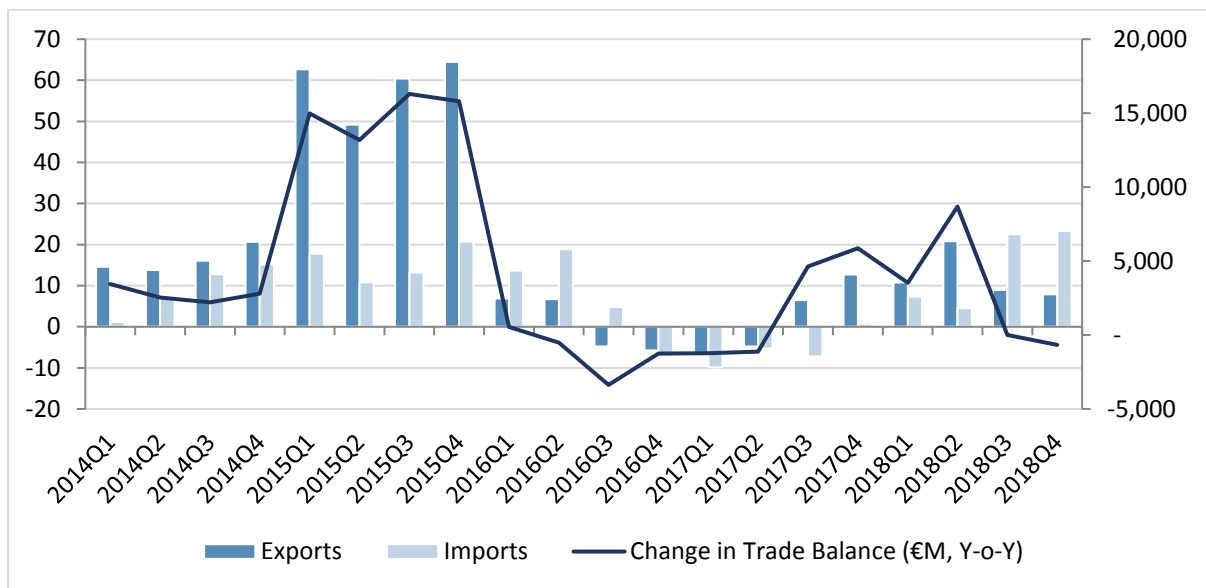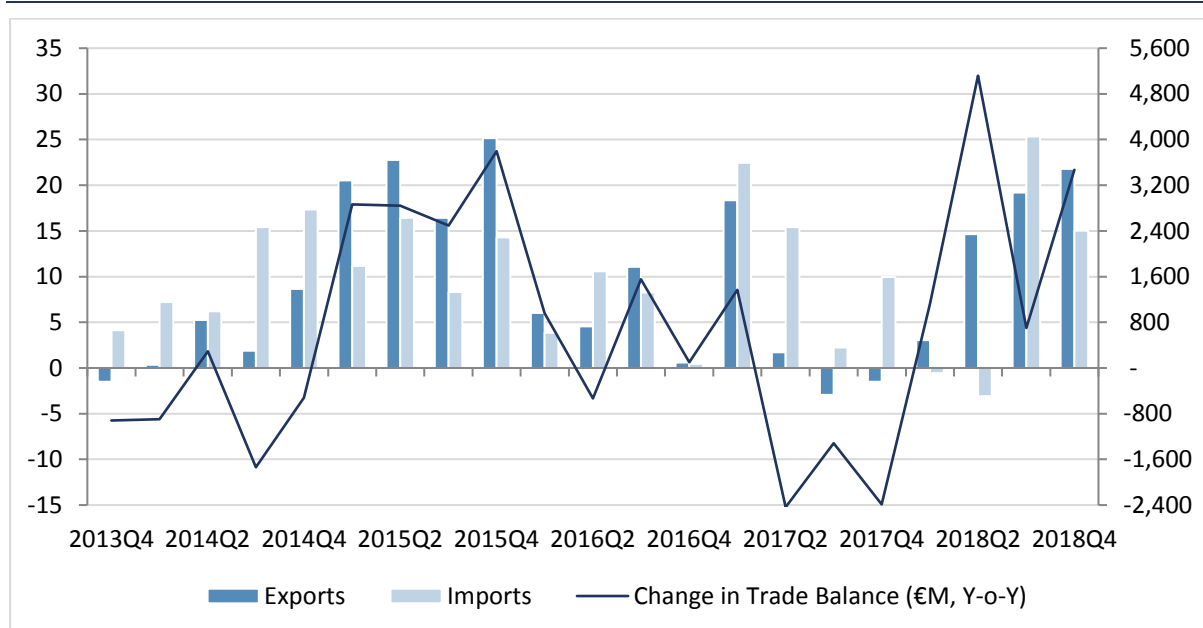

Source: Central Statistics Office.
Note: Export and Import growth rates feature on the LHS whereas € million changes in trade are highlighted by the RHS.

While these traded goods are owned by Irish resident firms, some of these goods may never physically cross the Irish border. When examining the trade of goods, foreign-owned Irish resident firm activities such as processing and merchanting must be taken into account.[8] Cross-border trade captured through monthly merchandise-related trade statistics excludes the trade of ownership goods (e.g. contract manufacturing, merchanting). Comparing cross-border trade with the overall trade of goods enhances understanding of domestic exporter activity.[9]

In Q4 2018, seasonally adjusted cross-border imports of goods increased by 15 per cent relative to the same period the previous year. Exports increased by 22 per cent, driven largely by continued growth in demand for medicinal and pharmaceutical products. Figure 7 highlights significant contributions to the trade balance leading to an annual increase in the trade surplus of 26 per cent (€10.4 billion) in 2018.

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8   'Goods for processing' is dominated by 'Contract Manufacturing', a process in which multinational companies residing in Ireland issue contracts to foreign firms to produce goods. Although these goods never enter the Irish economy, due to ownership of these goods pertaining to Irish resident firms, sales are recorded as an Irish export. 'Merchanting' consists of the buying and selling of completed goods abroad which at no stage enter or leave Ireland.
9   For further details on ownership trade, see CSO document 'Explaining Goods Exports and Imports 2012-2016'.

FIGURE 7   ANNUAL GROWTH RATE (%) IN CROSS-BORDER IRISH EXPORTS AND IMPORTS

Source: Central Statistics Office.

However, as displayed in Table 1, exports have declined in the Food industry, in Machinery and transport equipment and for commodities related to Animal and vegetable oils, fats and waxes. The overall improvement in exports of €17.8 billion was largely due to the €18 billion improvement in the export of Chemicals and related products. Excluding such products results in residual exports declining between 2017 and 2018 by 0.3 per cent.

TABLE 1   ANNUAL CHANGE IN IRISH EXPORTS BY COMMODITY

	2017	2018	€bn	% Change
Net Exports of Cross Border Goods	**122.8**	**140.6**	**17.8**	**14**
Food and live animals	11.4	11.1	-0.3	-2
Beverages and tobacco	1.4	1.4	0.1	5
Crude materials, inedible, except fuels	1.8	1.9	0.1	6
Mineral fuels, lubricants and related materials	1.0	1.2	0.2	21
Animal and vegetable oils, fats and waxes	0.1	0.1	0.0	-28
Chemicals and related products	**67.8**	**85.8**	**18.0**	**26**
Manufactured goods classified chiefly by material	2.3	2.3	0.0	1
Machinery and transport equipment	21.2	19.8	-1.4	-6
Miscellaneous manufactured articles	14.9	15.7	0.8	6
Other items	1.0	1.1	0.1	18
Net Exports less Chemical Products	**54.9**	**54.7**	**-0.1**	**-0.3**

Source: Central Statistics Office and *QEC* author calculations.

Given the vulnerability of the domestic agricultural sector to Brexit, it is worth examining trade in this sector in more detail. Figure 8 splits food trade into two major sub-components. In mid-2017, a spike in exports of dairy and egg products occurred, likely due to CAP quota changes. Given this large increase in exports in overall food exports in 2017, it is difficult to ascertain how strongly recent uncertainty to do with Brexit has impacted the agri-food sector. Examining food on a country basis, both the UK and EU contributed towards modest growth in Irish food exports whereas remainder of the world's demand for Irish food exports declined in value by 15.2 per cent between 2017 and 2018.

FIGURE 8   ANNUAL GROWTH RATE (%) IN CROSS-BORDER FOOD EXPORTS
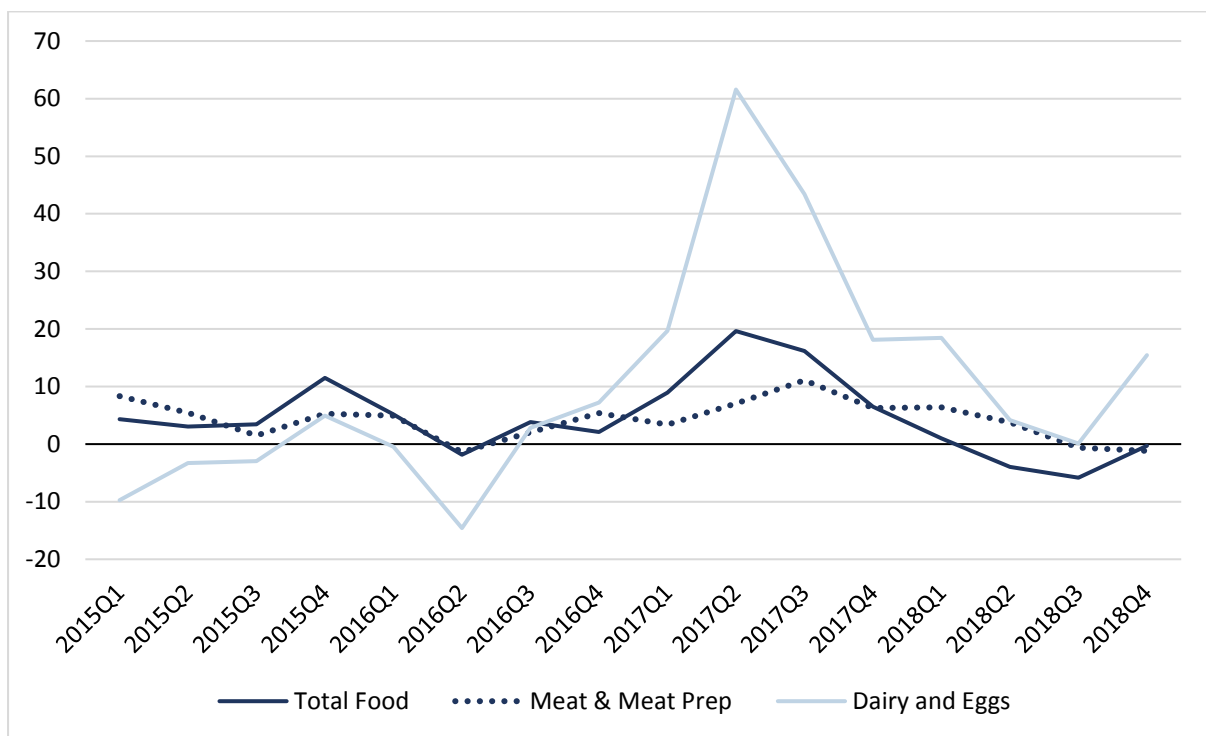
Source: Central Statistics Office.

The various components of cross-border trade are not available on a seasonally adjusted basis. In Q4 2018, total cross-border imports of goods by this measure rose year-on-year by 18.2 per cent (15.0 per cent when seasonally adjusted). Between 2017 and 2018, Machinery and transport equipment products and Chemicals products represented 42 and 22 per cent of total imports, respectively. Machinery imports increased by 7 per cent and Chemicals by 13 per cent for the same period.

Relative to 2017, Ireland's trade deficit with the UK increased by 35 per cent to €4.3 billion. While trade in chemical products with the UK fell significantly, imports from Europe and exports to the US have grown by 82 per cent and 39 per

cent, respectively. These, among other improvements, have caused Ireland's trade surplus with the EU27 to increase by €1.7 billion while the surplus with the US increased by €6.4 billion (89 per cent of the overall trade surplus). Table 2 details changes in exports and imports between Ireland and other trading regions in 2018.

**TABLE 2   JANUARY-DECEMBER ANNUAL CHANGE (%) IN GOODS EXPORTS AND IMPORTS**

|	Exports	% of Total Exports	Imports	% of Total Imports
Total – UK	**-3**	**10**	**5**	**20**
Food and live animals	2	3	5	4
Chemicals and related products	-15	3	-12	3
Machinery and transport equipment	-7	2	8	4
Miscellaneous manufactured articles	5	1	4	3
Total – Rest of EU	**18**	**40**	**23**	**40**
Food and live animals	3	3	6	4
Chemicals and related products	31	26	82	11
Machinery and transport equipment	-12	5	10	18
Miscellaneous manufactured articles	5	4	4	2
Total – US	**18**	**28**	**-4**	**18**
Food and live animals	-34	< 1	26	< 1
Chemicals and related products	39	20	-42	4
Machinery and transport equipment	-40	2	19	11
Miscellaneous manufactured articles	7	<1	0	1

Source: Central Statistics Office.

Services

Services imports continue to outpace exports in Q4 2018. This resulted in a negative trade balance contribution for services of €3.6 billion. Relative to the same period last year, imports of services increased by 20 per cent while exports of services increased by 13 per cent.

FIGURE 9   ANNUAL GROWTH RATE (%) IN IRISH SERVICE EXPORTS AND IMPORTS
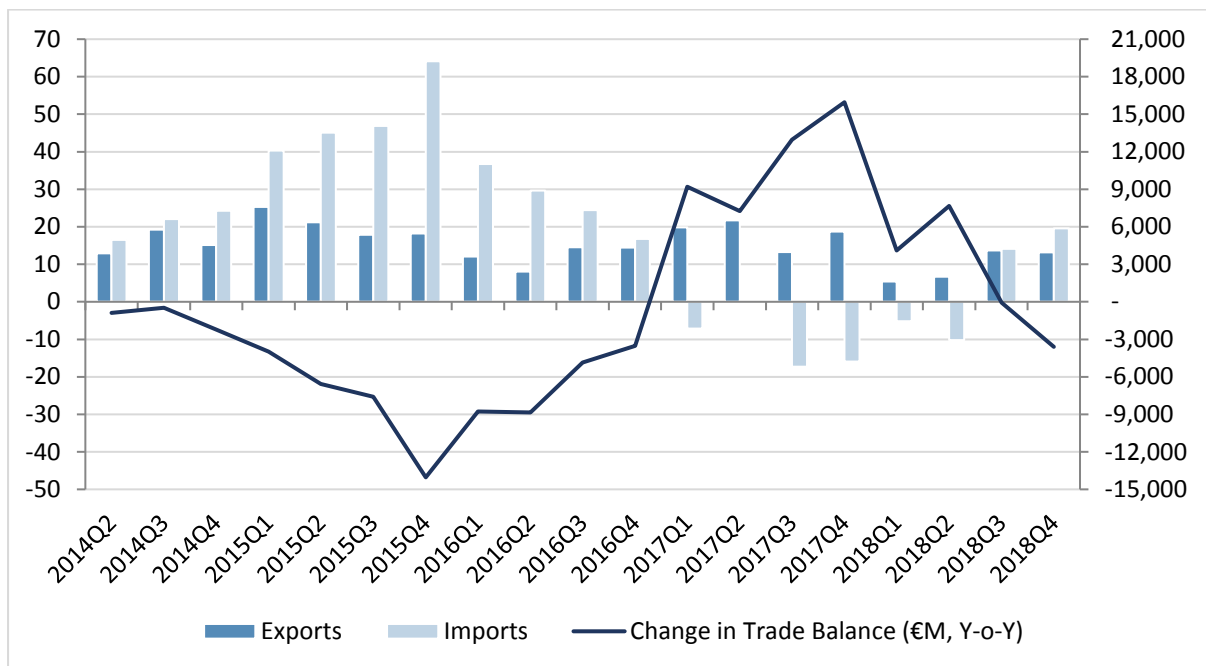
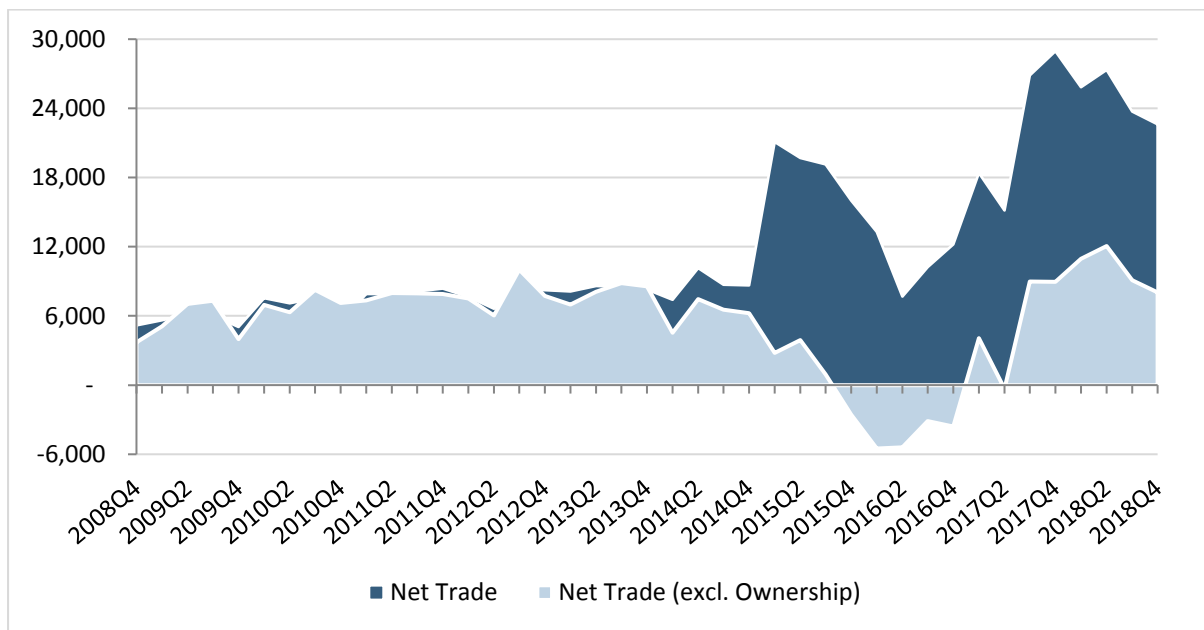*Source*:   Central Statistics Office.

Exports of computer services accounted for 46 per cent of total service exports in Q4 2018, increasing by 29.1 per cent relative to the same period last year. Royalties and licenses and business services formed 76 per cent of services imports in Q3 2018. These components experienced annual growth in Q4 2018 of 17.8 and 14.4 per cent respectively, as reflected in Figure 10. As a component of 'business services', imports of research and development services experienced the largest annual increase, rising by 120 per cent in Q4 2018 relative to the same period last year.

FIGURE 10   EXPORTS AND IMPORTS OF SERVICES (€ MILLION)
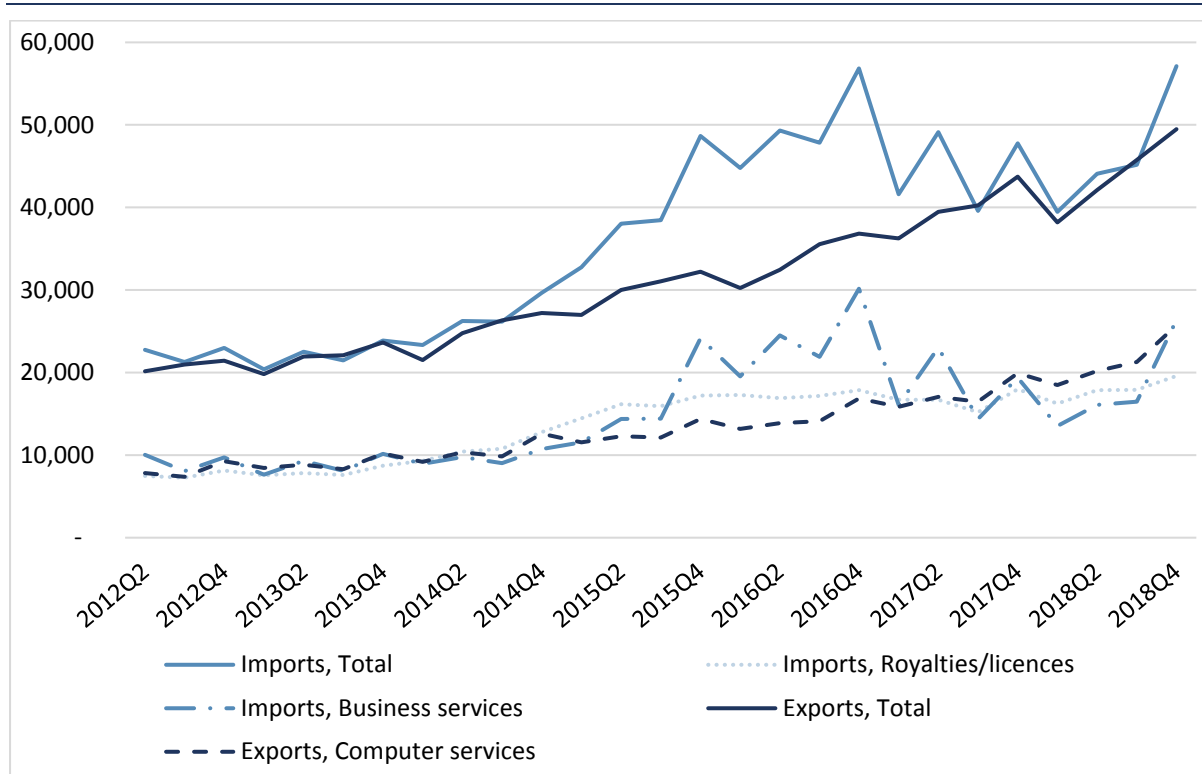
Source: Central Statistics Office.

Trade Balance

The value of goods and service exports in Q4 2018 increased at an annual rate of 9.3 per cent to €101 billion while imports increased by 22.3 per cent to €84 billion. This resulted in a €17 billion contribution to the Irish trade surplus, accounting for 21 per cent of nominal GDP in Q4 2018. Comparing cross-border trade with National Accounts data reveals estimates of ownership trade in the overall trade balance. Figure 11 highlights these differences, facilitating the assessment of domestic trade activity and Ireland's international competitiveness over the past ten years. Due to the inclusion of ownership trade, a domestic trade surplus in Q4 2018 of €8 billion increases to €23 billion.

FIGURE 11 CROSS-BORDER AND ADJUSTED NET EXPORTS OF GOODS AND SERVICES (€ MILLION)

Source: Central Statistics Office, *QEC* calculations.
Note: Adjustment to net trade accounts for ownership trade of goods. This includes, but is not limited to, forms of goods for processing such as contract manufacturing, and merchanting, i.e. purchase and resale of goods which do not enter the merchant's economy.

Due to the volatile nature of ownership trade in goods as well as services, forecasts in the *Commentary* continue to be based on trends in trade patterns linked to underlying Irish economic activity. Consequently, we expect export growth of 4.3 per cent and 4.4 per cent in 2019 and 2020 respectively. Imports are expected to increase by 7.5 per cent in 2019 and 8 per cent the following year. The year-end current account is expected to reach €17 billion (6.5 per cent of GNP) in 2019 before falling somewhat to €12.1 billion (4.4 per cent of GNP) in 2020.

Given the uncertainty concerning Brexit, based on the results in Bergin et al. (2019), we present different a range of forecasts for the short-term trade outlook for the Irish economy in Box 1, Table B.[10]

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[10]   Bergin, A., P. Economides, A. Garcia-Rodriguez and G. Murphy (2019). 'Ireland and Brexit: modelling the impact of deal and no-deal scenarios', *Quarterly Economic Commentary* Spring 2019, Special Article.

The Domestic Economy

OUTPUT

The domestic section of the *Commentary* is organised as follows; we initially review the outlook for output growth before discussing developments in the Irish monetary and financial sectors as well as developments in inflation. Demand-side factors such as consumption and housing market issues are then discussed. On the supply side, we then examine developments in investment and the labour market before concluding with an analysis of the public finances.

Given the ongoing uncertainty concerning the impact of Brexit on the Irish economy, the Department of Finance worked with researchers at the ESRI to examine the issue in some detail. This was mainly accomplished through use of COSMO – a structural model of the Irish economy. However, other empirical work by researchers at the Institute was also used. The results are presented in a paper to the present *Commentary* (Bergin et al., 2019). In Box 1, we use this work to assess the implications for the short-term growth rate of the economy under certain Brexit scenarios

BOX 1   A REASSESSMENT OF THE IMPACTS OF DIFFERENT BREXIT TYPE SCENARIOS ON THE SHORT-TERM FORECAST OF THE IRISH ECONOMY

As a significant body of work has been recently completed by researchers in the ESRI examining the potential impact of Brexit on the Irish economy, in this Box we update the analysis presented in the last *Commentary*. Therefore, we examine the implications for the short-run outlook of the Irish economy of different Brexit scenarios. In Bergin et al. (2019) the specifics of the scenarios are outlined in detail. These scenarios are compared with a baseline scenario where the UK is assumed to remain part of the European Union.

The Brexit scenarios include two 'no-deal' scenarios where the UK is assumed to trade on WTO terms with the EU from 1 April 2019. One such scenario assumes that the transition to this arrangement occurs in an orderly manner through the use of emergency provisions while the other scenario assumes that a significantly greater degree of disruption occurs ('*Disorderly No-Deal*'). This greater degree of disruption is modelled through the use of additional non-tariff measures (NTMs). It must be noted the research does not take into consideration other non-trade disruptions such as financial market distress that may occur following a disorderly Brexit nor does it address the potential indirect frictions that intra-EU trade could experience when passing through the UK landbridge.

Similar to previous exercises, the COSMO model links to an international network of models – in particular 'NiGEM' at the National Institute for Economic Research (NIESR) in the UK. However, the exercise also draws on more detailed micro-level research conducted on the Brexit issue in Lawless and Morgenroth (2016), Lawless (2018a) and Lawless (2018b). This work supplements the macro-level analysis with detailed information on the trading relationships between Ireland and the UK and between both countries and the rest of the EU.

Along with the two different 'no-deal' scenarios presented in Bergin et al. (2019), one scenario is based on the intended outcome of the Withdrawal Agreement achieved between the EU and the British Government in late 2018. The Withdrawal Agreement assumes a transition period of effective EU membership in the short run between the UK and the EU before a free trade agreement is established thereafter.

Table A summarises the impacts on the domestic economy of the different scenarios over the next ten years. These impacts are measured as percentage deviations from a baseline scenario where the UK continues to remain a member of the European Union. This impact of deviations from the baseline scenario is greatest in the case of 'no-deal' outcomes. In COSMO, the shock is transmitted to the Irish economy through the traded sector. Overall, in all cases there is a significant reduction in foreign demand which lowers the volume of output in the traded sector and exports over the medium to long-run below their baseline values. This fall in output results in labour demand being below the baseline level, which leads to lower employment and higher unemployment rates.

TABLE A   THE IMPACTS OF BREXIT ON THE IRISH ECONOMY OVER THE LONG TERM (TEN YEARS LATER)

Scenario	% Deviation from Baseline GDP
Withdrawal Agreement (FTA)	-2.6
No-Deal	-4.8
Disorderly No-Deal	-5.0

By ten years, the results are almost identical under both 'no-deal' scenarios; this is because the main difference between both scenarios has to do with disruptions over the progression to WTO trade arrangements in the short term. These differences have mostly dissipated by 2027. In both cases real Irish GDP is down by approximately 5 per cent relative to the baseline. In contrast, the Withdrawal Agreement results in Irish output levels being 2.6 per cent below the baseline level for the same period.

In the short run, current trading arrangements between the EU and the UK continue under the Withdrawal Agreement; this means that the full impact of the scenario is only felt by the Irish economy over the next ten years when the UK is assumed to have negotiated a trade deal with the EU. Therefore, we focus on the impacts of the '*Disorderly No-Deal*' as this poses the most significant challenge to the Irish economy.

As with the results in the last *Commentary*, these longer-term results from the econometric analysis are now related to shorter-term forecasts of the Irish economy. Initially, we focus on the implications of the results in Bergin et al. (2019) on the short-run forecasts of trade activity in the Irish economy. Table B presents forecasted rates of growth in exports and imports under the various Brexit scenarios.

TABLE B   THE IMPACTS OF BREXIT ON THE SHORTER-TERM COMMENTARY TRADE FORECASTS

Scenario	2019	2020
Baseline		
Exports	4.3	4.4
Imports	6.3	6.1
No-Deal		
Exports	3.6	2.5
Imports	5.8	4.3
Disorderly No-Deal		
Exports	0.9	3.1
Imports	3.5	4.6

Under the status quo of continued UK membership, the *Commentary* anticipates 4.3 per cent export growth in 2019 and 4.4 per cent growth in 2020. For imports of goods and services, a 6.3 per cent rise is expected in 2019 followed by a 6.1 per cent increase in 2020. Under a '*No-Deal*' scenario, exports are now estimated to grow by 3.6 per cent in 2019 and 2.5 in 2020. Imports are forecasted to grow by 5.8 per cent in 2019 and 4.3 per cent in 2020. Under a '*Disorderly No-Deal*' scenario, exports only increase by 0.9 per cent in 2019 and 3.1 per cent in 2020. Imports would grow by 3.5 and 4.6 per cent in 2019 and 2020 respectively, under such a scenario. It should be acknowledged that greater orders of disruption could occur. Lawless and Morgenroth (2017) suggests 53 per cent of Irish trade volumes are transported to or through the UK. Thus any significant landbridge frictions pose the risk of significantly limiting Irish trade performance and international competitiveness.[11]

In Table C, the impacts of the Brexit scenarios are examined in terms of the headline short-term GDP forecast for the Irish economy.

TABLE C   THE IMPACTS OF BREXIT ON THE SHORTER-TERM COMMENTARY GDP FORECASTS

Scenario	Year	% Growth Rate 2019/2018
Baseline	2019	3.8
Baseline	2020	3.2
Disorderly No-Deal	2019	1.2
Disorderly No-Deal	2020	2.4

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[11]   Lawless, M. and E. Morgenroth (2017). 'Ireland's international trade and transport connections', Economic and Social Research Institute, Working Paper No. 573.

In all cases the Irish economy is expected to grow in the short to medium term; under the '*Disorderly No-Deal*', however, output is only expected to increase by 1.2 per cent in the present year and 2.4 per cent in 2020. This compares with a baseline, no-Brexit case, of output growth of 3.8 and 3.2 per cent respectively for both years. It must be noted that this methodology does not include any major disruptions to financial markets or transport links that may occur under a hard no-deal scenario. These factors, if they were to occur, would almost certainly worsen the impact on Ireland.

References:

Bergin, A., P. Economides, A. Garcia-Rodriguez and G. Murphy (2019). 'Ireland and Brexit: modelling the impact of deal and no-deal scenarios', *Quarterly Economic Commentary* Spring 2019, Special Article.

Lawless, M., 2016a. *Intermediate goods inputs and the UK content of Irish goods exports*, Economic and Social Research Institute (ESRI).

Lawless, M., 2016b. 'Irish-UK services trade and Brexit', Working Paper No. WP595, Economic and Social Research Institute (ESRI).

Lawless, M. and E. Morgenroth, 2018. 'Brexit and Irish consumers', *Quarterly Economic Commentary*: Special Article, Economic and Social Research Institute (ESRI).

*This Box was prepared by Philip Economides and Kieran McQuinn.*

MONETARY AND FINANCIAL CONDITIONS

International monetary environment

In its October assessment of the international financial environment, the IMF noted that financial conditions in advanced economies remained accommodative, with tightening conditions in emerging economies. However, they highlighted an increase in both immediate and medium-term risks arising from both monetary policy normalisation and trade tensions. They also noted that the degree to which policy rate increases and trade developments impact growth prospects critically depends on their impact on asset valuations and economic fundamentals.

In recent months, global volatility has increased as documented by the CBOE VIX (Volatility Index)[12] presented in Figure 12. This is likely driven by both Brexit concerns as well as global trade issues.

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[12] The VIX Index is a calculation designed to produce a measure of constant, 30-day expected volatility of the US stock market, derived from real-time, mid-quote prices of S&P 500® Index (SPXSM) call and put options. On a global basis, it is one of the most recognised measures of volatility, widely reported by financial media and closely followed by a variety of market participants as a daily market indicator.

FIGURE 12   VIX VOLATILITY INDEX (%)
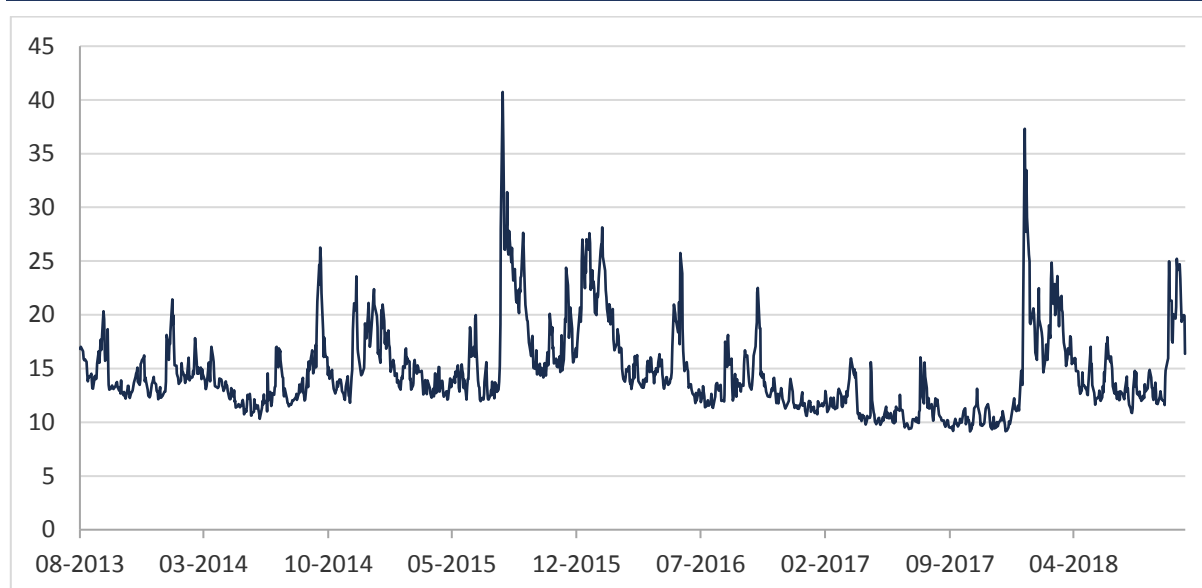
In the Euro Area, the continued operation of accommodative monetary policy through record low policy rates provides a stabilising backstop for financial markets. The worsening outlook for the European economy, as well as reduced inflation rates, have lessened the likelihood of a policy rate hike by the ECB in 2019. Extraordinary monetary policy measures, primarily in the form of quantitative easing, have been wound down but remain part of the toolkit if economic fundamentals deteriorate considerably. Figure 13 presents the EONIA rate, which continues to be negative in line with the policy rate stance.

FIGURE 13   EURO OVERNIGHT INDEX AVERAGE, EONIA (%)
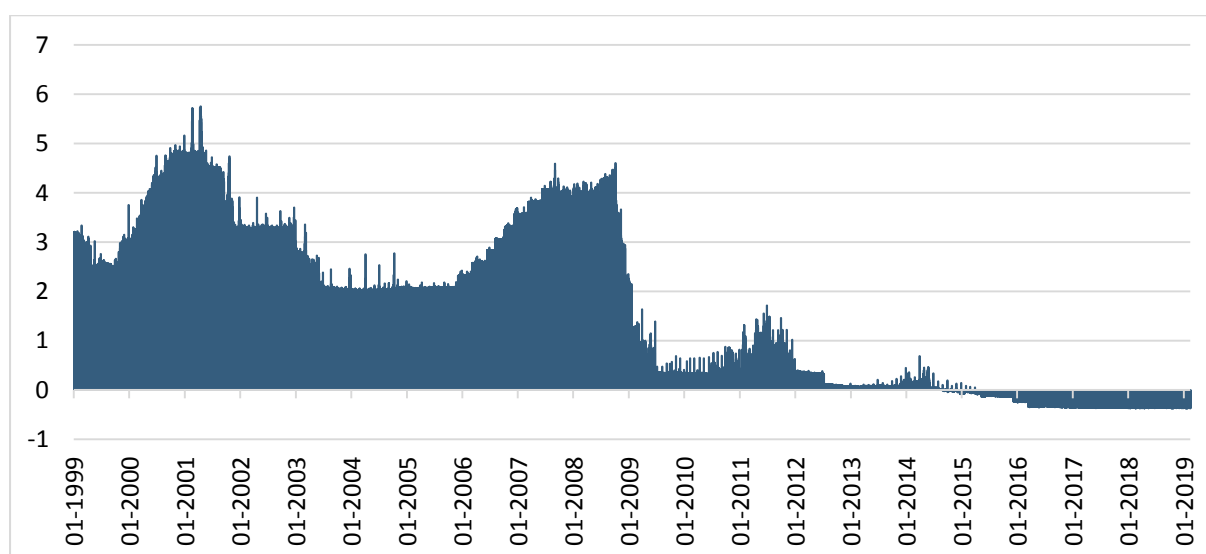
Low policy rates in the Euro Area, as well as the sovereign asset purchase programme, have ensured that government bond yields have remained low for the past number of years. For Ireland, this has been particularly fortuitous given the highly indebted nature of the sovereign. Figure 14 presents the ten-year government bond yield for Ireland and selected other advanced economies. Irish bond yields have remained low throughout 2018 (sitting below UK and US levels). As rates will likely rise in the medium term, continued action to reduce the level of government indebtedness is critical in ensuring long-term fiscal sustainability.

An open question under any monetary policy normalisation scenario is the level to which the policy rate may rise. Before the crisis, policy rates hovered at between 4 and 5 per cent. Recent research by Whelan (2018) notes that, for the Eurozone as a whole, demographic and productivity factors may lead to lower long-term growth rates in the coming years. This may lead to a reappraisal of what is the long-term 'neutral' real rate of interest for the European economy, the interest rate which allows the economy to grow at its potential level. If potential output growth is lower, this may lead to lower real interest rates in the medium term. For Ireland, this would be beneficial given the high debt levels. However, as Irish potential output growth is likely to be higher than the Eurozone average, it means that the real interest rate maybe be stimulatory and not 'neutral' from an Irish economic perspective.

FIGURE 14   TEN-YEAR GOVERNMENT BOND YIELD (%)
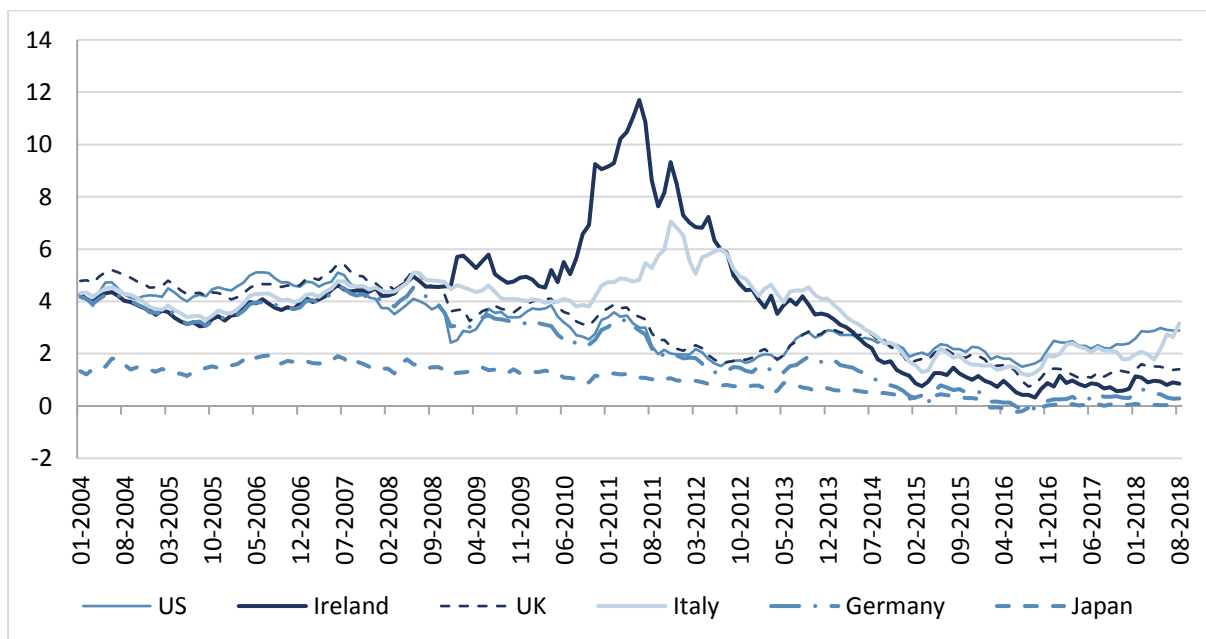

Source: St. Louis Fed. database.

Household Credit and Mortgage Market

Credit flows to the household sector are important in terms of financing consumption and housing investment but they must be closely monitored for emerging financial stability risks. Figure 15 presents the growth rates of credit to households from Irish resident credit institutions.[13] The data are split by loans for house purchase and other personal loans (auto finance, credit cards, student loans etc.). On an annualised basis, outstanding mortgage lending grew by 1 per cent to Q3 2018, a marginal increase on the previous quarter. Non-mortgage credit also continued to expand in Q3 2018 at an annualised rate of 0.2 per cent.

FIGURE 15   GROWTH RATES OF CREDIT TO HOUSEHOLDS (%)
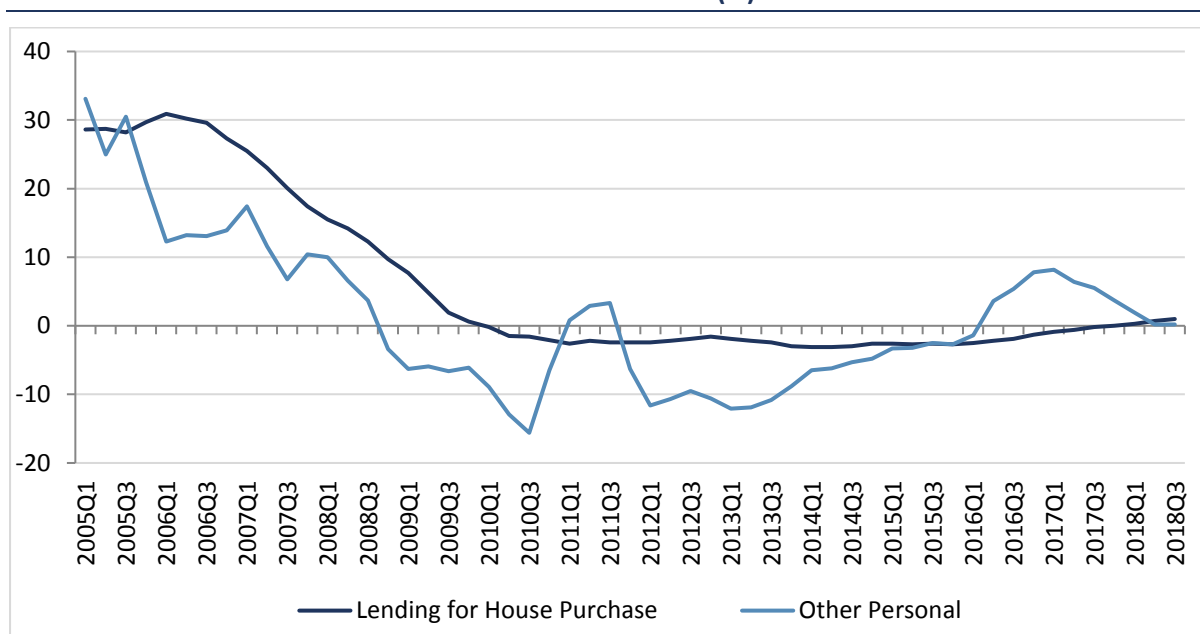
Source: Central Bank of Ireland, Credit, Money and Banking Statistics.
Notes: Data are taken from Central Bank of Ireland data release A.18, Growth rates series codes 777 and 1,252.

An important measure of the sustainability of activity in the mortgage market is the payment arrears rate. As of Q3 2018, the share of principal dwelling home (PDH) loans in arrears stood at 6.2 per cent, down marginally on the previous quarter and down from 7.0 per cent in Q3 2017. This constitutes a total of 9.4 per cent of the balance of outstanding PDH mortgages. The default rate on buy-to-let (BTL) loans has also reduced but remains at 14.7 per cent of accounts. For the most recent quarter, the rate of decline in arrears appears to have stalled, in particular for BTLs. Given the continued economic buoyancy over this period, it is likely the remaining stock of outstanding defaulted loans are long-term problem cases carried over from the boom. These cases will likely require financial restructuring or legal resolutions and are unlikely to be resolved by economic developments over time. For the Irish financial sector to fully recover from the

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13   See CBI for details.

international financial crisis, the issue of non-performing loans must be fully dealt with.

The risk to the mortgage market of heightened ECB policy rates is addressed in a Special Article accompanying this *Commentary*. Fahy et al. (2019) use household microdata to assess the ability of households to absorb the higher mortgage payments that would arise from increases in the policy rate.[14] They find that a 100 basis point increase in the policy rate would lead to a 50 basis point increase in new arrears flows, based on a measure of missed payments due to financial distress.[15] The economy would appear to be in a better position now to absorb such a shock given the improvements in labour markets observed during the recovery while the mortgage market also appears to have become more resilient over time.

FIGURE 16   IRISH HOUSEHOLD MORTGAGE ACCOUNTS IN ARREARS BY TYPE OF LOAN (%)
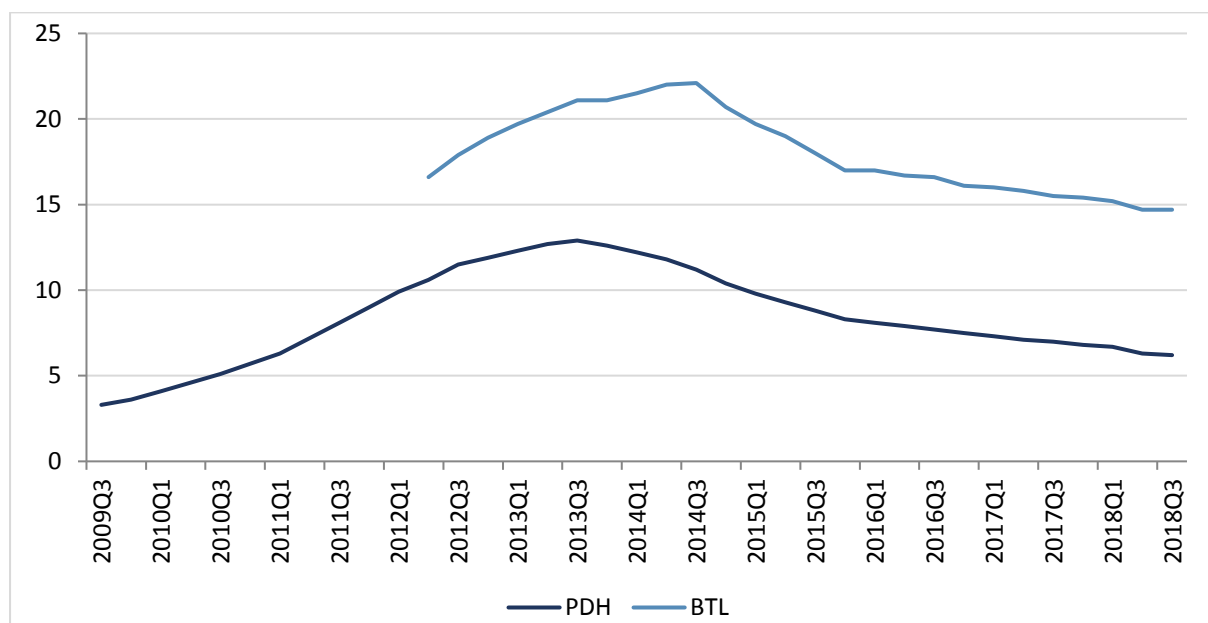

Source: Central Bank of Ireland, Mortgage Arrears Statistics.
Notes: PDH refers to principal dwelling houses loans while BTL are buy-to-let loans. Loans are defined in arrears if they are greater than 90 days past due on their payments.

Focusing on new mortgage lending, a total of €8.7 billion worth of new loans were drawn down in 2018. This represents a considerable increase on the 2017 total of €7.25 billion and is the highest level of new lending since 2009. In terms of the number of loans, over 40,000 new loans were originated in 2018. This represents a sizeable increase from 32,000 in 2017.

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[14]   M. Fahy, C. O'Toole and R. Slaymaker (2018). 'The financial crisis and the changing profile of mortgage arrears in Ireland', *Quarterly Economic Commentary,* Winter 2018, *Research Notes*.
[15]   The official definition of default as per the Basel criteria is 90 days past due.

FIGURE 17   TOTAL NEW MORTGAGE LENDING 2005-2018 (€ MILLION)
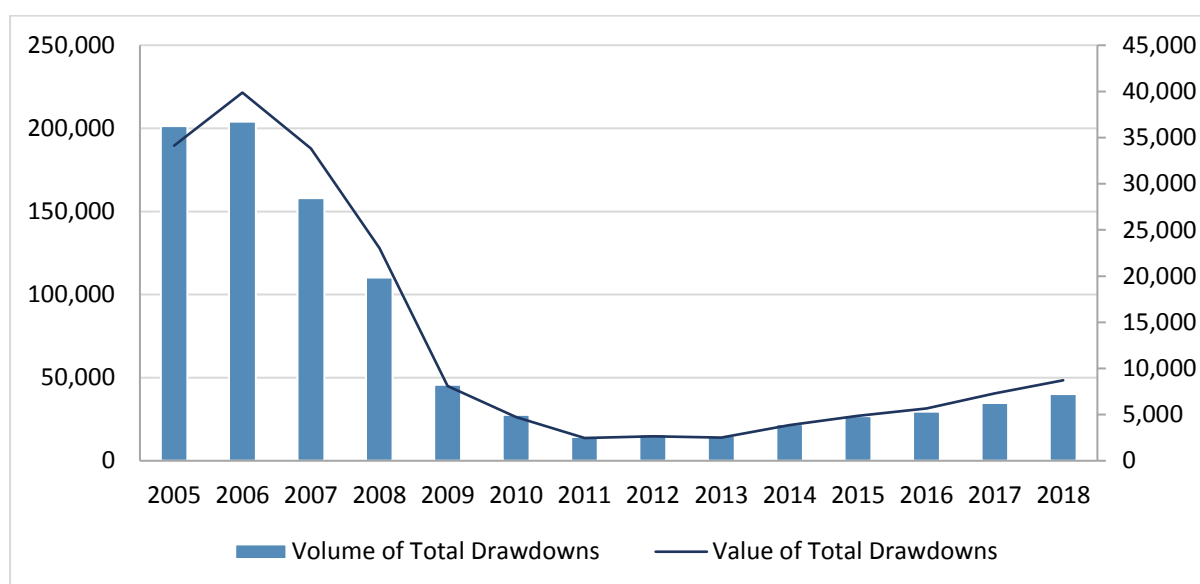
Given that credit availability tends to follow the economic cycle, it is critical to understand whether increases in lending are linked to economic fundamentals (such as income and population growth). In Figure 18, we present the growth in mortgage lending (value terms) and the growth rate in household income. It is clear that mortgage lending, at circa 20 per cent growth per annum, is fast outstripping income growth. However, the degree to which this indicates a financial stability risk depends on a) the credit conditions underlying the individual loans and b) the aggregate repayment capacity of the sector. In terms of the former factor, the macro-prudential framework deployed by the Central Bank in 2015 seeks to ensure that the credit conditions underlying the individual loans remain prudent. Recent research by McCann and Ryan (2016)[16] indicates that this framework has improved the credit risk of new Irish loans.

In terms of the repayment capacity, in a similar vein to Keenan and O'Brien (2018) we explore the trends in the ratio of new mortgage lending to net household disposable income on an aggregate basis (also in Figure 18 on the right hand axis).[17] If mortgage lending increases relative to personal disposable income, this can indicate the sector is leveraging beyond a sustainable level. Indeed, in 2006, new mortgage lending accounted for nearly 50 per cent of total household personal net disposable income in Ireland. While there have been

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[16]   McCann, F. and E. Ryan (2016). 'Originating Loan to Value ratios and the resilience of mortgage portfolios', Economic Letters, No 10/EL/16, Dublin: Central Bank of Ireland.

[17]   Keenan, E., and M. O'Brien (2018). 'New Mortgage Lending Activity in a Comparative Context', Economic Letters, No 8/EL/18, Dublin: Central Bank of Ireland.

increases more recently in this ratio for Ireland, it stands at just over 10 per cent as of 2018, which is well below the figures seen during the credit boom period.

FIGURE 18   LENDING GROWTH, INCOME GROWTH (LHS) AND NEW LENDING TO NET DISPOSABLE INCOME (RHS) (%)
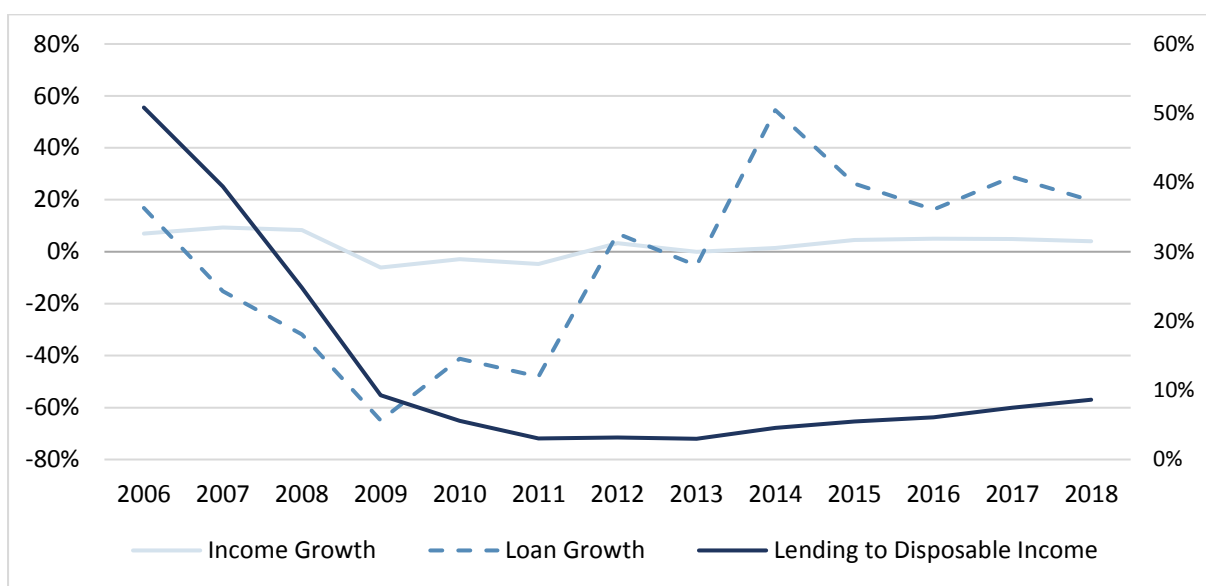
Source: New Lending Data from Banking and Payments Federation Ireland. Net disposable income of households – ESA code (B.6n_S1M) from CSO Annual National Accounts.
Note: Net disposable income for 2018 has been grown forward from 2017 by 4.8 per cent in line with *QEC* forecasts for personal disposable income.

Finally, to examine current household credit demand and supply conditions in Ireland in more detail, we outline recently collated survey data by the ESRI which capture information on applications and rejections for credit across a range of products. In Figure 19, we present the average application rate across mortgage loans, car loans, personal loans and credit cards for 2018 as well as the average rejection rate for those households who applied. The figures indicate that approximately 4 per cent of Irish households applied for a mortgage in 2018, 8 per cent applied for a car loan, 7 per cent for a personal loan and less than 2 per cent for a credit card. In terms of loan success, nearly 30 per cent of mortgage applications were rejected. This is higher than the other loan types and indicates the more intrusive screening that takes place for long-term home purchase finance relative to other credit transactions. The rejection rate was just over 6 per cent for car finance, over 11 per cent for personal loans and nearly 15 per cent for credit cards.

FIGURE 19   HOUSEHOLD CREDIT DEMAND AND SUPPLY – ESRI SURVEY EVIDENCE – 2018 (%)
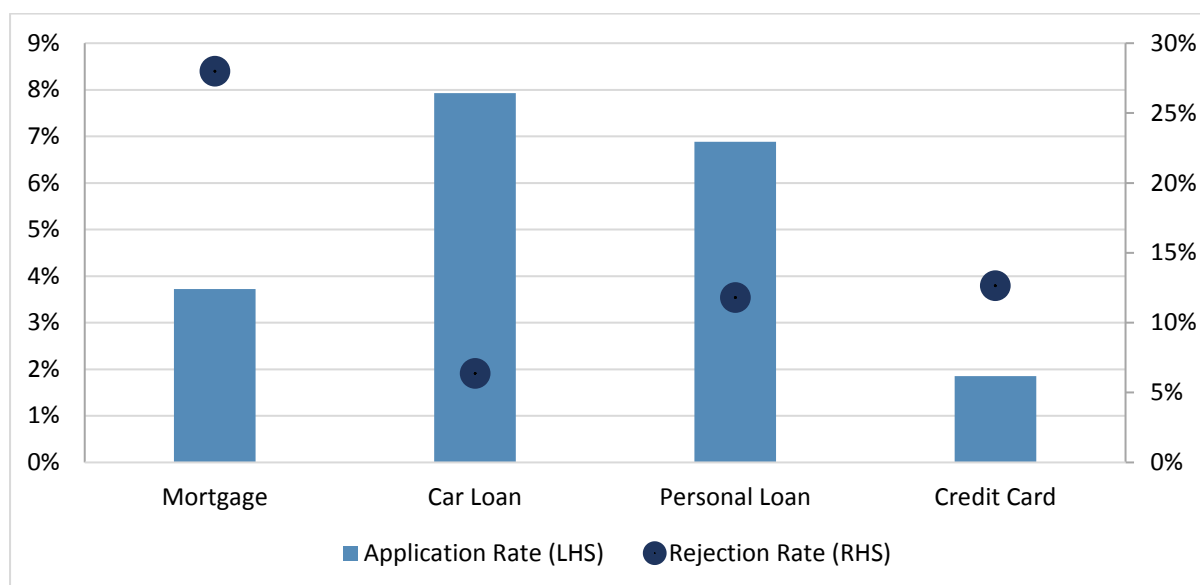
Source: ESRI Economic Sentiment Monitor.

Trends in SME and corporate credit market

A sufficient supply of credit to SMEs is critical in ensuring enterprises can manage day-to-day operations such as supply chain and inventory organisation. It also helps firms deploy capital for long-term productivity enhancing investments.

Figure 20 presents new lending to SMEs for the first three quarters of the year over the period 2011 to 2018. New lending has been increasing steadily in each year from 2015 onwards. The annualised growth rate for 2018 was 8 per cent. Considering the sectoral composition of lending, particularly large accelerations can be observed in construction, hotels and restaurants. It is noteworthy that there has been a decline in new lending to the wholesale and retail sector.

FIGURE 20   NEW LENDING TO SMES (LEVEL, € MILLION) – TOTAL Q1-Q3 PER ANNUM
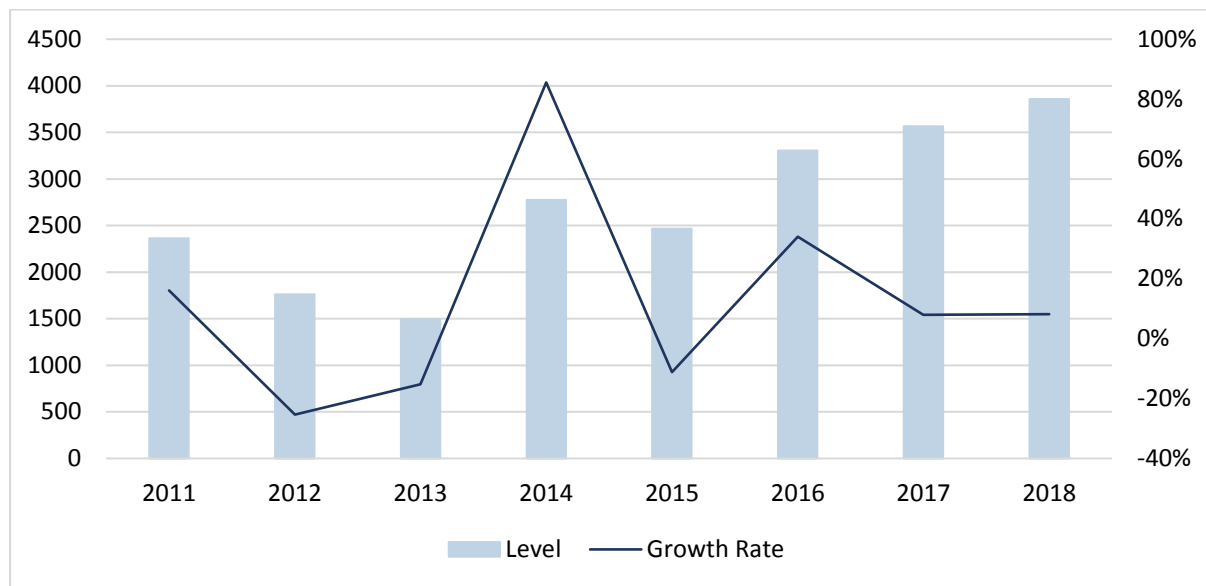
Source: Central Bank of Ireland, SME Credit Series, Table A.14.1.

While monitoring overall lending trends can be informative, it does not allow a disentangling of credit demand from credit supply factors. To get more insight into each of these dynamics separately, we present loan application and rejections data from the ECB survey of SMEs (Figure 21). We present the data for Ireland as well as the median value for other European countries for which data were available. Figures 21 A.1 and A.2 present the application and rejection rate for term loans. In the most recent data (April to September 2018) Irish SMEs had a similar application rate to their European peers of approximately 24 per cent. However, credit supply conditions appear tighter in Ireland with rejection rates over 7 per cent, which is nearly double the median level in the other EU countries. It is noteworthy that the rejection rate for Irish loans appears to have increased after Brexit which may reflect banks reappraising the credit risk of Irish companies exposed to UK trade. In terms of short-term credit demand, application rates are much lower in Ireland than in other European countries which may be suggestive of lower credit requirements.[18] It is also noteworthy that the application for short-term loans by Irish companies was comparable to other European countries until the Brexit referendum. Thereafter, it has trended downward in a marked fashion. Credit rejections for short-term facilities also rose after the UK European Union membership referendum but are now in line with other European countries.

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[18]   ECB SAFE data also indicate that discouraged borrowers (those that did not apply due to possible rejection) has been falling in line with other European countries. Gargan et al. (2018) also show that Irish firms have considerable own funds which may be reducing the requirement to obtain external financing and muting the level of loan demand.

FIGURE 21   SME CREDIT APPLICATIONS AND REJECTIONS (%)

A.1 Credit Applications for Bank Term Loans

B.1 Credit Applications for Short-Term Facilities

A.2 Credit Rejections for Bank Term Loans

B.2 Credit Rejections for Short-Term Facilities
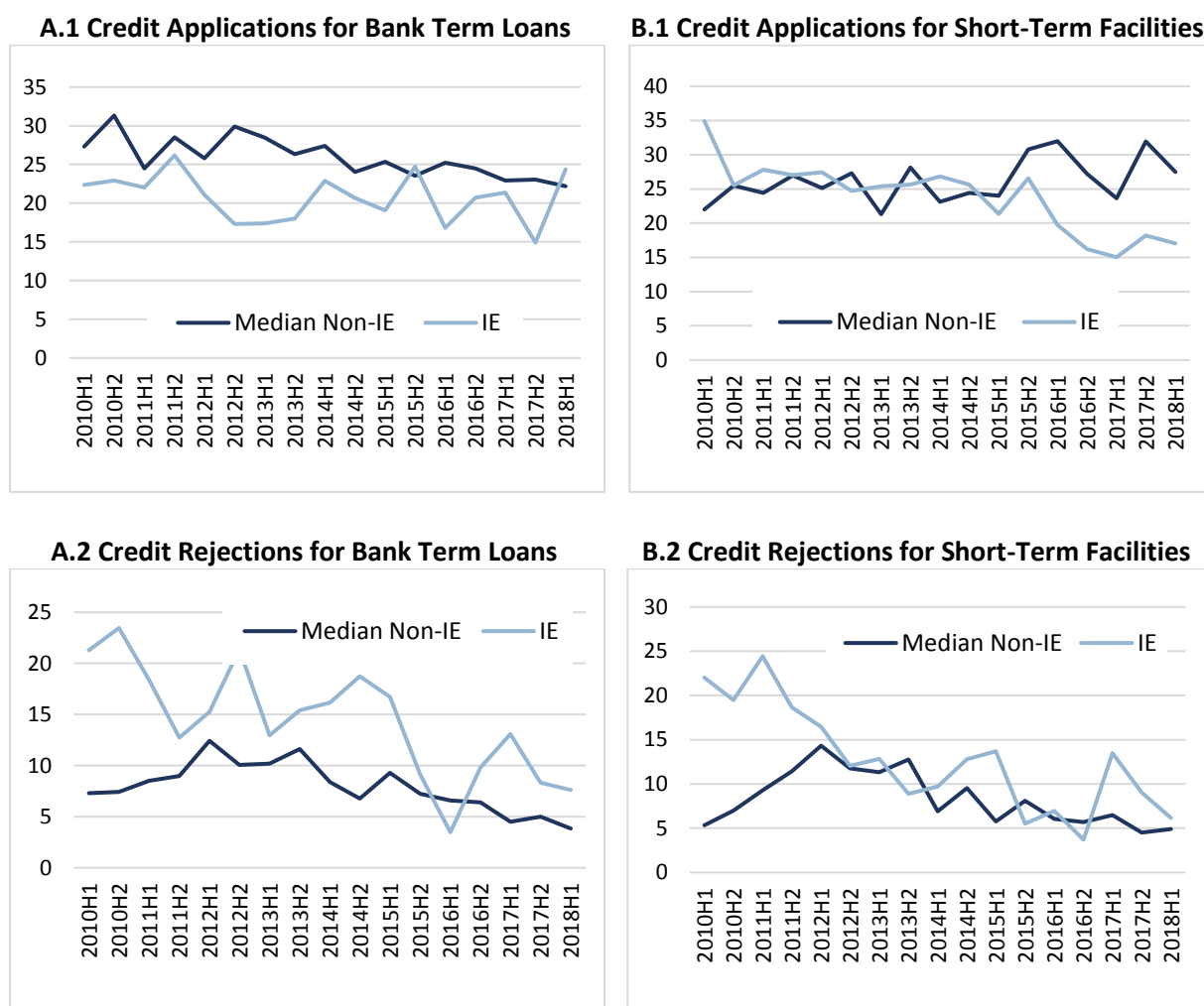
Sources: ECB SAFE Survey.
Notes: Other countries include: AT, BE, DE, ES, FI, FR, GR, IE, IT, NL, PT. Application rate indicates the percentage of firms that applied for credit.

Looking forward, enterprises are likely to face a shock to cash flows and working capital if a hard-Brexit scenario occurs. Having sufficient credit lines and funding in place to manage any immediate disruptions to business operations or supply chains is important. To this end, the Government has introduced a Brexit loan scheme through the Strategic Banking Corporation of Ireland, which provides low cost funding to cover Brexit related working capital and investment needs. Measures such as this can be vital in ensuring firms do not face a credit crunch at a time when they are trying to deal with significant changes in trading relationships.

Interest rates and the cost of finance

The standard variable rate on new mortgage loans in Ireland stood at 3.12 per cent as of Q4 2018; this is down slightly year-on-year from 3.32 in Q4 2017. The market for fixed rates has become more competitive and the average rate on one- to three-year fixed rate products stood at 2.74 per cent in Q4 2018 which is

down 30 basis points in 12 months. However, when comparing Irish new house purchase loans relative to other Eurozone economies, it is clear interest rates on mortgages in the domestic market remain the highest of comparator countries (Figure 22).

**FIGURE 22   INTEREST RATES ON NEW HOUSE PURCHASE LOANS TO HOUSEHOLDS (%)**
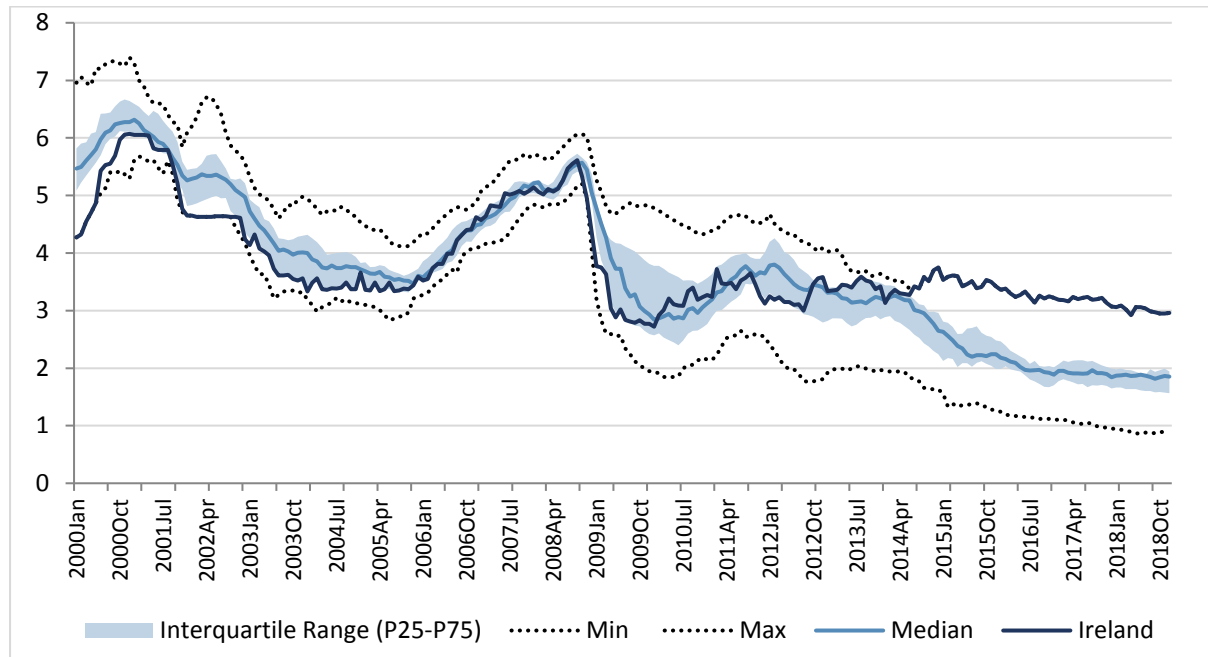
Source: Central Bank of Ireland, SME Credit Series, Table A.14.1.
Notes: Countries included are: AT, BE, EE, ES, FI, FR, IE, IT, LT, NL, PT, SI. These countries are selected due to data availability. Data differ between this chart presented and the text, as the ECB comparison data include restructured mortgages whereas the new business standard variable rate (SVR) is only for new drawdowns.

A similar picture emerges in relation to corporate interest rates. Figure 23 presents the interest rates on new business loans for non-financial corporates in Ireland relative to the average for the Eurozone. Two series are presented: 1) loans greater than €1 million which is a proxy for large companies and 2) capturing loans of less than €250,000 which is used as a proxy for loans for SMEs. In December 2018, the average rate on new loans for large Irish corporates was 1.92 per cent. The Eurozone average was 1.3 per cent, approximately 60 basis points lower than the Irish rate. For small Irish corporate loans, the interest rate in December 2018 was 4.29 per cent compared to the Eurozone average of 2.24 per cent, a full 200 basis points lower than the Irish figure.

Given the common monetary policy rate, the ongoing existence of a wedge between the Irish and European markets can be explained by a range of structural factors of the banking system such as risk appetite, competition, regulations and the cost of funds for Irish banks. Policies to enhance the competitiveness of the banking sector and its efficiency are required.

The wedge may also reflect a greater risk profile amongst Irish SMEs or whether they have collateral available.

FIGURE 23   INTEREST RATES ON NEW CORPORATE LOANS – EUROPEAN COMPARISON (%)
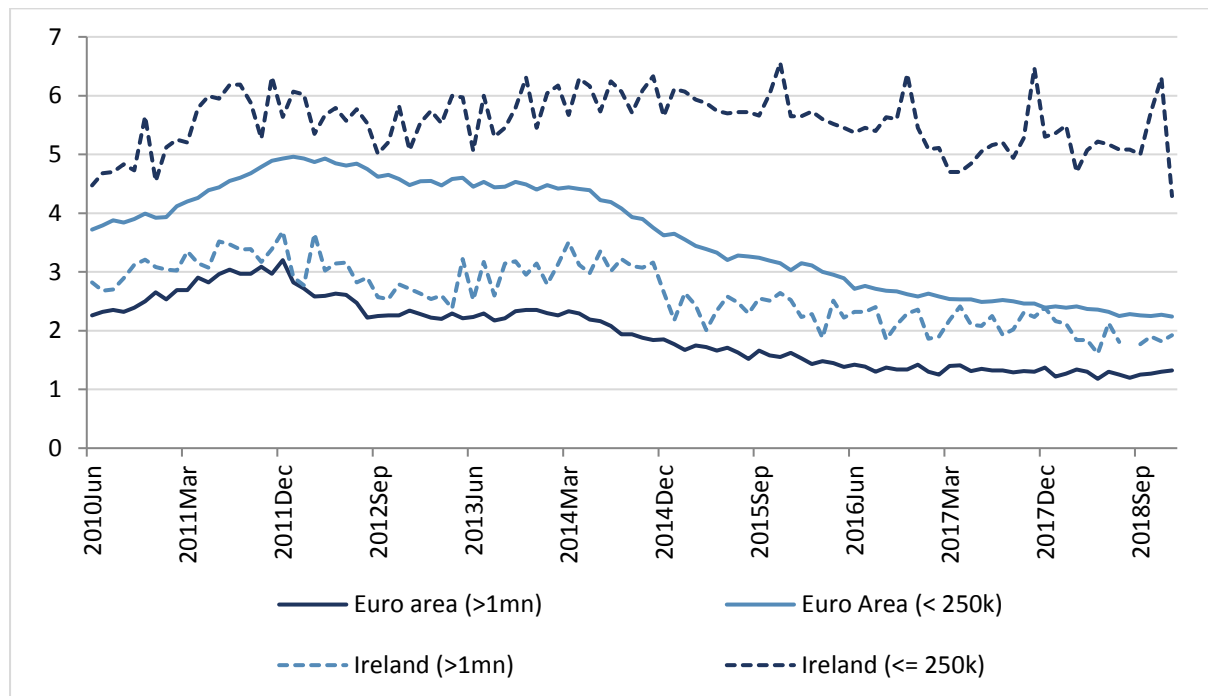
Source: ECB MFI data. Small loans refer to loans less than €250,000.

To provide more insight into the variation of SME interest rates within Ireland, Figure 24 presents the average new lending interest rates by sector for the first three quarters of 2018. The lowest rates are in the hotels, real estate and manufacturing sectors. Often these sectors would have access to physical collateral in the form of buildings or machinery that could be used to lower the cost of finance. Sectors such as business services, education and transport face the highest rates.

FIGURE 24 INTEREST RATES ON NEW CORPORATE LOANS – SECTOR COMPARISON (BAR IS MARKET AVERAGE)
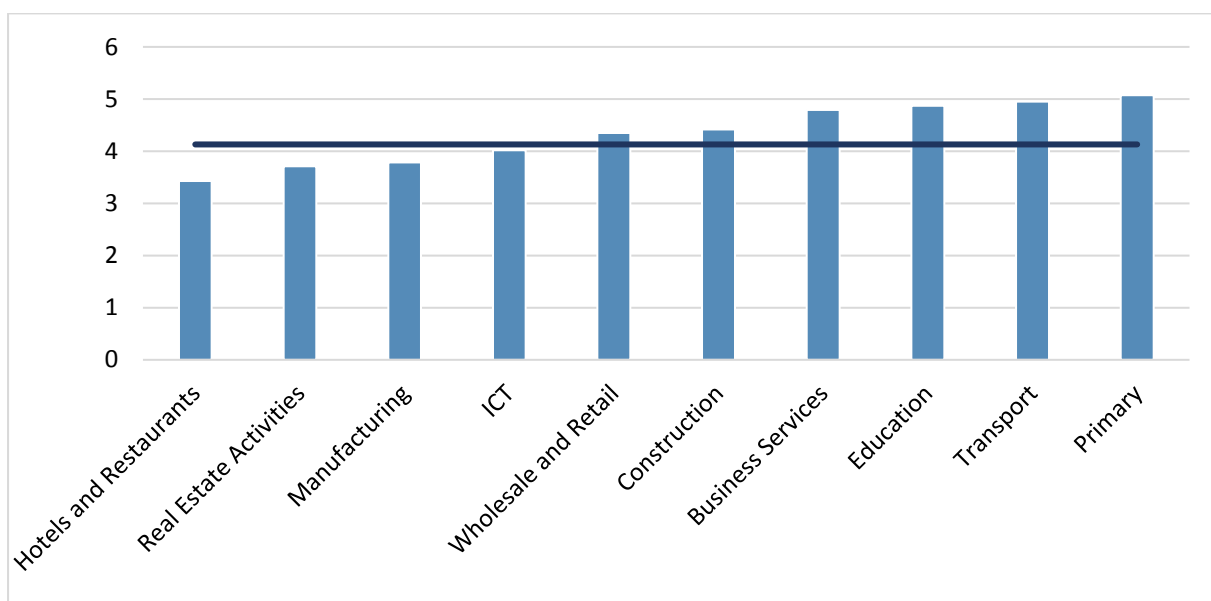
*Source:* CBI SME Credit Data.

Inflation Outlook

While the early months of 2018 had seen a moderation in inflation, both the overall Consumer Price Index (CPI) and the Harmonised Index of Consumer Prices (HICP) have started to rise in the final three quarters of 2018. Figure 25 presents the inflation rate for these series and the CPI excluding energy and unprocessed foods. While increasing inflationary pressures are evident from the CPI and HICP, core inflation which excludes energy and unprocessed foods is much weaker and suggests a more muted inflation outlook for the domestic economy. In the most recent data point there has been some convergence between the core and headline CPI.

FIGURE 25   ANNUAL INFLATION RATE (%)
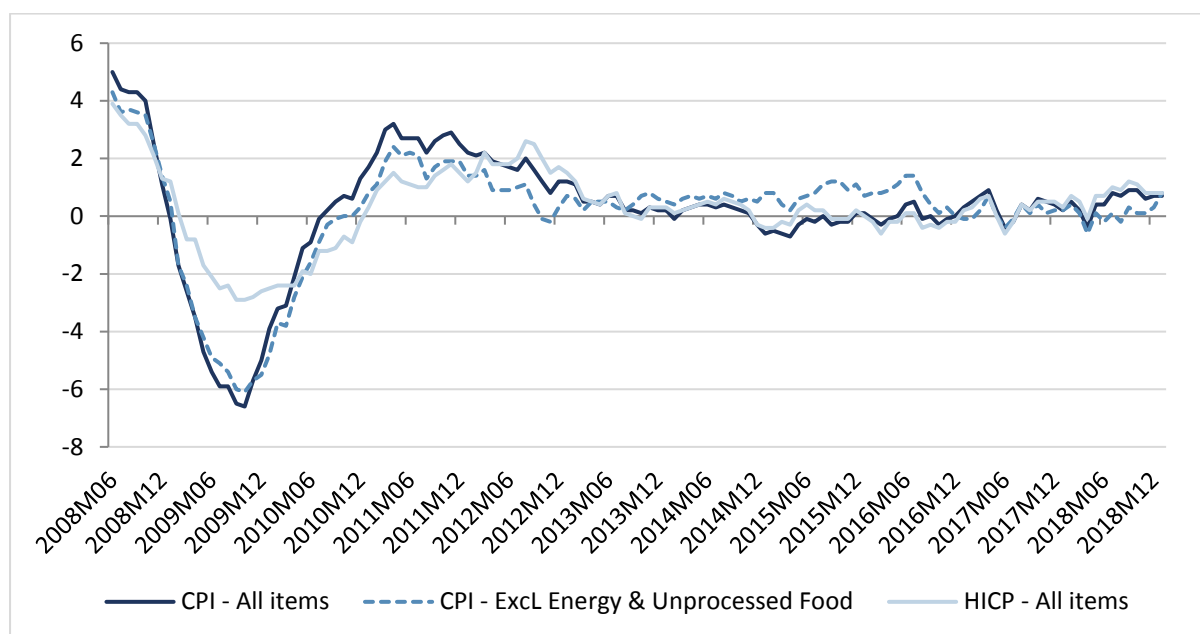
Source: Central Statistics Office.

The difference in price trends between the goods and services sectors is quite apparent. The underlying trends in the CPI (Figure 26) up to January 2019 indicates service prices have been accelerating. Goods prices on the other hand have been declining and, while it appeared some of the declines in goods prices were abating, the final months of 2018 and into 2019 show an accelerated rate of decline in goods prices.

In terms of the product-specific contributions to inflation, the product groupings which are lowering the inflation rate are miscellaneous goods and services, household furnishings, equipment and household maintenance and food and non-alcoholic beverages. Housing and utilities, hotels and restaurants and energy products are providing the greatest stimulus to inflation.

FIGURE 26   DECOMPOSITION OF ANNUAL (%) CPI GROWTH INTO GOODS AND SERVICES
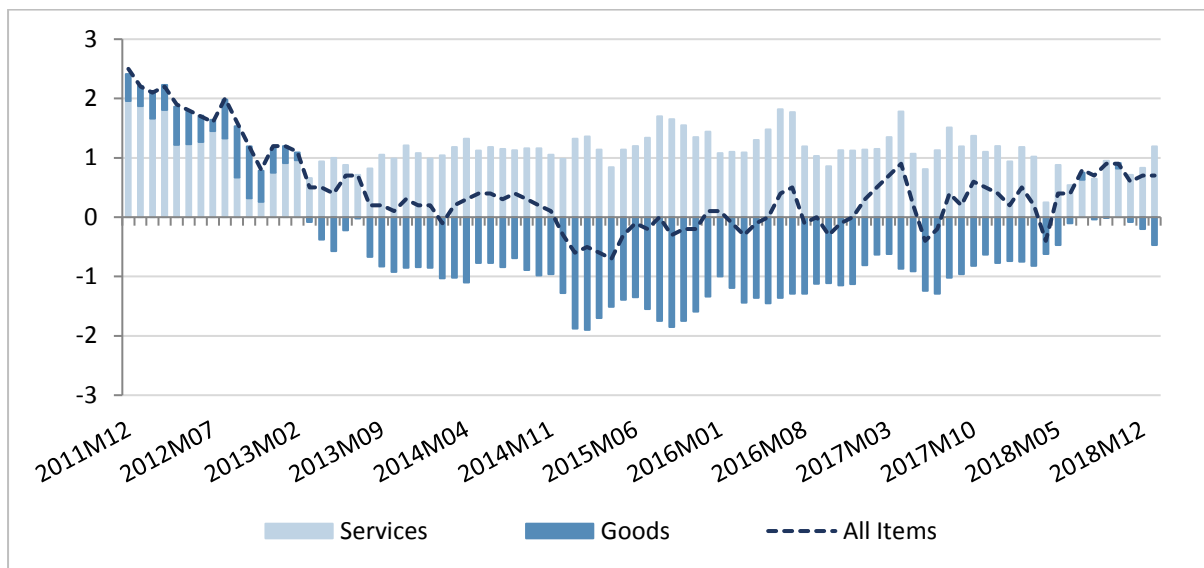
In light of the *Commentary*'s forecast of strong domestic demand and the continued positive developments in the labour market performance, prices are expected to increase over the next two years. Consumer prices are expected to increase moderately by 1 per cent in 2019, followed by 1.4 per cent in 2020. Lawless and Morgenroth (2018) address the possibility of greater trade frictions in the short term, estimating that rising costs of UK imports, in the case of a 'no-deal' outcome, would result in the Irish CPI increasing by between 2 – 3.1 per cent.[19]

DEMAND

Household sector consumption

Due to the well-documented issues associated with measuring output in Ireland, consumption expenditure is a more robust indicator of underlying domestic economic activity (FitzGerald, 2015; 2018).[20] The latest quarterly National Accounts show that, on an annualised basis, personal consumption expenditure increased by 2.6 per cent in Q4 2018. The continued strong growth in household spending is being driven by the increase in employment, increasing disposable incomes and improvement in household balance sheets.

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[19]   Lawless, M. and E. Morgenroth (2018). 'Brexit and Irish Consumers', *Quarterly Economic Commentary*, Spring 2018, Special Articles.

[20]   FitzGerald, John, (2015). 'Problems Interpreting the National Accounts in a Globalised Economy — Ireland,' *Quarterly Economic Commentary*, Summer 2015: Special Articles.
FitzGerald, John, (2018). 'National Accounts for a global economy: the case of Ireland', *Quarterly Economic Commentary*, Summer 2018: Special Articles.

FIGURE 27 QUARTERLY PERSONAL CONSUMPTION ON GOODS AND SERVICES – CONSTANT MARKET PRICES AND SEASONALLY ADJUSTED
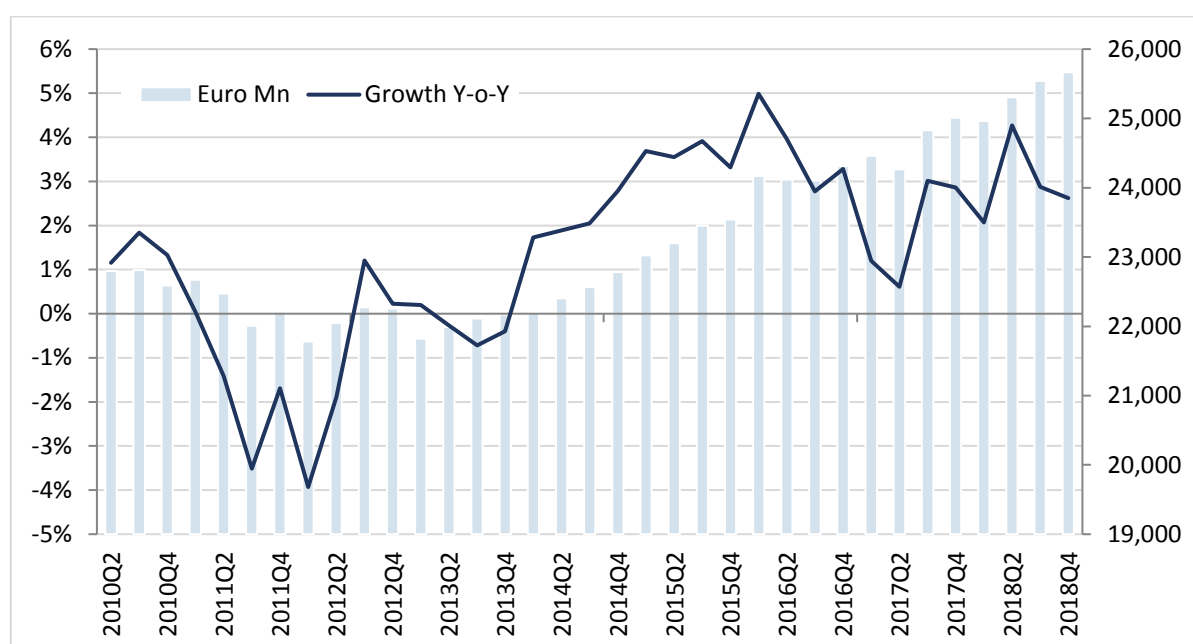
Source: Central Statistics Office.

Retail sales are a well-known leading indicator for consumption. By examining what type of goods and services households are purchasing, sources of growth in consumption can be more clearly established. Table 4 presents the annual growth in retail sales volume for select items in Q4 2018. Across all sectors, retail sales have risen relative to the same quarter the previous year. Overall retail business increased by 4.4 per cent, or 3.7 per cent when sales of motor vehicles were excluded. Sales in furniture and lighting were particularly impressive, up 12.4 per cent, which is likely due to strong growth in the housing market.

TABLE 4   GROWTH IN SELECT RETAIL SALES (VOLUME) ITEMS (Q4 2018)

Retail Business – NACE Rev. 2	Volume of Sales Annual % change
Motor Trades	5.1
Non-specialised stores (excluding department stores)	5.3
Department stores	2.0
Clothing, Footwear and Textiles	1.3
Furniture and lighting	12.4
All retail businesses	4.4
All retail businesses, excluding motor trades	3.7

Source: Central Statistics Office.

The overall trends in retail sales are displayed in Figure 28. This chart presents a three-month rolling average of annual growth of total retail sales, sales excluding

the motor trade, and sales of household equipment. Overall retail sales (both including and excluding motor sales) continue to perform strongly. The growth in household equipment sales remains well above the average of all retail sales, with the three-month rolling rate up 16.6 per cent in December 2018. The increase in activity in the housing market with more new builds and renovations is likely a driving factor in the accelerating sales of household equipment. Despite remaining positive throughout 2018, there was a slight dip in retail growth towards the end of the year. With the Brexit issue still unresolved, this fall in growth may continue into 2019 and could cause difficulties for Irish retailers.

FIGURE 28   AVERAGE GROWTH (%) IN RETAIL SALES INDEX VOLUME ADJUSTED (BASE 2005=100), THREE-MONTH ROLLING AVERAGE
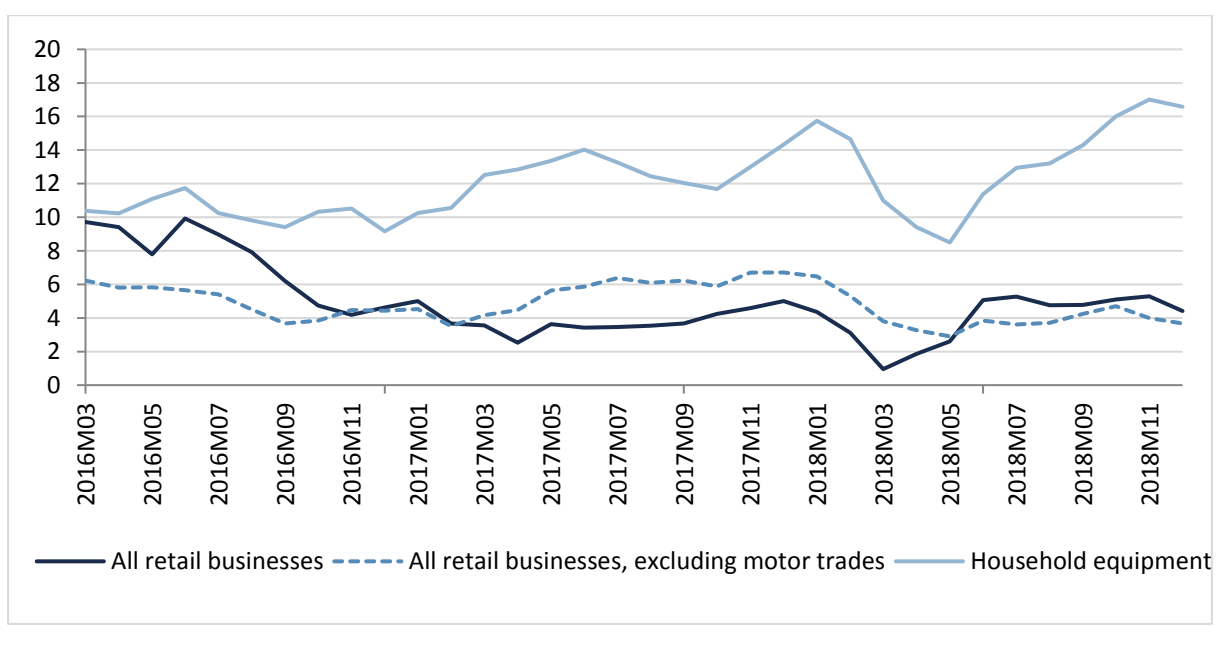
Source: Central Statistics Office.

Figure 29 presents the ESRI/KBC Consumer Sentiment Index which tracks the monthly views of households towards their current and future economic perspectives. The index declined significantly during Q4 2018 and as of November was at its lowest point since Q1 2015. The primary reason for the fall in the index has been a deterioration in consumer confidence with regards to future expectations. It is likely that consumer uncertainty around the outcome of Brexit and the increased possibility of a 'no-deal' scenario is contributing towards a negative outlook for the Irish economy. While there was an uptick in consumer confidence in January 2019, this came as a result of a greater appetite for major household purchases and improved perceptions amongst households as to their own financial situation. The general economic outlook on the other hand continued to deteriorate.

FIGURE 29   ESRI/KBC CONSUMER SENTIMENT INDICATORS
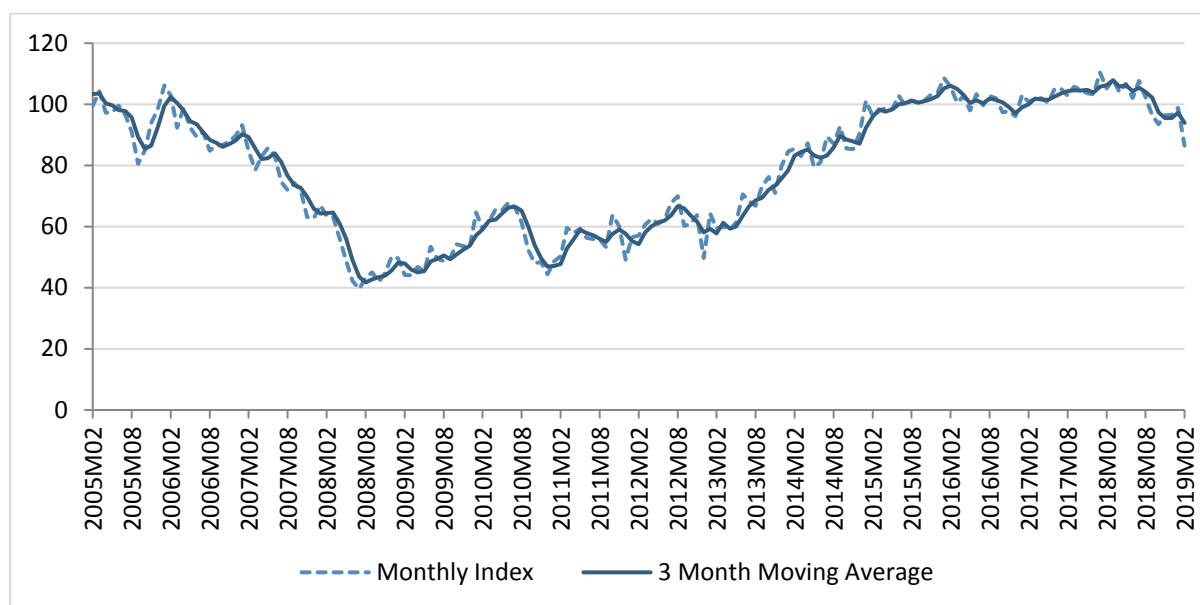
In addition to understanding trends in consumer sentiment, further insight into Irish households' appetite for spending and views on economic activity can be drawn from their savings behaviour. Figure 30 displays the three-month rolling average of the ESRI/Bank of Ireland Savings Index, which measures Irish people's sentiment towards savings. Overall, the index remained relatively stable in Q4 2018 as it has been for much of the year. From January 2018 to December 2018 the three-month average index has fallen by 2.8 per cent down to 101 index points. As of January 2019, the index is currently at 101.5 index points.

To get a better idea of what drives changes in the index the graph also includes the two sub-indices which compose the main savings index, the Savings Attitudes and the Savings Environment. For much of 2018 these sub-indices moved in opposite directions, with attitudes towards savings improving and views on the savings environment deteriorating. However, towards the end of the year both these sub-indices started converging. On the attitude side there was a decline, both in the amount of people saving and satisfaction with the level of savings, while on the environment side there was some improvement in individuals' views towards the savings environment today and in six months' time.

FIGURE 30   SAVINGS INDEX AND SUB-INDICES, THREE-MONTH ROLLING AVERAGE
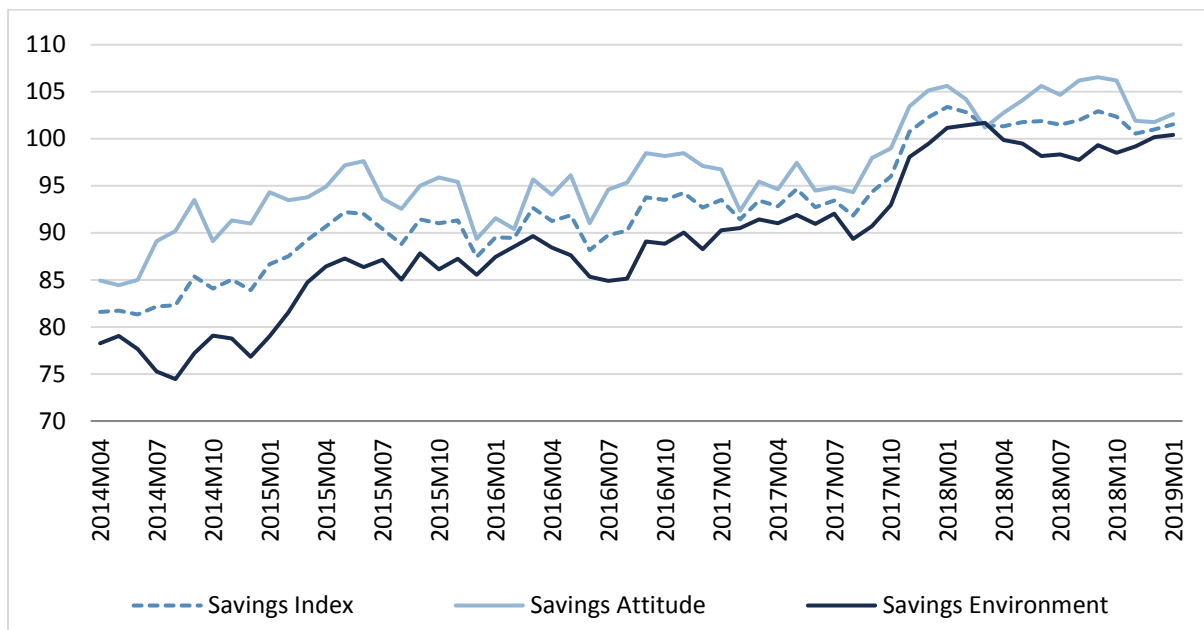
Source: ESRI/Bank of Ireland Savings Index.

The overall position of Irish households' net worth, which is the stock of financial and housing assets minus the stock of liabilities, is presented in Figure 31. Irish household net worth grew by 8 per cent year-on-year in Q3 2018. Contributing to the rise in net worth over this period was the increase in the value of financial assets which rose by €8 billion (2.1 per cent) and a decline in the value of liabilities which reduced by €4 billion (2.6 per cent). However, the main contributor to the improvement in household balance sheets has been the rise in the value of housing assets, which increased by €45 billion (9.2 per cent) over the same period. Household net worth was severely diminished in the years after the financial crisis as housing assets fell sharply in value. In Q1 2013 household net worth was €430 billion, down from €719 billion in Q2 2007 and housing assets were worth €289 billion, well below the previous high of €607 billion. While still remaining 12 per cent below their peak level, housing assets have recovered by 85 per cent since the low point in Q1 2013. The recovery in the value of housing assets is the main reason for the increase in household net worth to €769 billion.

FIGURE 31   IRISH HOUSEHOLD NET WORTH (€ BILLION)
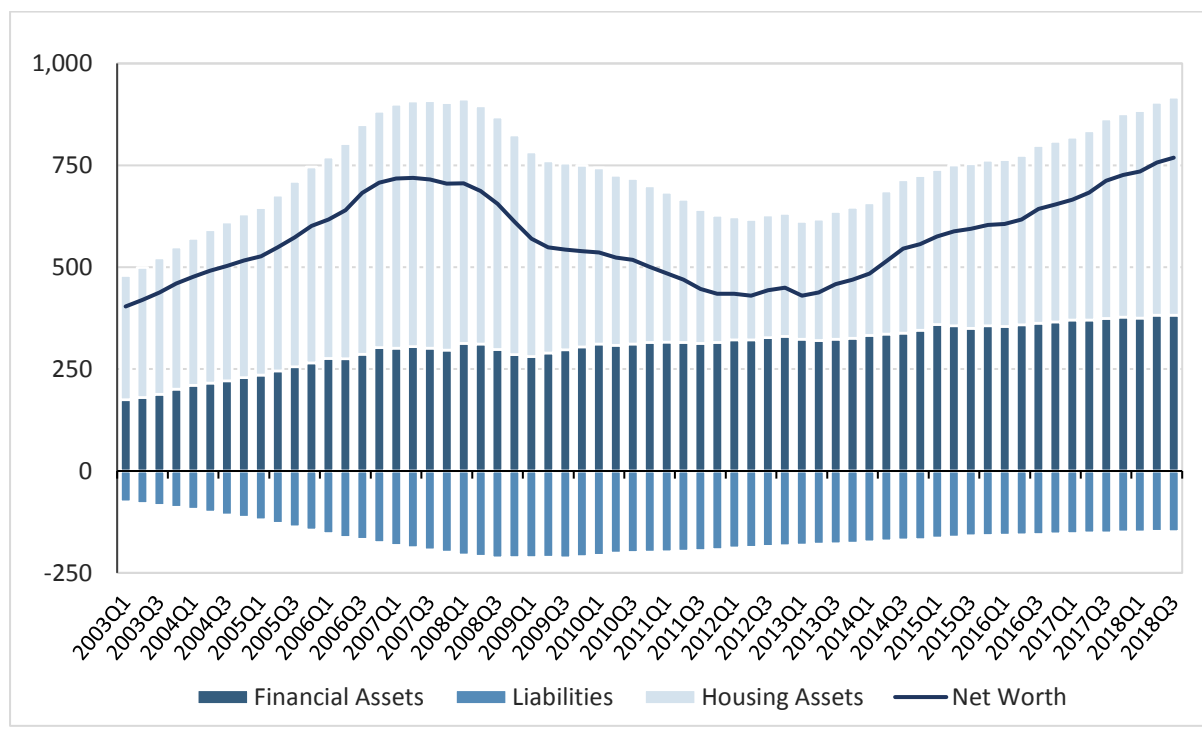
Source: Central Bank of Ireland, Quarterly Financial Accounts.

While household consumption is expected to continue growing over the next two years, a slowdown in the fall in unemployment and associated further decreases in consumer sentiment will likely moderate the increase. In 2019 we expect consumption expenditure to grow by 2.3 per cent and at a slightly slower pace of 2.2 per cent in 2020.

Property market developments

Property price growth continued to decelerate in Q4 2018 and is currently at its lowest rate since mid-2016. Figure 32 plots the year-on-year changes in residential property prices by property type.

FIGURE 32   ANNUAL RESIDENTIAL PROPERTY PRICE GROWTH (%) BY DWELLING
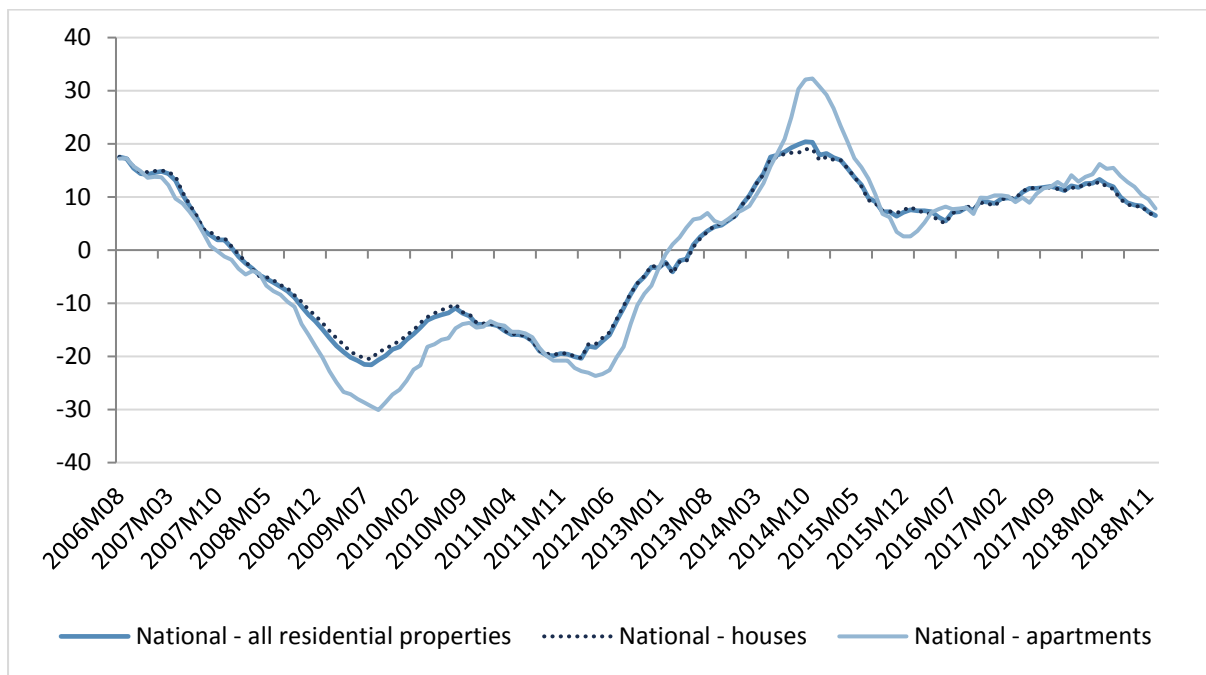
Since April 2018, annual property price growth has fallen month-on-month and as of December the growth rate was 6.5 per cent. This is a considerable decline from the growth rate of 13.3 per cent seen earlier in the year. One explanation for this drop in price growth could be the increased number of new residential properties completed in 2018. Figures released by the CSO[21] show there were 25.4 per cent more dwelling completions in 2018 in comparison to 2017.

Another likely reason for the decelerating growth rate comes from reduced demand as a consequence of the Central Bank's macro-prudential regulations. Due to the restrictions posed by the regulations (in the form of loan-to-value and loan-to-income limits), potential buyers are unable to borrow in excess of the regulatory parameters. As house prices continue to rise, an increasing number of buyers will likely become restricted by the regulations and demand for residential property will continue to fall. Some seasonality in terms of credit access may be evident given the system of allowances to the macro-prudential limits (whereby banks are enabled to lend a specific portion of total new lending in excess of the rules).

Across different types of dwelling, the divergence in growth rates between house prices and apartments has somewhat narrowed over the final quarter of 2018.

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[21]   CSO: New Dwelling Completions – Quarter 4, 2018.

In August 2018 there was a 4.2 percentage point difference in the rate of property price growth between houses and apartments. This difference has fallen to 1.2 percentage points in December 2018 with house prices growing at 6.6 per cent and apartment prices growing at 7.8 per cent. In Dublin in particular, there has been a significant drop in the growth rate of apartment prices, down to 2.9 per cent in December.

Property price developments for Dublin and the rest of Ireland are presented in Figure 33. The deceleration of property price growth is most prevalent in Dublin where year-on-year property price growth fell to 3.8 per cent in December, the lowest growth rate in the capital since June 2016. Property price growth in the rest of the country fell at a slower pace over the second half of the year and as of December was at 9.6 per cent. Due to the relatively high house prices in Dublin, the Central Bank's macro-prudential regulations are likely to be more binding in Dublin than the rest of the country. This is likely stifling demand in the capital which is one of the reasons why price growth has been falling more in Dublin than elsewhere.

FIGURE 33   RESIDENTIAL PROPERTY PRICE GROWTH (%) BY REGION
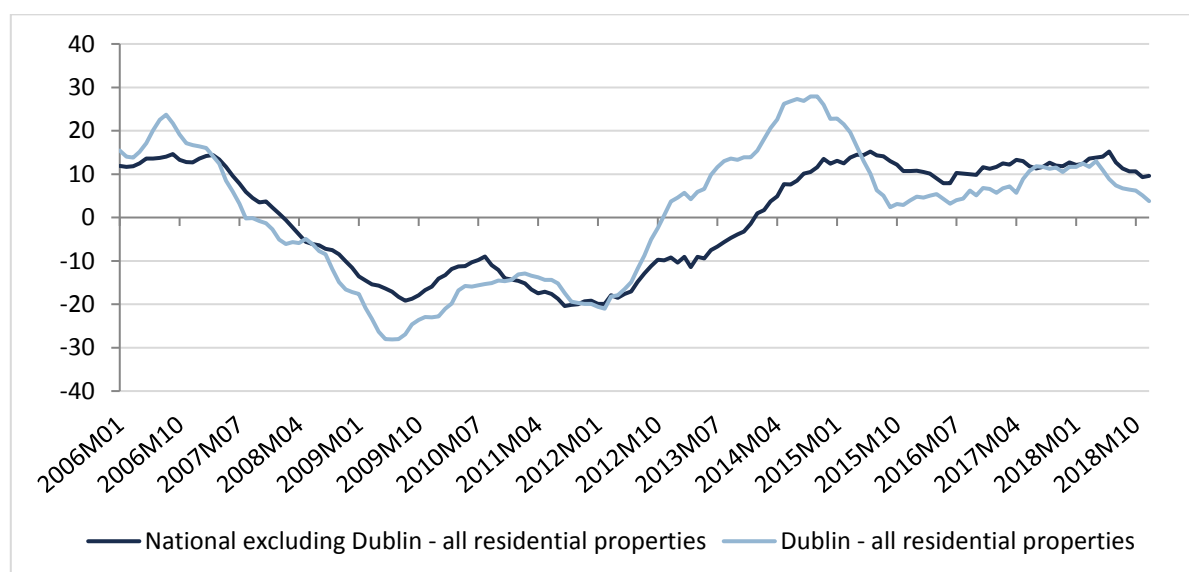
Source: Central Statistics Office.

Across the country rent levels continue to rise. In Q3 2018, the National Rent Index grew by 7.5 per cent compared to Q3 2017. As well as the national index, the ESRI/RTB Rental Index also produces indicators at a regional level, namely for Dublin, the Greater Dublin Area excluding Dublin (GDA) and outside of the GDA. These indices are presented in Figure 34. Annual rent rates in Dublin grew by 9.5 per cent in Q3 2018, a higher rate than the other regional areas. Rents in the GDA and outside the GDA both grew at around 6.5 per cent. Increases in the rent level

across the country are expected to continue as the level of housing supply fails to meet the country's structural demand.

FIGURE 34   RTB RENT GROWTH – NATIONAL, DUBLIN, GDA (EXCL. DUBLIN) AND OUTSIDE GDA
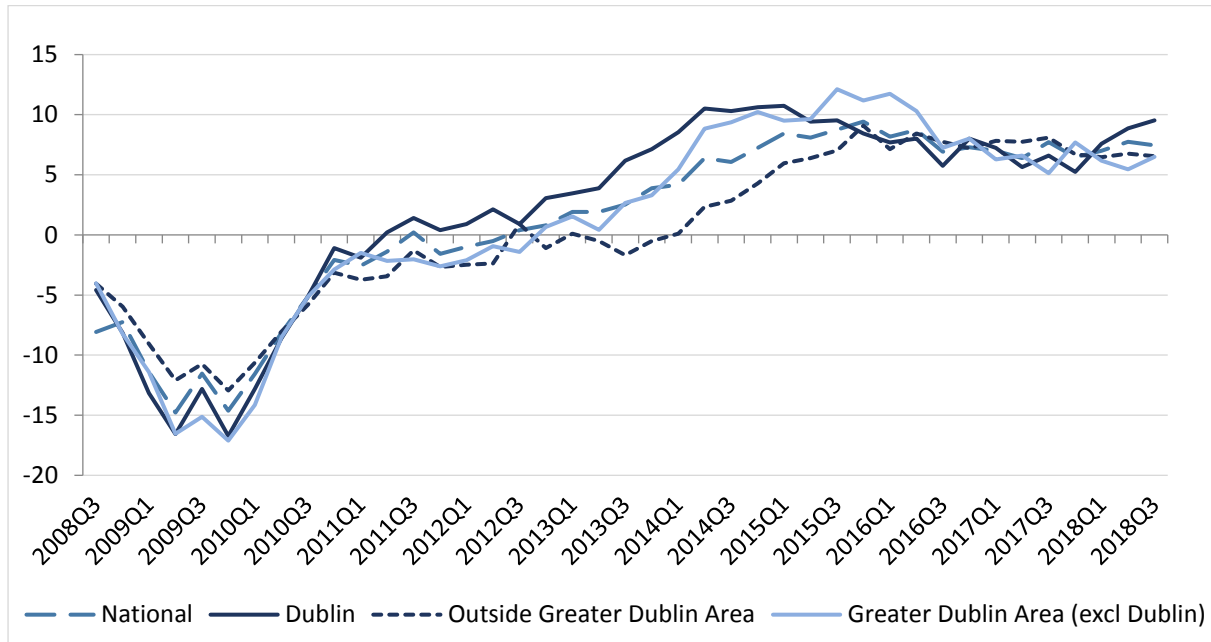
Source: Residential Tenancies Board (RTB).

Figure 35 shows how public sentiment towards the property market has changed over time. Data are taken from the ESRI Economic Survey Monitor which captures individual perception of the housing market and expectations regarding the future dynamic of the market. Respondents were asked whether they thought it was currently a good time to buy a house and in a separate question whether it was currently a good time to sell a house. Since early 2017 there has been a crossover in sentiment, with more respondents believing that it is a good time to sell rather than buy a house. The trend in the gap has been getting larger since then and as of January 2019, 68 per cent of respondents thought it was currently a good time to sell in comparison to 28 per cent who thought it was currently a good time to buy. This shift in sentiment may be indicative of a belief amongst the general public that further rapid increases in house prices are unlikely or that house prices may start falling in the not so distant future. Such sentiment may in turn be contributing to the slowdown in property price growth, given that price expectations often act as self-fulfilling prophecies.

FIGURE 35   DO YOU THINK IT IS CURRENTLY A GOOD TIME TO BUY/SELL A HOUSE

Source: ESRI Survey, Economic Sentiment Monitor Data.

Figure 36 highlights how property price growth in Ireland compares to other OECD countries. Ireland had the second highest rate of house price growth in the OECD, trailing only Iceland over the three-year period from Q3 2015 to Q3 2018. The 26.6 per cent rate of real house price growth over this period was 16.6 percentage points greater than the OECD average and 18.2 percentage points greater than the Euro Area average.

FIGURE 36   REAL HOUSE PRICE GROWTH FOR OECD MEMBERS
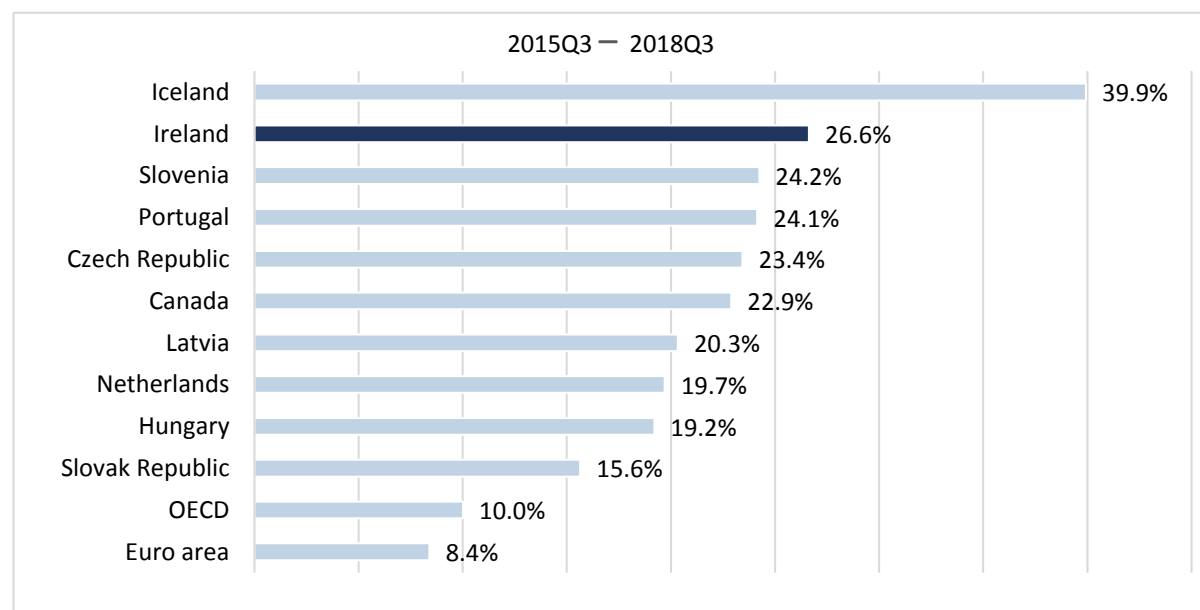
Source: OECD.

SUPPLY

Investment

Investment in long-term capital is a critical component in determining the productivity of the Irish economy. Capital investment is often highly volatile and can be very sensitive to changes in economic conditions and, in particular, uncertainty. Given the irreversible nature of fixed capital investment, research has shown that firms are always wary about investing in periods of heightened uncertainty (Awano et al., 2018).[22]

From an Irish perspective, at present the two main sources of uncertainty for firms are: a) Brexit, which is likely to most affect domestic SMEs and b) international trade uncertainties, which are more likely to affect the multinational sector. Given the importance of the multinational sector for Ireland, any contraction in global demand or increase in global uncertainty will have a knock-on impact on their investments in Ireland. For domestic companies the ongoing uncertainty due to Brexit is likely to be deterring companies from committing to new large investments.

Despite the uncertainty, investment in Ireland has remained strong through 2017 into 2018. This is mainly driven by strong growth in construction activity. Figure 37 presents the trends in modified Gross Fixed Capital Formation in Ireland to Q4 2018. Overall investment decreased by 4 per cent year-on-year, largely due to a decline in intangible assets. Focusing on the subcomponents, year-on-year growth in construction investment rose by 7 per cent, machinery and equipment investment declined by 15 per cent and investment in intangibles fell by 26 per cent.

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[22]   Awano, G., N. Bloom, T. Dolby, P. Mizen, R. Riley, T. Senga, J. van Reenen, J. Vyas and P. Wales (2018). 'A firm-level perspective on micro- and macro-level uncertainty; An analysis of business expectations and uncertainty', from the *UK Management and Expectations Survey*, No ESCoE DP-2018-10, Economic Statistics Centre of Excellence (ESCoE) Discussion Papers, Economic Statistics Centre of Excellence (ESCoE).

FIGURE 37   COMPONENTS OF MODIFIED INVESTMENT (€ MILLION)
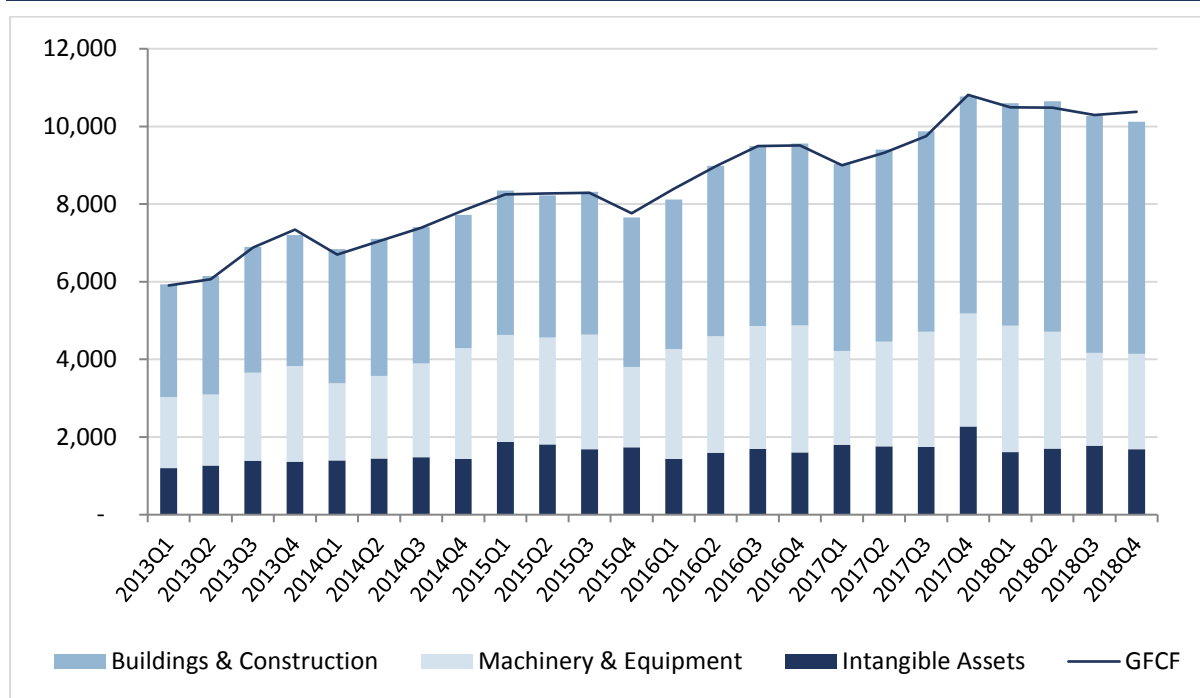
Source: Central Statistics Office, Quarterly National Accounts Data.

The tail-off in investment in machinery and equipment is particularly noteworthy. These assets represent the day-to-day capital that enterprises in the real economy use to produce output. Indeed, Gargan et al. (2018)[23] find these to be the most popular investment type amongst SMEs. The fact that the trend growth rate in machinery and equipment has dropped in the latest quarter likely reflects the increase in uncertainty around the Brexit issue.

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[23]   Gargan, E., M. Lawless, M. Martinez-Cillero and C. O'Toole (2018). 'Exploring Investment Patterns for the Irish SMEs: New Survey Evidence', *Quarterly Economic Commentary*: Special Article, Economic and Social Research Institute.

FIGURE 38   FOUR-QUARTER ROLLING AVERAGE GROWTH RATE IN INVESTMENT (%)
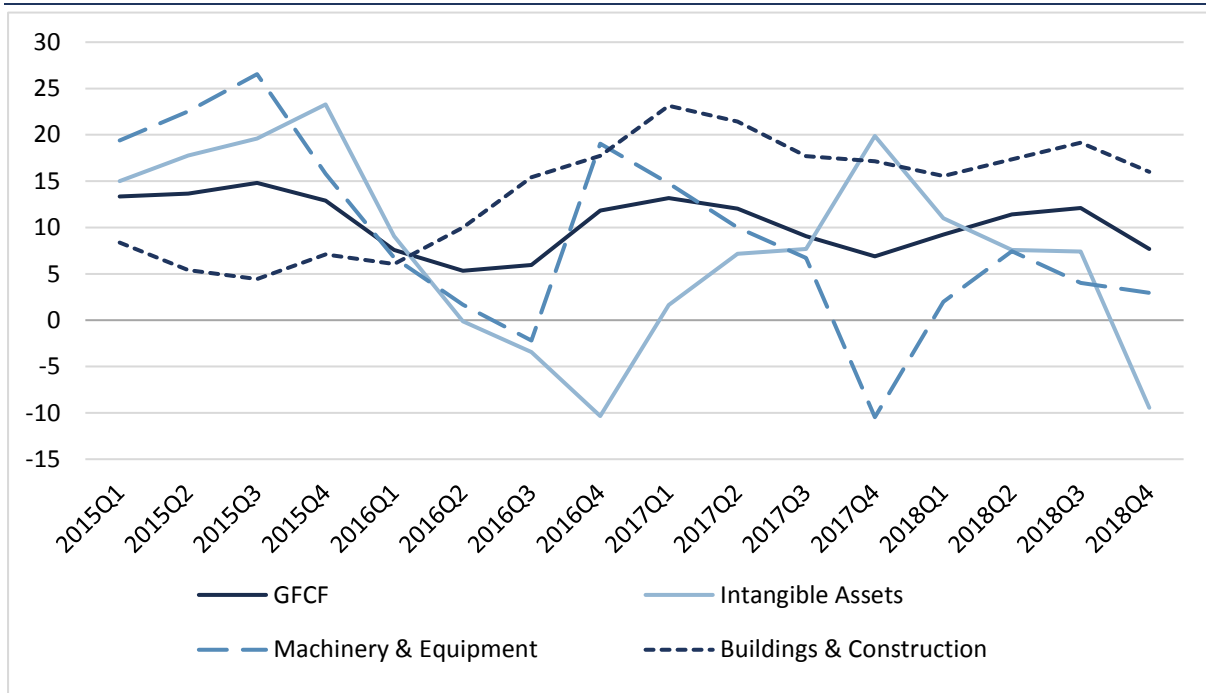
Source: ESRI analysis of CSO data.

Investment sentiment

To better understand the role of Brexit in driving current Irish investment sentiment, we draw on data from the Bank of Ireland/ESRI Savings and Investment Index which tracks Irish households' views on the investment environment. We first identify households who indicate that it is currently a bad time to invest in each month since the index began in October 2017. We then run a simple model which compares how more likely households were to indicate now is a bad time to invest as compared to January 2018. We also control for the age, education and employment status of the household. Figure 39 indicates the difference in the likelihood of indicating it is a bad time to invest in each month relative to January 2018. The results indicate that in December 2018 and January 2019, households have become increasingly likely to indicate it is currently a bad time to invest (in the other periods the results are not statistically different from January 2018); in January, there was a 13 percentage point increase in the number indicating it is a bad time to invest compared to January 2018. The rapid increase in this likelihood is correlated with the rejection of the Withdrawal Agreement in the UK Parliament and the ongoing uncertainty about the Brexit issue.

FIGURE 39 'BAD TIME TO INVEST NOW' – CURRENT INVESTMENT SENTIMENT OCTOBER 2017-FEBRUARY 2019

We also look at whether or not households are also pessimistic about the investment climate in six months' time. This is presented in Figure 40 which runs a similar model but includes the forward-looking investment sentiment indicator as the dependent variable. This also indicates that since December, sentiment has worsened and households increasingly think it will be a bad time to invest in six months.

FIGURE 40 'BAD TIME TO INVEST IN SIX MONTHS' – CURRENT INVESTMENT SENTIMENT OCTOBER 2017- FEBRUARY 2019
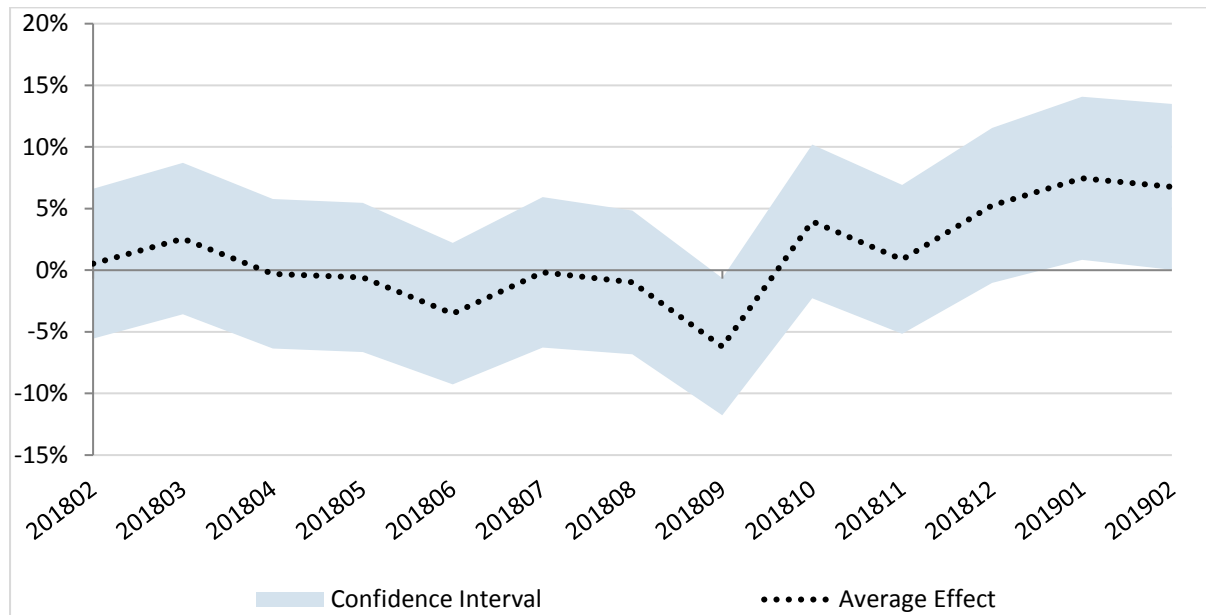
Source: ESRI/Bank of Ireland Investment Sentiment Index.

While these indicators capture household investment sentiment and are not direct measures of corporate investment appetite, they do provide some timely information as to the deterioration in views around investment. This is likely to lead to the postponement or cancellation of capital projects which has adverse implications for the development of the country's capital stock across different asset classes.

Construction outlook

In terms of our outlook for construction investment, we expect that building investment will continue to increase particularly as the rate of housing construction expands. Given the strong increase of output from 14,400 units in 2017 to 18,000 units in 2018, we expect continued growth in 2019 and 2020. Both the increased private sector output and the expanded commitment by Government to increase capital spend in housing (particularly related to the delivery of social and affordable units) in Budget 2019 are likely to be key factors supporting output increases in the sector. Consequently, we forecast 25,000 units in 2019 increasing to 30,000 units in 2020 (Figure 41). However, as noted in McQuinn and O'Toole (2018),[24] a hard Brexit may have a negative impact on the supply side of the residential market as a number of basic materials for the market are sourced through the UK.

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[24] McQuinn K. and C. O'Toole (2018). 'Presentation on impacts of Brexit on the housing market' to the Oireachtas Committee on Housing, Leinster House, Dublin, November 13.

FIGURE 41   ANNUAL HOUSING COMPLETIONS (2019-2020 FORECASTS) – TO 2018 ACTUAL
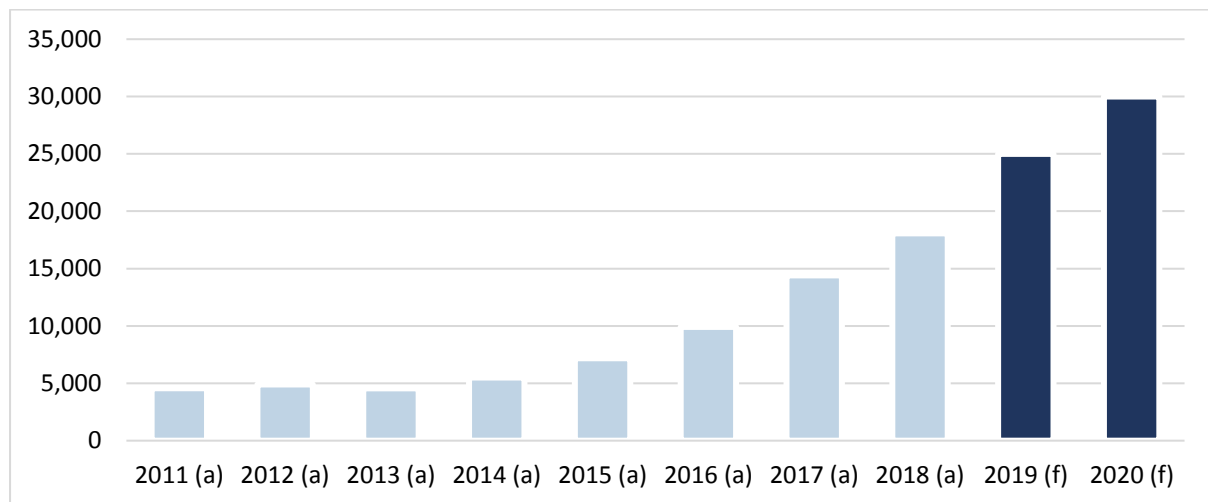
Source: Central Statistics Office and ESRI forecasts.

A notable feature of the recovery in construction has been a strong increase in construction activity for commercial property activity. This is depicted in Figure 42 as an increasing share of other building and construction in total construction investment from the CSO quarterly National Accounts. Given the expected increase in residential dwelling construction, this does increase the likelihood that capacity constraints could limit general construction activities going forward.

FIGURE 42   INVESTMENT IN CONSTRUCTION BY TYPE OF ACTIVITY (% OF TOTAL)
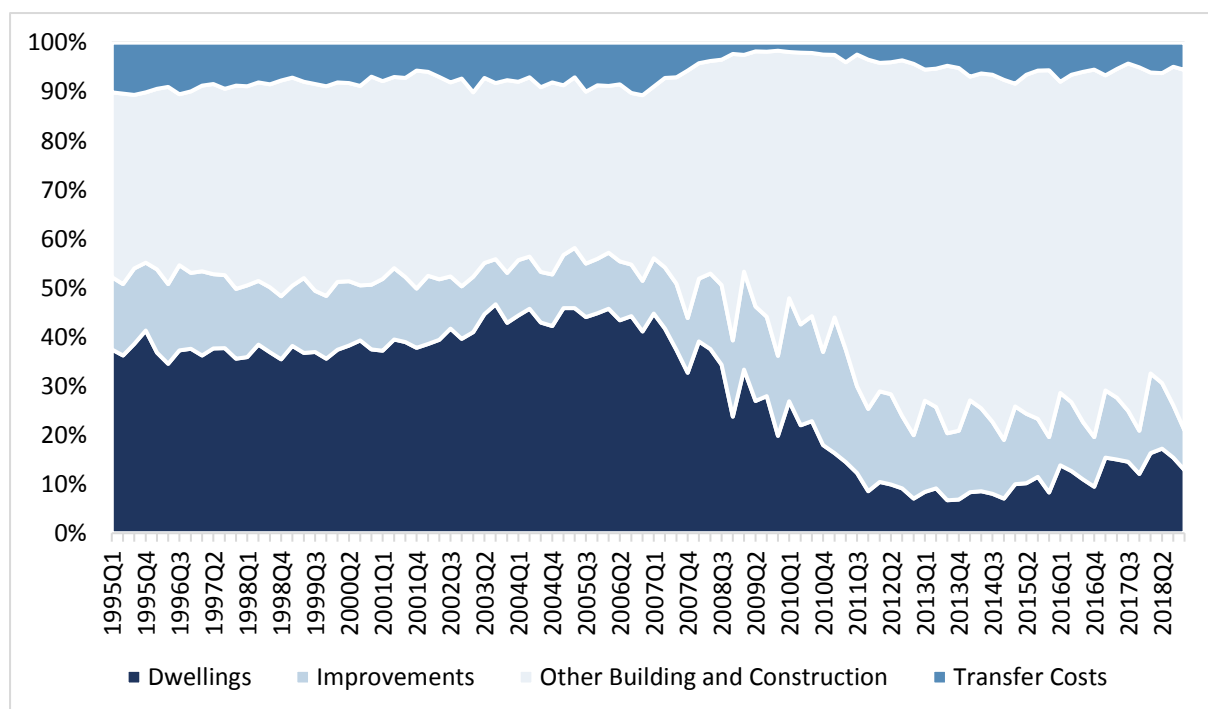
Source: Central Statistics Office.

Forecasts

Therefore, despite the international uncertainties, we maintain an optimistic position for overall investment in 2019 and 2020, driven, in the main, by the construction sector. In particular, we expect annual average growth in investment of 9.5 per cent in 2019 and 7.5 per cent in 2020. Further moderation in 2020 is likely if global conditions continue to deteriorate and if a hard Brexit materialises.

LABOUR MARKET

Conditions in the Irish labour market continued to improve in Q4 2018, with continued increases in the level of employment and reductions in both the amount of people on the Live Register and the amount of people in long-term unemployment. Earnings also improved over this period as wage rates across the majority of sectors increased. However, there has been some evidence of a moderation of activity in the labour market with unemployment rates levelling off at 5.7 per cent over the second half of 2018.

Unemployment

While the Live Register is not a precise measure of unemployment,[25] as it includes part-time and some seasonal and casual workers, it is one of the most up-to-date and detailed labour market measures. On a seasonally adjusted basis, the number of people on the Live Register decreased by 37,800 between January 2018 and January 2019, a fall of 15.9 per cent. Currently there are 200,300 people on the Live Register, a figure which has been in decline since August 2016. However this remains some way off the lowest figures of under 160,000 seen before 2007.

The total number of people under the age of 25 on the Live Register as of January 2019 was 21,400, which is a fall of 18.6 per cent from the same period in 2018. Among those aged 25 or older there were 178,800 people on the Live Register in January 2019, a fall of 15.5 per cent from the same period the previous year.

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[25] The Live Register provides a monthly series of the numbers of people registered for Jobseekers Benefit, Jobseekers Allowance or other statutory entitlements at the Irish Department of Employment Affairs and Social Protection.

FIGURE 43   NUMBERS ON THE LIVE REGISTER ('000) BY AGE: OCTOBER 2006 TO OCTOBER 2018
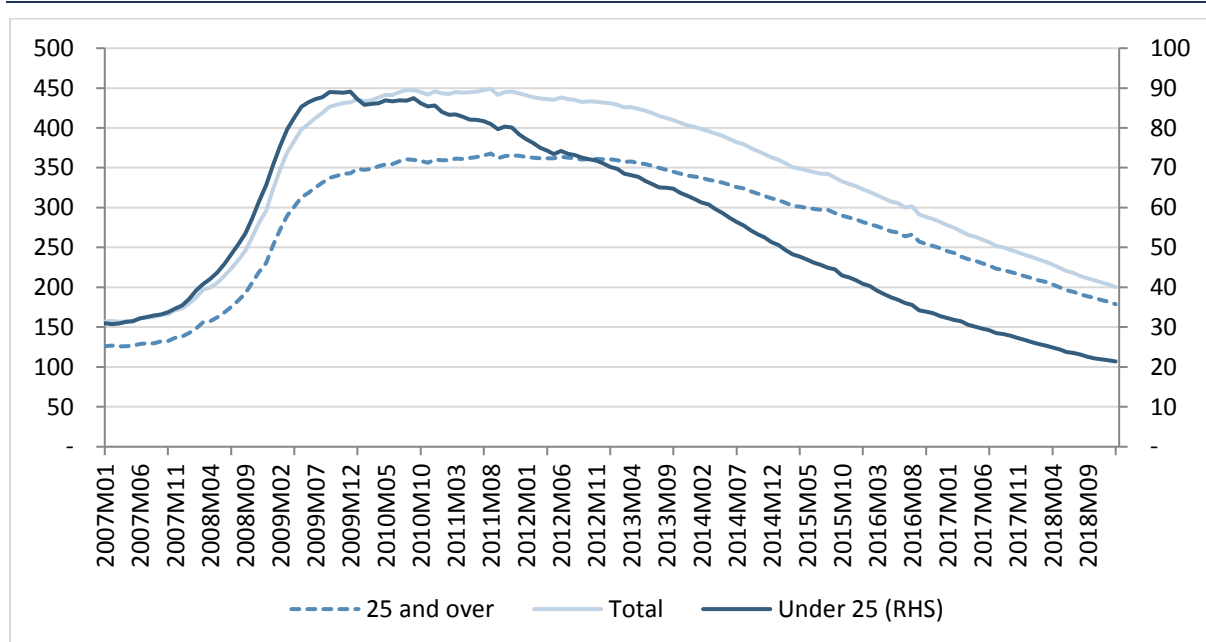
Source: Central Statistics Office.

Long-term unemployment is defined as being out of work for a period greater than 12 months and its negative consequences for individuals and society have been well documented.[26] The longer a person is unemployed, the more difficulty they are likely to find returning to the workforce as a result of deskilling, reduced motivation and apprehension from employers about hiring someone who has been out of work for a sustained period of time.

Table 5 shows the number and proportion of people on the Live Register by duration. As of January 2019 the number of people who can be classified as long-term unemployed was 79,000 which is 39.6 per cent of the total number on the Live Register. Viewed against comparable figures for 2014, there has been a substantial fall in terms of both the number and proportion of people in long-term unemployment. Over the five years the amount of people on the Live Register for more than a year has fallen by nearly 100,000, and the amount of people that have been on the Live Register for more than three years has fallen by 55,000.

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[26]   Abraham, Catharine G., Kristin Sandusky, John Haltiwanger and James R. Spletzer (2016). 'The Consequences of Long Term Unemployment: Evidence from Matched Employer-Employee Data,' Working Papers 16-40, Center for Economic Studies, US Census Bureau.
J. O'Connell, P., S. McGuinness and E. Kelly (2010). 'A Statistical Profiling Model of Long-Term Unemployment Risk in Ireland'. Economic and Social Research Institute (ESRI), Papers.

TABLE 5   NUMBERS AND PROPORTIONS ON THE LIVE REGISTER ('000) BY DURATION

	2014M01		2018M01		2019M01	
	('000)	%	('000)	%	('000)	%
All durations	399.2		237.4		199.6	
Under 1 year	218.0	54.6	139.4	58.7	120.6	60.4
1 year and over	181.2	45.4	98.0	41.3	79.0	39.6
1 year – less than 2 years	47.3	11.8	25.6	10.8	21.4	10.7
2 years – less than 3 years	33.1	8.3	15.1	6.4	12.6	6.3
3 years and over	100.9	25.3	57.3	24.1	45.0	22.5

Sources: Live Register, Central Statistics Office.

Following CSO revisions in January, provisional unemployment rates for the latter months of 2018 have been adjusted upward. These new figures reveal that from August 2018 to January 2019 the unemployment rate has remained fixed at 5.7 per cent. This may be symptomatic of the fact that the Irish economy is reaching full employment and so there is likely to be a slowdown in the rate at which unemployment is falling.

FIGURE 44   SEASONALLY ADJUSTED UNEMPLOYMENT RATE BY MONTH (%)
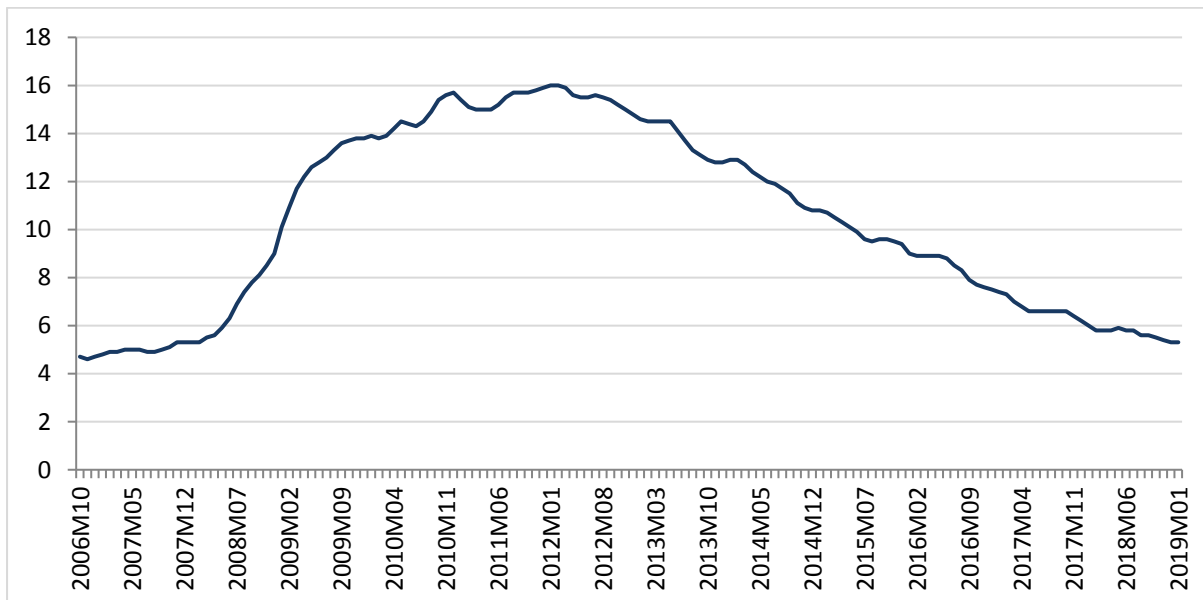
Source: Labour Force Survey, Central Statistics Office.

Employment

Seasonally adjusted figures for employment reveal continued strong growth in the number of people working in the Irish economy. An additional 50,000 jobs were added in Q4 2018 in comparison to the same period the previous year. bringing the total number of people in employment up to 2,272,200. The labour

force participation rate remained at 62.2 per cent in Q4 2018, the same rate as it had been in Q4 2017.

On a seasonally adjusted basis, the number of people in full-time employment increased by 2.8 per cent from Q4 2017 up to 1,815,000 in Q4 2018. Over the same period the number of people in part-time employment has increased by 0.5 per cent up to 461,400.[27] The number of people who are part-time _underemployed_, which is a measure of the number of people who are currently working part time but would like more hours, fell by 6 per cent over this period. The fall in this measure suggests there has been an increase in the number of people who moved from part-time to full-time work in the Irish labour force. As of Q4 2018, 80 per cent of the Irish workforce are working full time.

FIGURE 45   SEASONALLY ADJUSTED EMPLOYMENT, FULL-TIME AND PART-TIME ('000)
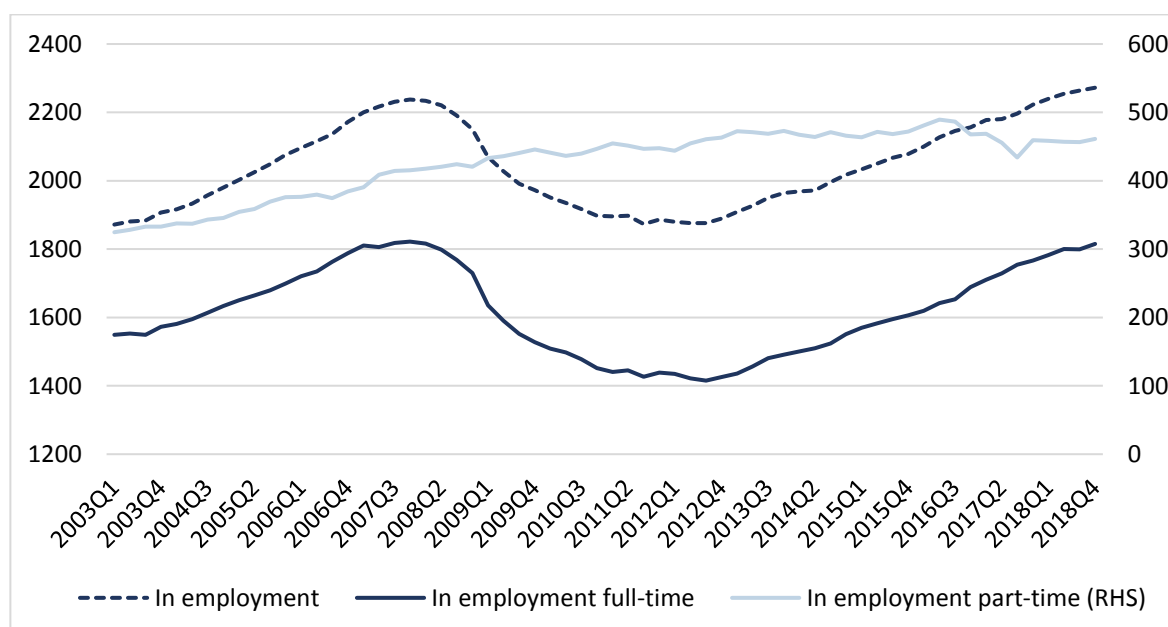
Sources: Labour Force Survey, Central Statistics Office

Figure 46 shows the year-on-year change in the rate of employment for a select group of NACE sectors.[28] The annual rate of employment fell across all sectors in the years after the financial crisis, with consistent positive rates of growth only reoccurring from 2013 onwards. Construction was by far the most negatively impacted sector with the annual rate of growth falling as low as -38 per cent in 2009. Since 2013, employment growth has generally been positive across all

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[27]   Seasonally adjusted full-time and part-time series do not equal seasonally adjusted employment due to the method of seasonal adjustment used. Seasonal adjustment is conducted using the direct method meaning the sum of components of a series may not be equal to the overall series.

[28]   NACE (Nomenclature of Economic Activities) is the European statistical classification of economic activities.

sectors with especially strong rates of growth in the Construction and Accommodation and food service sectors.

In Q4 2018, employment increased by 7.9 per cent in the Construction sector, 3.7 per cent in the Accommodation and food service sector, 1 per cent in the Wholesale and retail trade sector and 0.3 per cent in the Financial, insurance and real estate sector.

FIGURE 46 ANNUAL SEASONALLY ADJUSTED EMPLOYMENT GROWTH BY SECTOR
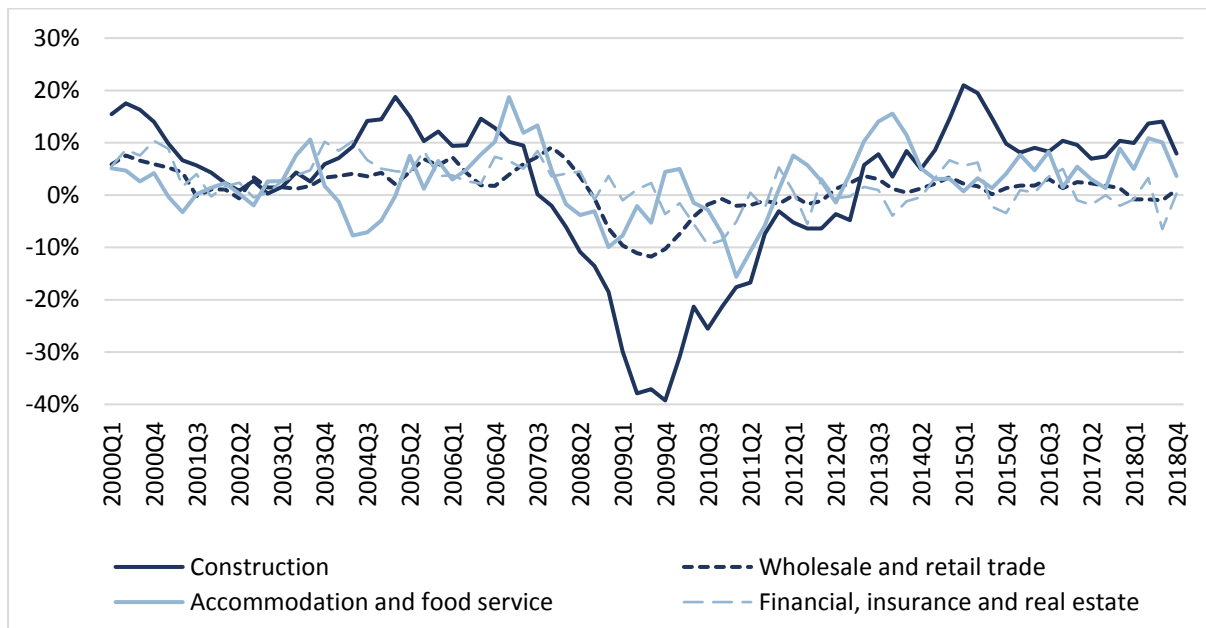
Sources: Labour Force Survey, Central Statistics Office

The overall employment rate in Ireland remains similar to the EU at around 69 per cent as of Q3 2018. However, when comparing employment rates by age and education status clear differences emerge. Employment rates among the younger (15-24 years) and older generations (55-64 years) are higher in Ireland than in the EU, whereas prime age workers (25-54 years) face lower employment rates. The difference is particularly stark for those between the ages of 15-24 where the employment rate in Ireland is 6.7 percentage points higher than in the EU. Examining employment rates by level of education reveals an even greater difference among the younger cohort. For those with a tertiary level of education the employment rate is 18.7 percentage points higher in Ireland relative to the EU, while for those with an education level of lower secondary or below, the employment rate was 6.3 percentage points below the EU average. Previous

work by McGuinness et al. (2018)[29] found Ireland to have a relatively high rate of overskilling in comparison to other EU countries. The employment rate differentials for young people may be a reflection of this overskilling as those with higher levels of education may be taking on lower skilled jobs.[30] However, as noted in the same paper, caution must be exercised in interpreting the differences in employment rates as evidence of overskilling. Differences in employment rates can be explained by a wide range of factors including variance in the quality of jobs between regions. If there is a higher proportion of jobs in Ireland which require tertiary education in comparison to the EU average, then the relatively high rate of employment for college graduates and relatively low rate of employment for those with lower levels of education may not be indicative of overskilling.

TABLE 6   Q3 2018 EMPLOYMENT RATES BY AGE GROUP AND EDUCATION (%)

Education Level	Age Group	Ireland	EU
All Education levels	Total (15-64 years)	69.1	69.0
	From 15 to 24 years	43.1	36.4
	From 25 to 54 years	79	80.8
	From 55 to 64 years	60.4	59.2
Lower secondary or below	Total (15-64 years)	37.8	47.3
	From 15 to 24 years	13.9	20.2
	From 25 to 54 years	54.5	63.8
	From 55 to 64 years	48.3	44.6
Upper secondary and post-secondary non-tertiary	Total (15-64 years)	70.2	72
	From 15 to 24 years	58.0	47.5
	From 25 to 54 years	76.8	82.3
	From 55 to 64 years	62.4	60.8
Tertiary	Total (15-64 years)	83.9	84.2
	From 15 to 24 years	79	60.3
	From 25 to 54 years	86.6	88.2
	From 55 to 64 years	70	74

Sources: Labour Force Survey, Central Statistics Office, Eurostat.

Earnings

In Q4 2018, seasonally adjusted Average Hourly Earnings increased by 3.5 per cent, to €23.40 per hour relative to the same period in 2018. The largest increase

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[29]   McGuinness, S., K. Pouliakas and P. Redmond (2018). 'Skills mismatch: concepts, measurement and policy approaches', *Journal of Economic Surveys*, 32: 985-1015.

[30]   See European Commission (2015). 'Measuring skills mismatch', European Commission Analytical Web Note 7/2015, European Commission, Luxembourg.

for the quarter was observed in the Mining and quarrying sector, rising annually by 11.8 per cent (an additional €2.88 per hour). This was followed closely by the Transportation and storage sector which rose by 10.3 per cent (€2.17 per hour). Other notably high increases occurred in Other service activities (+7.8 per cent), Administrative and support services (+7.5 per cent), Construction (+6.2 per cent), and Financial, insurance and real estate activities (+6 per cent). The only sector in which there was a fall in the seasonally adjusted Average Hourly Earnings over this period was in Professional, scientific and technical activities (-1.6 per cent). Figure 47 highlights wages persistently trending upwards since the end of 2015. As of Q4 2018, average weekly earnings across all sectors reached €762.22, a 4.6 per cent increase from Q4 2017.

FIGURE 47   TRENDS IN AVERAGE EARNINGS PER WEEK AND PER HOUR (€), SEASONALLY ADJUSTED
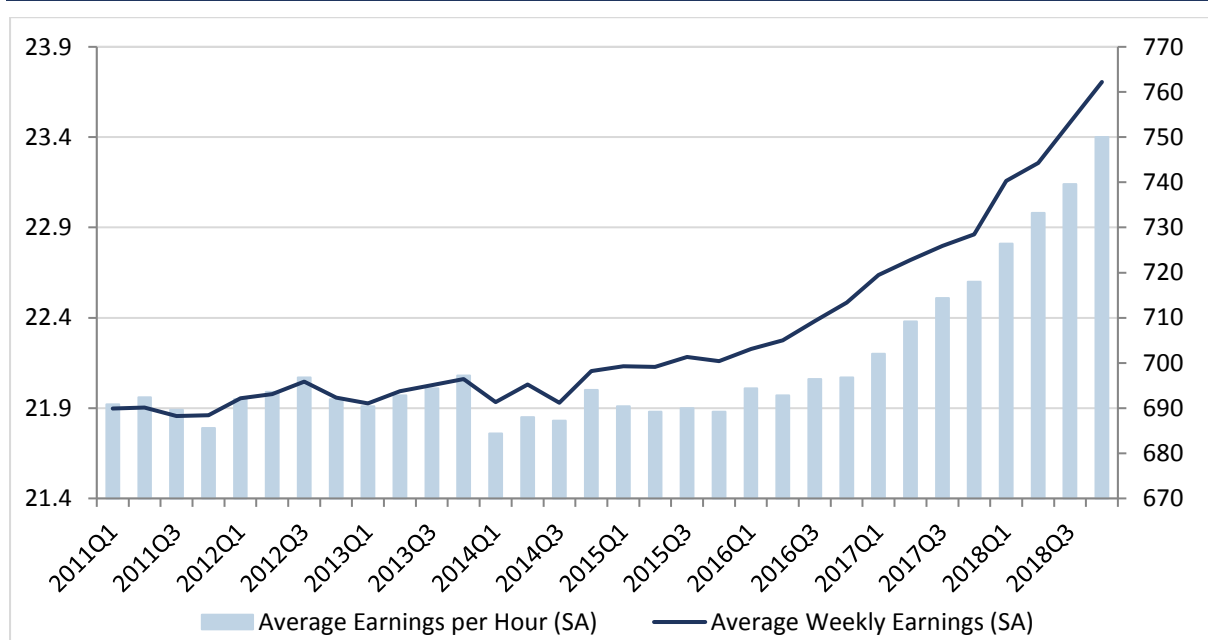
Source: Earnings and Labour Costs Quarterly, Central Statistics Office.
Note: The y-axis on the LHS scale has a very low range of values.

Looking at the difference between public and private pay, public sector employees experienced an annual increase of 4.4 per cent to €21.65 per hour while private sector employees experienced an annual increase of 2.7 per cent to €29.77 per hour. For the public sector, weekly earnings ranged from €844.42 among regional bodies to €1,232.53 per week for An Garda Síochána in Q4 2018. Private sector earnings ranged from €360.73 per week in Accommodation and food service activities to €1,175.46 per week in Information and communication. Irregular earnings – bonuses which are not paid regularly at each pay period – were highest in the public sector amongst An Garda Síochána at an average of €159.94 per week. In the private sector they were highest for Information and communication workers averaging €165 per week.

FIGURE 48   HOURLY EARNINGS BY SECTOR, Q4 2018 (€)

Horizontal bar chart with categories (top to bottom): All NACE economic sectors, Manufacturing, Construction, Accommodation and food service activities, Information and communication, Professional, scientific and technical activities, Administrative and support service activities, Education, Human health and social work activities, Financial, insurance and real estate activities, Civil service, Garda Siochana, Private sector, Public sector. X-axis from 0 to 40.

Legend: ■ Average Hourly Earnings excluding Irregular Earnings   ■ Average Hourly Irregular Earnings

Source: Earnings and Labour Costs Quarterly, Central Statistics Office.

Labour market forecasts

As the Irish economy is expected to grow over the next two years, we expect further improvements in the labour market. However, as the labour market approaches full employment, the rate of unemployment is expected to decrease at a slower pace than 2018. The unemployment rate is expected to average 5.2 per cent in 2019 and 4.8 per cent in 2020. Employment is set to exceed 2.3 million by the end of 2019, increasing to 2.36 million by the end of 2020. As the demand for labour increases over the next two years, so too will the wage rate. We expect nominal earnings to rise by 3.2 per cent in 2019 and by 3.4 per cent in 2020.

PUBLIC FINANCES

Irish taxation receipts in 2018 witnessed a significant increase. While all items, with the exception of excise duty, experienced increases, it was the surge in corporation tax receipts which attracted most attention. Corporation tax receipts grew by almost 24 per cent year-on-year; this compares with the expected increase by the Department of Finance at the onset of 2018 of just under 4 per cent. While the contribution of corporation taxes is the most notable element of Exchequer receipts, it is worth pointing out that other categories, which are more reflective of underlying economic activity such as income tax and VAT, also experienced sizeable annual increases of 6 and 6.8 per cent respectively. Stamp

duty also experienced a sizeable increase with revenues growing by over 30 per cent for the year.

Figure 49 illustrates the annual changes in taxation returns for the last three years for the main tax categories as well as the overall total amount.

FIGURE 49   ANNUAL CHANGES IN MAJOR TAX SUB-COMPONENTS (%)
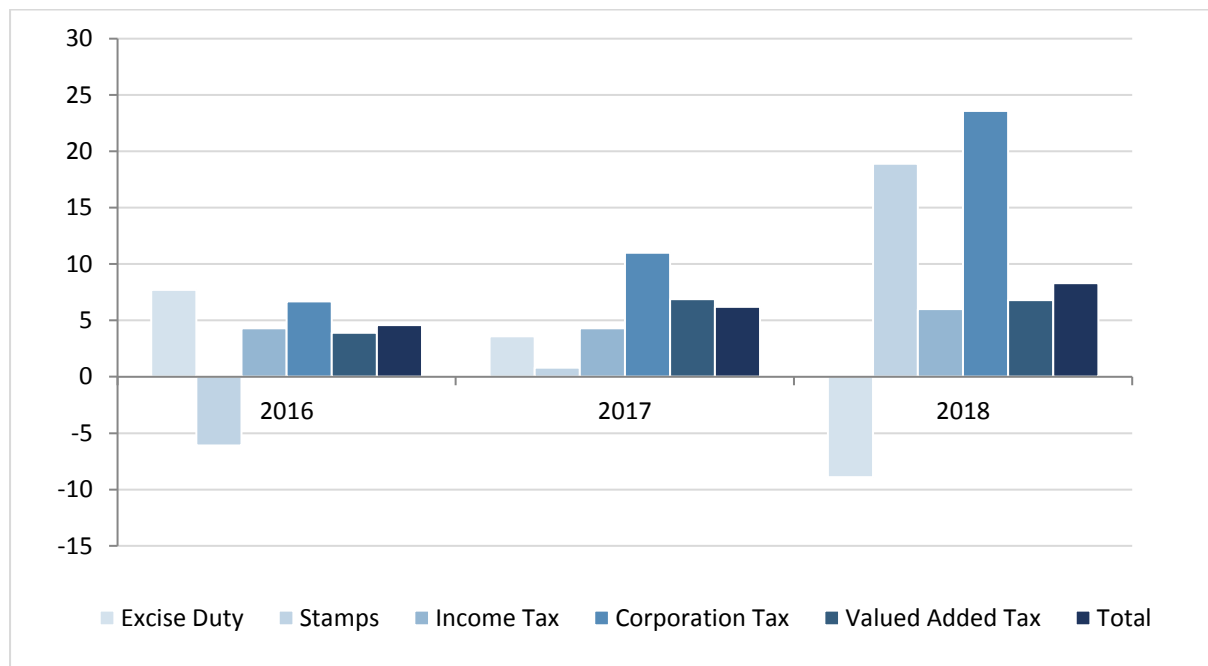
Source: Department of Finance and *QEC* calculations.

Further evidence of the strong underlying performance of the economy can be observed from the increased contributions to the Social Insurance Fund through pay related social insurance; these returns, which are closely correlated with developments in the Irish labour market, increased by 5.2 per cent in 2018.

Notwithstanding the increases in taxation items associated with underlying growth in the economy, the significant spike in corporation tax receipts suggests caution should be exercised in assessing the state of the fiscal accounts. In Figure 50 we compare the actual growth rate in corporation tax returns with the expected or 'profile' forecasts issued by the Department of Finance at the onset of each year

FIGURE 50   ANNUAL   ACTUAL   AND   EXPECTED   GROWTH   RATES   IN   CORPORATION   TAX   RECEIPTS (%): 2005-2018
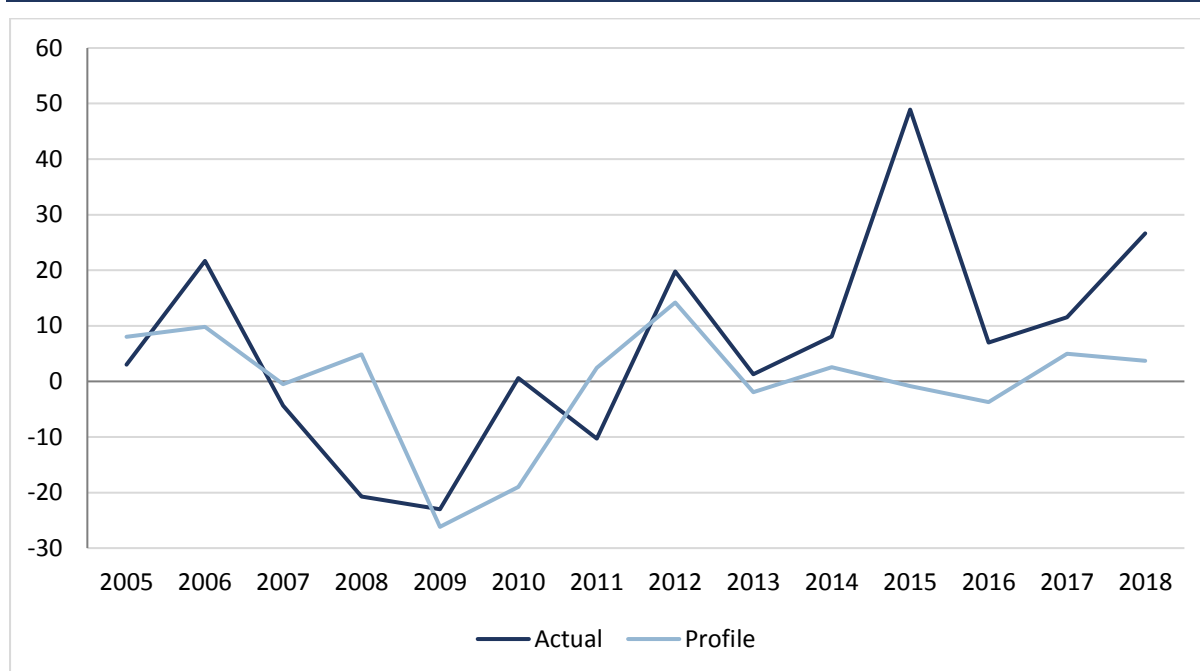
Source: Department of Finance and *QEC* calculations.

The graph illustrates how, since the start of the general economic recovery in 2013, the rate of increase in corporation taxes has been underestimated relative to profile levels, with the differences in 2015 and 2018 being particularly pronounced. In terms of absolute amounts, this means that for corporation taxes alone, the Exchequer has been in receipt of over €5.5 billion of unanticipated or 'windfall' returns between 2013 and 2018. This would be over 10 per cent of total taxation receipts in 2018.

As a counterfactual exercise to demonstrate the impact of the corporation tax windfalls, we re-estimate the general government balance (GGB) with the profile estimate of corporation tax as opposed to the actual level. All other components of the budget are kept the same. Overall, instead of a balance of -0.3 per cent of GDP, the 'windfall' in corporation taxes results in a budget surplus of 0.1 per cent of GDP. This illustrates how assessments of the country's public finances are increasingly sensitive to unanticipated changes in corporation tax receipts.

Figure 51 presents the debt-to-output ratio for both GDP and the new GNI* measure. While both trends indicate that Ireland's debt sustainability is clearly improving, a significant difference is evident between the GDP and GNI* output denominators.

FIGURE 51   DEBT-TO-GDP AND GNI*RATIOS (%)
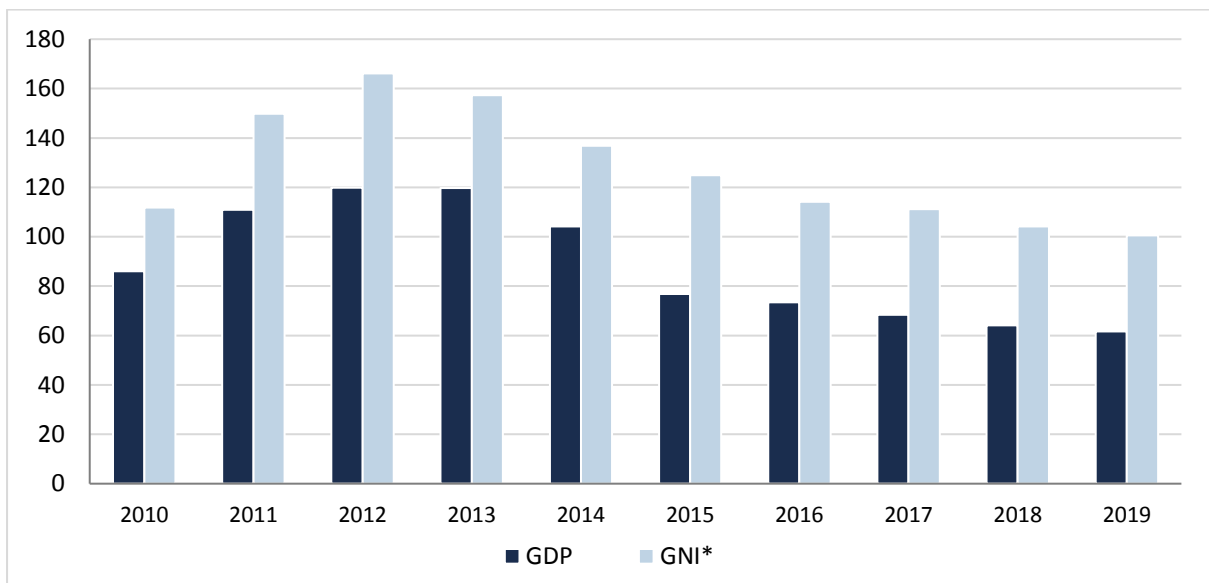
Source: *QEC* calculations.

General Assessment

From a growth perspective, the Irish economy sustained its excellent performance in 2018. While headline estimates of GDP are significantly impacted by the performance of a relatively small number of multinational firms, the increase in taxation receipts (apart from those in the corporation category), along with the continued expansion in total employment, illustrates the strong momentum in the domestic economy.

However, the outlook for 2019 is characterised by an unprecedented level of uncertainty, particularly in terms of Ireland's relationship with external trading partners. The continued lack of clarity over the nature of the UK's withdrawal from the European Union is the most immediate pressing risk to the Irish economy. Researchers at the ESRI and the Department of Finance have conducted an in-depth assessment of the relative impacts of both a 'no-deal' Brexit, and the implications of the Withdrawal Agreement between the UK and the EU, compared to a baseline of the UK maintaining EU membership. The work published in a paper to the *Commentary* (Bergin et al., 2019) is a novel combination of both macroeconometric analysis using COSMO and more granular, microeconomic research presented in Lawless (2018a), Lawless (2018b) and Morgenroth and Lawless (2016).[31] This allows for arguably the most comprehensive examination of the impacts of Brexit on the Irish economy to date.

The results clearly point to a long-term loss of output and employment for the Irish economy vis-à-vis a no-Brexit case. The accumulation of this loss in economic activity will adversely impact the resources available to the State in addressing key infrastructural challenges such as those in the housing and health areas.

The prospect of a no-deal Brexit also leads to significant variability around short-term forecasts for the Irish economy; under a baseline, no-Brexit case, we believe the Irish economy would grow by 3.8 per cent in 2019 and 3.2 per cent in 2020. However, a no-deal scenario with significant disruptions would reduce these GDP

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[31] Lawless, M. (2016a). *Intermediate goods inputs and the UK content of Irish goods exports*, Economic and Social Research Institute (ESRI).
Lawless, M. (2016b). 'Irish-UK Services Trade and Brexit', Working Paper No. WP595, Economic and Social Research Institute (ESRI).
Lawless, M. and E. Morgenroth (2018). 'Brexit and Irish Consumers', *Quarterly Economic Commentary*: Special Article, Economic and Social Research Institute (ESRI).

growth rates to 1.2 and 2.4 per cent respectively. Such potential variation in the short-term outlook underscores the need for prudence to be exercised, particularly in relation to the public finances. The recent issue concerning the increased costs on the current and capital Health budget, including the Children's Hospital, along with the potential for increased public pay demands following the recent agreement reached with the nurses' unions, highlights the pressures the public finances are already under.

Aside from Brexit, it is clear that the international climate for the domestic economy has deteriorated somewhat since the last *Commentary*. A number of factors are responsible for this with the slowdown in the recovery of the Euro Area and an escalation of vulnerabilities in the Chinese economy being to the fore. The impact of these vulnerabilities on the global economy is exacerbated by the uncertainty concerning China's trading relationship with the United States.

Notwithstanding the uncertainties on the external front, our first forecast for 2020 in the present *Commentary* indicates that the unemployment rate in the economy will fall to approximately 4.7 per cent. Historically, this suggests the domestic labour market would be operating at full capacity at that stage. As noted in the previous *Commentary*, given the present state of the Irish labour market, significant inward net migration is required to meet the investment priorities such as the increase in housing supply and the infrastructure priorities identified by Government.

A medium-term risk to the Irish economy relates to the normalisation of ECB monetary policy. Given the indebted nature of the Irish economy, the legacy of the crash still poses a financial threat to certain households if repayment burdens rise with policy rate increases. The present *Commentary* contains a Special Article examining the issue of mortgage arrears in the Irish market. In Fahy et al. (2019) the impact on the Irish mortgage market of the potential normalisation of Euro Area monetary policy is examined. Using data from the Survey on Income and Living Conditions (SILC), the findings indicate an increase in policy rates of 100 basis points would lead to a 50 basis points increase in new arrears cases. While the market is in a better position to withstand such shocks given the increase in incomes and labour market developments, this would inevitably cause challenges for many borrowers and raise the level of mortgage arrears.

While the disproportionate impact of a small number of multinationals on headline Irish economic data is most readily observable in terms of GDP, it is clear that corporation tax receipts are also susceptible to the activities of a small number of firms. In 2018, corporation tax receipts increased by over 26 per cent, while the expected or profile increase was just less than 4 per cent. The

difference between expected and actual corporation tax receipts, as illustrated in the public finances section of the *Commentary*, resulted in Government running a mild surplus rather than a deficit on the general government balance. This is the first time the Government has run a general surplus since 2007. While a surplus is a positive development, the sensitivity of key fiscal metrics, such as the Government balance, to the activities of a small number of firms is an ongoing concern. It highlights the particular vulnerability of the Irish economy to international developments and argues for domestic policymakers being more cautious in their fiscal objectives than they would otherwise be. The public finances section of the *Commentary* estimates that the Exchequer has been in receipt of over €5.5 billion in 'windfall' receipts from corporation taxes alone between 2013 and 2018. The scale of this windfall argues for a special strategy to be employed in using such funds, e.g. should any windfall estimate be diverted purely to funding capital-based projects or towards the 'Rainy Day fund'?

DETAILED FORECAST TABLES

FORECAST TABLE A1   EXPORTS OF GOODS AND SERVICES

	2017	% change in 2018		2018	% change in 2019		2019	% change in 2020		2020
	€ bn	Value	Volume	€ bn	Value	Volume	€ bn	Value	Volume	€ bn
Merchandise	192.9	8.0	11.9	208.2	4.3	3.3	217.3	4.4	3.2	226.9
Tourism	5.0	5.3	3.9	5.2	3.2	3.2	5.4	3.2	3.2	5.6
Other Services	154.7	10.1	5.3	170.3	7.3	6.4	182.7	7.2	6.1	195.8
Exports of Goods and Services	352.6	8.9	8.9	383.8	5.6	4.3	405.3	5.6	4.4	428.2
FISM Adjustment	0.0			0.0			-0.7			-0.5
Adjusted Exports	352.6	8.9	8.9	383.8	5.4	4.3	404.6	5.6	4.4	427.7

FORECAST TABLE A2   INVESTMENT

	2017	% change in 2018		2018	% change in 2019		2019	% change in 2020		2020
	€ bn	Value	Volume	€ bn	Value	Volume	€ bn	Value	Volume	€ bn
Housing	5.4	35.0	24.4	7.3	16.5	19.2	8.5	22.4	19.8	10.4
Other Building	14.3	19.5	12.3	17.1	17.1	11.0	20.0	17.8	12.0	23.5
Transfer Costs	1.2	36.7	24.5	1.6	8.2	3.0	1.7	6.5	2.4	1.8
Building and Construction	21.8	24.3	15.9	27.1	16.4	12.7	31.5	18.4	13.7	37.3
Machinery and Equipment	52.4	10.8	7.3	52.4	6.8	4.7	55.9	7.3	5.0	60.0
Total Investment	69.0	15.1	9.8	87.4	10.0	7.5	87.4	11.3	8.0	97.3

FORECAST TABLE A3   PERSONAL INCOME

	2017	% change in 2018		2018	% change in 2019		2019	% change in 2020		2020
	€ bn	%	€ bn	€ bn	%	€ bn	€ bn	%	€ bn	€ bn
Agriculture	0.7	2.5	0.0	0.7	1.4	0.0	0.7	1.2	0.0	0.7
Non-Agricultural	85.7	5.9	5.0	90.7	6.1	5.5	96.2	5.6	5.4	101.7
Rental Income	10.0	7.6	0.8	10.8	7.4	0.8	11.6	7.2	0.8	12.4
Other Income	15.7	7.9	1.2	17.0	4.7	0.8	17.8	2.4	0.4	18.2
Total Income Received	112.1	6.3	7.1	119.2	6.0	7.1	126.3	5.3	6.7	133.0
Current Transfers	8.6	-6.6	-0.6	8.0	-8.8	-0.7	7.3	-10.0	-0.7	6.6
Gross Personal Income	120.7	5.4	6.5	127.2	5.0	6.4	133.6	4.5	6.0	139.6
Taxes on Income and Wealth	-22.2	9.9	-2.2	-24.3	4.1	-1.0	-25.3	5.0	-1.3	-26.6
Personal Disposable Income	98.6	4.4	4.3	102.9	5.3	5.4	108.3	4.3	4.7	113.0
Consumption	93.8	4.3	4.0	97.8	3.9	3.8	101.7	4.1	4.2	105.9
Personal Savings	11.4	7.5	0.9	12.3	17.5	2.1	14.4	5.9	0.9	15.3
Savings Ratio	11.2			11.4			12.7			12.9
Average Personal Tax Rate	0.18			0.19			0.19			0.19

FORECAST TABLE A4   IMPORTS OF GOODS AND SERVICES

	2017	% change in 2018		2018	% change in 2019		2019	% change in 2020		2020
	€ bn	Value	Volume	€ bn	Value	Volume	€ bn	Value	Volume	€ bn
Merchandise	85.2	15.6	14.4	98.5	9.6	8.5	108.0	8.8	7.2	117.5
Tourism	5.8	8.8	7.8	6.3	6.4	4.8	6.7	6.2	4.4	7.1
Other Services	172.2	4.2	3.2	179.5	7.2	5.8	192.4	7.1	5.5	206.0
Imports of Goods and Services	263.3	8.0	7.0	284.4	8.0	6.3	306.3	8.0	6.1	330.6
FISM Adjustment	0.0			0.0			-0.7			-0.8
Adjusted Imports	263.3	8.0	7.0	284.4	7.7	6.3	305.6	7.7	6.1	329.8

FORECAST TABLE A5   BALANCE OF PAYMENTS

	2017	2018	2019	2020
	€ bn	€ bn	€ bn	€ bn
Exports of Goods and Services	352.6	383.8	404.7	427.5
Imports of Goods and Services	263.3	284.4	306.3	330.6
Net Factor Payments	-59.8	-65.4	-75.6	-79.4
Net Transfers	-4.6	-5.1	-5.6	-6.1
Balance on Current Account	24.9	29.0	17.0	12.1
As a % of GNP	10.7	11.5	6.5	4.4

FORECAST TABLE A6   EMPLOYMENT AND UNEMPLOYMENT, ANNUAL AVERAGE

	2017	2018	2019	2020
	'000	'000	'000	'000
Agriculture	110.4	107.4	105.0	105.0
Industry	412.0	423.2	433.5	444.2
Of which: Construction	128.8	143.4	147.9	151.5
Services	1,664.1	1,719.2	1,762.7	1,805.8
Total at Work	2,194.2	2,249.8	2,307.1	2,355.6
Unemployed	157.7	145.2	125.5	119.7
Labour Force	2,352.0	2,394.9	2,432.6	2,475.2
Unemployment Rate, %	6.7	5.7	5.2	4.8

Special Articles

IRELAND AND BREXIT: MODELLING THE IMPACT OF DEAL AND NO-DEAL SCENARIOS[1]

* Adele Bergin, Philip Economides, Abian Garcia-Rodriguez and Gavin Murphy

ABSTRACT

This Article attempts to quantify the macroeconomic impact of Brexit on the Irish economy. Given both the political and economic uncertainty, we consider a range of alternative scenarios. We focus on the most well understood channels through which Brexit will affect Ireland, namely though lower trade, incorporating the impact of tariff and non-tariff measures, and the potentially positive impact of FDI diversion to Ireland. Our approach, and the main contribution of this paper, is to build up estimates of each of these channels from a range of recent micro-economic studies, so our estimates are anchored in the empirical literature. We then use these micro-estimates to calibrate macro scenarios; specifically we generate alternative paths for the UK and international economy using the NiGEM global model and assess the impact on Ireland using the COSMO model. Overall, in each scenario, the level of Irish output is permanently below where it otherwise would have been were the UK to decide to remain in the EU.

INTRODUCTION

Following the result of the UK referendum in June 2016 and the invocation of Article 50 of the Treaty on the European Union in March 2017, the UK is due to leave the EU at the end of March 2019. While a Withdrawal Agreement and Political Declaration were agreed between the UK and EU in November 2018, the UK House of Commons failed to approve it in January 2019. At the time of writing, the political impasse means that there is a wide range of possible outcomes. In addition to the heightened political uncertainty, there is also uncertainty as to the economic impact of Brexit in whatever form it eventually

takes as there is no precedent of a country leaving a major trading block such as the EU.

While there is a strong consensus that leaving the EU will have a negative impact on the UK, there is no consensus on the duration, composition or scale of the impact on the UK economy. Empirical studies make different assumptions around each of these components so, even if they are considering broadly similar overall scenarios, there can be variation in estimates of the ultimate economic impact.

This Article attempts to quantify the macroeconomic impact of Brexit on the Irish economy under a range of scenarios. In terms of the impact, existing evidence indicates that Ireland will be hit relatively hard compared to other EU countries given its close economic relationship with the UK. Our previous analysis of Brexit (Bergin et al., 2017b) used scenarios from the National Institute of Economic and Social Research (NIESR) based on their NiGEM global econometric model to assess the impact of Brexit on Ireland's trading partners and the wider international economy, and then examined the effect of these changes in the international economy on Ireland using the COSMO model of the Irish economy. We use the same overall modelling framework in this Article but we follow a different approach. We focus on the most well understood channels through which Brexit will affect Ireland, namely though lower trade incorporating the impact of tariff and non-tariff measures, and the potentially positive impact of FDI diversion to Ireland. Our approach, and the main contribution of this Article, is to build up estimates of each of these channels from a range of recent micro-economic studies, so our estimates are anchored in the empirical literature. We then use these micro-estimates to calibrate macro scenarios; specifically we generate alternative paths for the UK and international economy using the NiGEM global model and assess the impact on Ireland using the COSMO model.

Given both the political and economic uncertainty, it is prudent to consider a range of scenarios. We consider three scenarios which we describe as *Deal*, *No-Deal* and *Disorderly No-Deal*. To estimate the economic impact of each scenario, we compare them to a counterfactual scenario where the UK remains in the EU. In the *Deal* scenario, the UK makes an orderly agreed exit from the EU. This involves a transition period covering the years 2019 and 2020, and a free trade agreement between the UK and the EU27 thereafter.[2] In the *No-Deal* scenario, the UK exits the EU without a deal but there is an orderly period of adjustment for trade. Ultimately, WTO tariff arrangements will apply to goods trade, there will be non-tariff measures, and services trade will also be negatively impacted. In

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[2]   The *Deal* scenario is based on the Withdrawal Agreement wherein the short-run impact of Brexit is more limited. This scenario is also broadly consistent with a short extension of Article 50.

the *Disorderly No-Deal* scenario, the UK exits the EU without a deal and there is an additional disruption to trade in the short-run, above that considered in the *No-Deal* scenario. In each scenario, some of the negative trade impact is partially offset by FDI being diverted to Ireland.

Overall, our scenario results suggest that in the long run (after ten years), the level of real output in the Irish economy would be 2.6 per cent, 4.8 per cent and 5.0 per cent lower in the *Deal*, *No-Deal* and *Disorderly No-Deal* scenarios, respectively, compared to a situation where the UK stays in the EU. The magnitude of each of these shocks is considerable and will have negative effects throughout the economy on the household sector, the labour market, firms and the public finances.

There is uncertainty around when the ultimate trade and FDI impacts of Brexit will impact the UK and Ireland. As such, there is arguably more uncertainty about the short-run impact of Brexit as it depends crucially on how smooth any transition to the new trading arrangements will be. Our scenario results indicate that by 2020, the level of real output in the Irish economy would be 0.6 per cent, 1.2 per cent and 2.4 per cent lower in the *Deal*, *No-Deal* and *Disorderly No-Deal* scenarios, respectively, compared to a situation where the UK remains in the EU.

The remainder of the Article is structured as follows: Section 2 reviews the existing literature on the impact of Brexit from both an international and Irish perspective, Section 3 describes our approach to estimating the impact of Brexit on Ireland, Section 4 discusses the macroeconomic impacts of each scenario and Section 5 provides concluding remarks.

EXISTING EVIDENCE

The size of the UK economy and its substantial interlinkages with the European and broader international economy suggest that the impact of Brexit could be considerable. Since before the 2016 referendum, most research on Brexit has focussed on the impact for the UK. Many studies have been macroeconomic in nature and, while they have employed different approaches and assumptions, there is almost a complete consensus that Brexit will reduce economic activity in the UK below where it otherwise would have been. More recently, there has also been a surge in the micro-economic literature examining how Brexit may impact the UK and other economies. These studies examine, for example, how tariff and non-tariff measures affect trade and can take account of differences in tariffs and non-tariff measures at a much more granular level, in terms of products and sectors, than macroeconomic models generally allow for. This expansion and deepening of the literature ultimately means that there is a better understanding

of how Brexit may impact the UK and other economies, and also that there are more reliable estimates available that can be used to calibrate scenarios in macroeconomic models. This section briefly discusses this literature and focusses on the latest studies that attempt to capture the channels through which Brexit will impact the UK and other economies.

2.1   UK macroeconomic findings

Following the UK's vote to leave the EU, a significant body of research has sought to estimate the potential consequences of Brexit for the UK economy. The NiGEM macro-econometric model of the NIESR has been used in many studies including by NIESR itself, HM Treasury, and the OECD. As a multi-country model it is suited to modelling the potential Brexit related changes in trade etc. Simulations using other modelling approaches have also been employed including Computable General Equilibrium models (LSE/CEP), DSGE models (European Commission), and Bayesian estimated models (IMF).

Given the ongoing uncertainty surrounding the future relationship between the UK and the EU, the standard approach in these studies is to present a range of scenarios. In earlier Brexit studies, these scenarios broadly reflected three potential outcomes. First, the UK would agree to join the European Economic Area (EEA) and maintain access to the EU Single Market. A second possibility explored was that the UK and EU would form a free trade agreement. Third, the UK and EU would impose a standard WTO arrangement whereby 'most favoured nation' (MFN) tariff terms are applied, in a situation where both parties fail to reach an agreement (see, for further discussion, Sampson, 2017; HM Treasury, 2016; Dhingra and Sampson, 2016). Since November 2018, the proposed Withdrawal Agreement and Political Declaration on plans for the future UK-EU relationship has enabled more recent studies to distinguish between a deal outcome, as set out under the terms of the Withdrawal Agreement, and differing forms of a 'no-deal' outcome, where WTO tariff rates are applied to UK trade. Given the proximity to the exit date, recent no-deal analyses have focused on the potential impact of a disorderly Brexit and the additional trade frictions that could be introduced (e.g. Bank of England, 2018).

In modelling these scenarios, studies vary in terms of the range of economic channels that are analysed. While the trade and FDI impacts are the most important, consideration has also been given to the potential impacts of uncertainty in the short-run, to productivity impacts associated with lower trade and FDI, to migration and to EU budget contributions. Notwithstanding differences in modelling techniques, variation in scenario estimates of the overall economic impact generally reflect different assumptions around the timing and

magnitude of changes in each of the modelled components (Tetlow and Stojanovic, 2018).

With respect to time horizons, the majority of studies on the impact of Brexit on the UK have tended to focus on the long-run impact on the UK economy (Tetlow and Stojanovic, 2018). From a modelling perspective, this is understandable as the evidence points towards changes in trade and FDI patterns in the longer term, although there is no consensus on the timing of these changes or whether the scale of these changes will be gradual or more sudden in nature. Many of the short-term impacts of Brexit are primarily driven by uncertainty including exchange rate fluctuations which are difficult to accurately quantify.

The short-term estimates of the impact of Brexit on the UK economy suggest significant deviations from the baseline of 'remain'. By 2020, deviations in the level of real UK GDP range from -1.7 per cent under a Norway-like (EEA) deal (Ebell and Warren, 2016) to -5.6 per cent in the case of no deal (IMF, 2016). A more recent NIESR study, accounting for the proposed terms of the Withdrawal Agreement, sits within this range at -2.2 per cent by 2020, following a two-year transition period (Hantzsche et al., 2018).

A strong consensus has also emerged regarding the negative effect the UK's withdrawal from the EU will have on its economy in the longer term (generally considered to be after ten to 15 years) (HM Treasury, 2016; HM Government, 2018; IMF, 2018b; Kierzenkowski et al., 2016; Hantzsche et al., 2018; Vandenbussche et al., 2019). Table 1 shows the estimated long-run impacts range from -0.1 per cent under a 'liberal Customs Union' (Oxford Economics, 2016) to -10.5 per cent under a 'disorderly' no-deal scenario (Bank of England, 2018). Among free trade agreement (FTA) scenarios, the average long-term loss to UK GDP relative to a remain baseline is 3.7 per cent. Various WTO (no-deal) scenarios indicate an average relative loss of 6.0 per cent.

TABLE 1   **COMPARISON OF RECENT STUDIES ON THE LONG-TERM IMPACT OF BREXIT ON THE UNITED KINGDOM**

Study	Scenario	GDP % Change Relative to Base
Bank of England (2018)	Deal + FTA	-1.5
	Deal + Backstop	-3.8
	No Deal	-7.8
	Disorderly No Deal	-10.5
HM Treasury (2016)	EEA	-3.8
	FTA	-6.2
	WTO	-7.5
HM Government (2018)	EEA	-1.4
	FTA	-4.9
	No Deal	-7.6
IMF (2018)	FTA	-3.1
	WTO	-6.2
Kierzenkowski et al. (2016)	WTO/FTA (Optimistic)	-2.7
	WTO/FTA (Central)	-5.1
	WTO/FTA (Pessimistic)	-7.7
NIESR (Hantzsche et al., 2018)	Deal + FTA	-3.9
	Deal + Backstop	-2.8
	No Deal	-5.5
Oxford Economics (2016)	Liberal Customs Union	-0.1
	FTA	-2.8
	WTO	-3.9
Vandenbussche et al. (2019)	Norway Deal	-1.2
	No Deal	-4.5

2.2   Irish macroeconomic findings

Much like the research on the impact of Brexit for the UK, an increasing number of studies have examined its potential implications for the Irish economy. Similarly, a consistent finding is that Ireland will be negatively affected relative to a situation where the UK remained in the EU. Moreover, international comparative studies indicate that the impact for Ireland could be more pronounced relative to other EU countries (Vandenbussche et al., 2019; Kierzenkowski et al., 2016; IMF, 2016; Dhingra et al., 2016a). This particularly high degree of exposure is not surprising given how deeply integrated the Irish and UK economies are. In 2015, Irish exports to the UK accounted for 14 per cent of total cross-border goods exports and 20 per cent of total service exports. Imports from the UK are also significant, representing 26 per cent of total cross-border goods imports and 10 per cent of service imports. The Irish economy has also benefitted from a long established common labour market with the UK, predating EU membership.

More recently, Chen et al. (2018) examine relative differences in the potential regional impacts of Brexit and they find that among the EU28 Member States, only regions in Ireland face local GDP exposure levels similar to UK regions.[3] The study suggests that primary activities such as agriculture, forestry and fishing are more at risk in the Border, Midland and Western region of Ireland whereas the construction and services sectors are more exposed in the Southern and Eastern region of Ireland.

Focusing on the potential macroeconomic impact, Table 2 summarises the existing findings on the long-term (generally considered to be after ten to 15 years) impact of Brexit on Ireland.[4] Bergin et al. (2017b) using the Irish macroeconomic model (COSMO) while drawing on results from Ebell and Warren (2016), find that under an EEA scenario Ireland's output is reduced by 2.3 per cent relative to a no-Brexit scenario; whereas a WTO scenario would result in a relative reduction of output by 3.8 per cent. This compares to an estimated 3.2 per cent decline in GDP under a no-deal scenario published by the Central Bank of Ireland (2016) using a Bayesian Vector Autoregression model. Copenhagen Economics (2016) using a CGE model produce estimates at the upper end of the spectrum, with the loss in GDP ranging from 2.8 per cent under an EEA agreement to 7 per cent under a 'No-Deal' simulation.

In the context of heightened concerns of a potential UK exit without any deal or transition arrangement, the Central Bank of Ireland (2019) simulated the implications of a disorderly Brexit on Irish GDP, relative to a baseline scenario of continued EU membership. In the first year alone, a 4 percentage point reduction in GDP growth occurs. In the long run, GDP is estimated to fall by 6 per cent as a result of a disorderly Brexit relative to a remain scenario. Arriola et al. (2018), in a two-stage process, use their general equilibrium trade model (METRO) to quantify the impacts of tariffs and non-tariff measures under a WTO scenario on trade before incorporating these effects into NiGEM to establish the macroeconomic impact on Ireland. They estimate a 2 to 2.5 per cent relative decline in Irish GDP over the long run.

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[3] Members are disaggregated regionally at the NUTS 2 level, resulting in 28 members being split into 252 regions. National levels of GDP exposure to Brexit find that trade-related exposure of the UK economy is 4.6 times greater than the rest of the EU whereas in Ireland's case it is only 1.2 times greater.

[4] These studies differ with respect to both baseline scenarios and the assumptions underpinning alternative Brexit outcomes. As a result, the impacts are not directly comparable and only enable establishing a range of potential impacts.

TABLE 2   **COMPARISON OF RECENT STUDIES ON THE LONG-TERM IMPACT OF BREXIT ON THE IRELAND**

Study	Scenario	GDP % Change Relative to Base
Arriola et al. (2018)	No Deal	-2.3
Bergin et al. (2017b)	EEA	-2.3
	FTA	-2.7
	WTO (No Deal)	-3.8
Copenhagen Economics (2016)	EEA	-2.8
	FTA	-4.3
	No Deal	-7.0
Conefrey et al. (2018)	No Deal	-3.2
Central Bank of Ireland (2019)	Disorderly No Deal	-6.0
IMF (2018a)	FTA	-2.5
	No Deal	-4.0
Vandenbussche et al. (2019)	Norway Deal	-1.3
	No Deal	-5.7

2.3   Recent literature: trade impacts

The recent focus on estimating micro-founded impacts of tariff and non-tariff measures on trade patterns is an important development in the Brexit literature (Lawless and Morgenroth, 2019; Cappariello, 2017; Arriola et al., 2018). These approaches generally seek to identify the economic costs of Brexit through directly applying trade frictions (such as tariffs and non-tariff measures) to micro-level data. Such estimates are likely to be more appropriate than the use of gravity model estimates to gauge the size of trade impacts which have been regularly used in macro-modelling exercises.

Gravity models estimate how much additional trade in goods and services happens between EU members (compared with countries that are not members) while accounting for differences in the size of economies, distance and other relevant factors. These studies generally find a positive effect on trade associated with EEA and EU membership. To calibrate a trade shock in macro-models, studies often simply reverse the value of these estimates. As summarised in Hantzsche et al. (2018), gravity model estimates suggest a reduction in bilateral UK-EU goods trade of between 25 and 65 per cent, and a reduction in UK-EU services trade of 19 to 65 per cent. This is a very wide range of estimates. Although the range largely reflects the particular trade agreement that is assumed and difference in samples, there is often wide variation in estimates of specific types of trade agreements (and the range of estimates associated with different types of trade agreements sometimes overlap). It can be argued that this approach lacks the precision needed to make a convincing estimate of the impact of EU membership on trade. Furthermore, assuming that the impact of leaving the EU is symmetric (i.e. reversing the value of estimates from gravity

models implying that all of the estimated trade gain associated with EU membership is lost) may excessively simplify the impact of increased trade frictions.

In this context, Lawless and Morgenroth (2019) provide an important alternative approach to quantifying the potential product, sectoral and aggregate impacts of applying WTO tariffs on UK-EU Member States' bilateral trade flows. Under the assumption that the full tariff amount would be incorporated into the price, they show that the impacts of tariffs significantly differ across countries due to variation in sectoral trade exposures.[5] In their analysis, they show that WTO tariffs vary significantly by product, ranging from zero up to 75 per cent in the case of water pipe tobacco. At a sectoral level the average tariff rate ranges between zero and 50 per cent, with the Food, Clothes, and Tobacco sectoral aggregates in particular being highly exposed.

In terms of aggregate impacts, Lawless and Morgenroth (2019) find that EU to UK goods exports would be reduced by 30 per cent while UK to EU goods exports decline by 22 per cent. Interestingly, while Ireland makes up 5 per cent of UK imports, it would represent close to 20 per cent of the total EU tariff impacts under a WTO MFN tariff scenario. The projected fall in Irish goods exports to the UK is 31 per cent (4 per cent fall in total Irish exports) and UK goods exports to Ireland decline by 28 per cent (1.5 per cent fall in total Irish imports). In terms of trade losses, they find that agricultural and food products, textiles and traditional manufacturing sectors would be most affected.

Notwithstanding the importance of assessing the impact of tariffs, the ending of the UK's EU membership will have significant implications for the non-tariff measures (NTMs) including legal, regulatory and administrative terms under which goods and services can be traded. Integration of the EU Single Market has seen significant agreement by Member States over the years on standards and regulations in regards to, for example, product technical and safety specifications, and health compliance reviews. This has been coupled with agreement on administrative processes including customs declarations and documentary compliance, and border inspections. Membership of the Single Market supports greater trade integration, by reducing trade costs through for instance, the

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[5]   It should be noted that quotas on particular imports determine the effective tariff rate. Any within-quota imports face lower tariffs, meaning that the overall effective tariff would likely be lower than the WTO MFN rate. In the absence of the UK's WTO tariff schedule and given that the UK is unlikely to impose EU quotas (due to its smaller size than the EU and its trade deficit in products such as food and pharmaceuticals), this particular analysis has taken the conservative option of applying full tariffs to all trade. As such, the tariff rates imposed should be considered an upper bound to the median tariff rate applied in that analysis.

streamlining of customs processes, and by better regulatory alignment which can facilitate the elimination of market failures arising from information asymmetries.

Studies seeking to quantify NTM effects, including Lawless (2010) and Byrne and Rice (2018), use variations of a gravity model approach to estimate the impact of non-tariff measures on sectoral trade flows. Byrne and Rice (2018) show that the average border time increase associated with leaving the Customs Union is 4.5 hours. This would equate to a 90 per cent increase on current UK waiting times for imports. This is estimated to lead to a 9.6 per cent decline in goods trade between the Ireland and the UK. From an Irish perspective, these transport waiting times are a particularly relevant concern as a considerable proportion of Irish goods (measured in terms of volume) are shipped to (53 per cent) and from (11 per cent) the continent via the UK landbridge (Lawless and Morgenroth, 2017).

2.4   Recent literature: FDI impacts

While the UK's exit from the EU will adversely affect Irish trading activity with significant negative implications for the wider economy, a strong argument can be made that the impact will be offset in part as a result of FDI being diverted into Ireland. As discussed in Barrett et al. (2015), Ireland continues to be one of the most important destinations for FDI in the world. This is attributed to factors such as the presence of a highly educated English speaking labour force, limited barriers to trade and investment due to EU membership and trade agreements with other non-EU countries, a business friendly regulatory environment and a simple corporate tax system with relatively low tax rates. To the extent that these attributes are closely shared with the UK, it opens up the potential opportunity for firms to relocate investment here in order to remain within the EU or undertake new investment that might otherwise have located in the UK (Lawless and Morgenroth, 2016).

Compared to the trade literature, there is limited research to draw on in terms of quantifying the potential impact of the UK's decision to exit the EU on the inflow of FDI into the UK. Ebell and Warren (2016) identify three main approaches that provide useful estimates which can be used to quantify potential FDI inflow effects under alternative EU UK trading arrangements. These include gravity models, synthetic cohorts analyses and regression based analyses assessing the relationship between FDI and openness. Most studies appear to indicate that UK inward FDI will reduce by in the region of 20 to 30 per cent, (e.g. Ramasamy and Yeung (2010), 20-27 per cent; Bruno et al. (2016), 12-28 per cent; HM Treasury (2016), 26 per cent; Campos and Coricelli (2015), 25-30 per cent; Straathof et al. (2008) estimates a 22 per cent intra-EU FDI loss and an 11 per cent non-EU loss).

However, findings in Fournier (2015) would suggest a greater band of uncertainty around the potential impact of Brexit on UK FDI (i.e. 10 to 45 per cent).

In terms of gauging the impact for Ireland, Lawless and Morgenroth (2016) suggest that the stock of Irish FDI would increase by 7.3 per cent assuming a reduction in the UK FDI stock of 27 per cent which is allocated in line with Ireland's current non-UK EU FDI share of 6.9 per cent.

SCENARIOS

Our analysis is focused on the most well understood potential impacts of Brexit, namely on trade and FDI. The scenarios are built up from estimates in the empirical literature of the magnitude of the effects on trade, incorporating the imposition of tariffs and non-tariff measures, and on FDI. In contrast, our previous analysis of the potential impact of Brexit (Bergin et al., 2017b) drew on macro scenarios from NIESR (Ebell and Warren, 2016) and did not include the effects of potential FDI diversion to Ireland, whereas in this Article we use recent micro-evidence to calibrate macro scenarios in NiGEM and assess the impact on Ireland using the COSMO model. While these effects may not be exhaustive, there is a consensus that these are the most important impacts. In this section, we describe the particular assumptions that we use to model the main impacts of Brexit on the Irish economy.

3.1   Approach

A key question concerns the range of possible outcomes for the future relationship between the UK and the EU. At the time of writing, there is still considerable uncertainty as to this future relationship. This study focuses on three main scenarios, which we describe as *Deal*, *No-Deal* and *Disorderly No-Deal*, while acknowledging that other outcomes are possible. In order to determine the total potential impact of Brexit on Ireland, we compare these scenarios to a counterfactual or hypothetical base case where the UK stays in the EU.[6]

In the *Deal* scenario, a deal between the UK and EU is agreed which includes a transition period until the end of 2020 during which time the UK continues to abide by all existing EU rules and regulations. In the longer term a free trade agreement is agreed between the UK and the EU27. This scenario is based on the Withdrawal Agreement. While the Withdrawal Agreement does not fully specify

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[6]   To the extent that existing forecasts, such as those regularly undertaken by the ESRI, Department of Finance Central Bank, etc., have already incorporated some Brexit scenarios, directly adjusting these forecasts for the impacts described in this paper would constitute an over-adjustment as the base case here is the UK remaining in the EU.

the future relationship between the UK and EU, it is consistent with a high degree of alignment between the UK and EU. Hantzsche et al. (2018) interpret the Withdrawal Agreement as including no tariffs, fees or quantitative restrictions on goods trade, and deep but not full regulatory alignment thereby leading to more trade frictions than EU membership. While there are no specific provisions for services in the Withdrawal Agreement, the Political Declaration looks for the EU and UK to conclude 'ambitious, comprehensive and balanced arrangements on trade in services…'. Hantzsche et al. (2018), interpret this as implying more frictions than EU membership. It is also possible that Article 50 will be extended by some time to ensure that a deal can be agreed between the UK and EU that can be ratified in the UK parliament. While an extension of Article 50 may lead to some additional uncertainty in the short-run, the ultimate economic impact will be close to the *Deal* scenario considered in this paper.[7, 8] The short-run effects of this scenario are more limited. In the *No-Deal* scenario, the UK exits the EU without a deal but the adjustment to the changed relationship between the UK and EU occurs in an orderly fashion. However, WTO tariff arrangements will apply to goods trade, there will be non-tariff measures, and services trade will also be negatively impacted. In the *Disorderly No-Deal* scenario, the UK exits the EU without a deal and there is an additional disruption to trade in the short-run. In each scenario, some of the negative trade impact is partially offset by FDI being diverted to Ireland.

We adopt a two-step modelling approach to estimate the potential impact of Brexit on the Irish economy. In the first step, we apply shocks to the UK economy using the NiGEM global model of the National Institute of Economic and Social Research to generate estimates of the impact of Brexit on the UK and the wider international economy. Several studies have used the NiGEM model in their analyses of the economic impact of Brexit (e.g. Ebell and Warren, 2016; Ebell et al., 2016; Hantzsche et al., 2018; HM Treasury, 2016; Kierzenkowski et al., 2016), as it is a multi-country model with explicit trade linkages that makes it very suitable for modelling the impacts of changes in trade policy. Then, in the second step, we incorporate these international impacts into COSMO, the ESRI's model of the Irish economy,[9] to gauge the impact on Ireland.[10] We also incorporate the

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[7] This scenario assumes a relatively close ongoing relationship between the EU and UK. We have also considered a scenario whereby a deal is agreed but the eventual relationship between the UK and EU is less close.

[8] This, of course, assumes that following an extension of Article 50 a deal is agreed between the UK and EU that is ratified by the UK parliament. If, after an extension of Article 50, this does not happen it would imply reverting to a no-deal scenario.

[9] See Bergin et al. (2017a) for a full description of the mechanisms and behaviour of the model. In COSMO, sectors are defined based on the Supply and Use Input-Output Tables from the Central Statistics Office. A sector is defined as traded if at least 50 per cent of total final uses (excluding change in stocks) are exported. The aggregate government sector comprises those sectors in which at least 50 per cent of total final uses (excluding changes in stocks) are used by the government as consumption. The non-traded sector comprises the remaining sectors.

[10] Specifically, in COSMO the international economy is largely exogenous, reflecting the small open economy nature of Ireland, so we incorporate key international variables from NiGEM. These variables include interest rates, effective

likely impact of Brexit on FDI to Ireland using the same approach as Lawless and Morgenroth (2016). While the FDI effect is expected to have a positive effect on Ireland, the positive impact is outweighed by the negative trade effect.

There is one main difference to the modelling approach adopted compared to our previous assessment of the impact of Brexit on Ireland (see Bergin et al., 2017b) and to the Central Bank of Ireland (2019), and that is we calibrate our own estimate of the trade shock associated with Brexit. There is a consensus in the literature that the largest impacts of Brexit (on the UK, EU and Ireland) will be through the trade channel. The most common approach in macro-modelling exercises, to gauge the size of trade impacts, is to draw on estimates from gravity models. Here, we move away from gravity model based estimates where possible and draw on the recent micro-economic literature to calibrate potential trade shocks (described in detail in Section 3.3) which then incorporate into the NiGEM and COSMO models using the approach described above.

3.2   The counterfactual scenario

To capture the potential impact of Brexit, we compare the various Brexit scenarios to a counterfactual baseline where the UK remains a member of the EU. There is some evidence to suggest that the performance of the UK economy has already been affected by the decision to leave the EU, implying that overall UK growth has already fallen below where it otherwise would have been since the referendum. This is largely attributed to the impact of uncertainty on business investment decisions, the depreciation of Sterling and the downgrading of future growth prospects (see, for example, Born et al., 2018; Bloom et al., 2018). NIESR construct a counterfactual scenario whereby, should the UK decide not to leave the EU, there would be some unwinding of these negative effects (Hantzsche et al., 2018). We import this international baseline into COSMO to generate a counterfactual baseline.

3.3   Assumptions

Trade

NIESR (Hantzsche et al., 2018) construct various Brexit scenarios with detailed assumptions for the UK concerning reductions in trade, FDI, EU budget contributions, migration and productivity.[11] Previous research suggests that the main economic impact of Brexit on most countries, and especially for extremely open economies such as Ireland, is likely to transmit through the trade channel.

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exchange rates, oil prices, competitor prices, trade-weighted world demand (for Irish exports) and conditions in alternative labour markets.

[11]   In the scenarios that follow, we implement alternative trade shocks in NiGEM, while keeping other UK assumptions the same as in Hantzsche et al. (2018).

Therefore, the assumptions made about the long-run change in UK-EU trade as a consequence of Brexit are crucial to assessing the impact of Brexit. NIESR (Hantzsche et al., 2018) draw on various estimates from the empirical literature based on gravity models (including Baier et al., 2008; Ebell, 2016; van der Marel and Sheperd, 2013; and Ceglowski, 2006) and assume in a no-deal scenario that the long-run reduction in UK-EU bilateral trade as a result of Brexit will be 56 per cent. They consider separate estimates for goods and services and take account of the share of goods and services in total UK-EU trade, which is 68.3 per cent and 31.7 per cent, respectively (Hantzsche et al., 2018). This study employs a more direct approach to examining potential trade impacts of various Brexit scenarios by focussing on the imposition of tariffs and non-tariff measures.

In a no-deal scenario, the UK is assumed to revert to trade under WTO most-favoured-nation status after the UK leaves the EU at the end of March and so goods trade will be subject to tariff and non-tariff measures and services trade will be impacted by regulatory measures. We draw on several studies to calibrate each component of the shock and use these micro-founded estimates to generate an alternative trade shock.

Lawless and Morgenroth (2019) examine detailed trade flows between the UK and all other EU members and match over 5,200 products to WTO tariff rates applicable to external EU trade. Their analysis accounts for differences in trade patterns across countries as well as differences in tariffs and in the responsiveness of demand for different products to price changes. They find a total reduction in UK-EU goods trade of 22 per cent with different impacts across countries. We use these estimates to calibrate a shock to goods trade.

While Lawless (2018a) shows that there is a strong correlation between tariff and non-tariff measures, for our purposes we draw on the empirical literature to develop a micro-founded estimate of the potential impact of non-tariff measures on goods trade. We use Smith et al. (2018) estimates of non-tariff costs associated with the UK's exit from the EU and combine them with the sectoral median trade elasticities obtained from Imbs and Mejean (2017)[12] to derive Brexit related NTM impacts on goods trade.[13,14] This is similar to the approach used by Lawless and Morgenroth (2019) to quantify tariff increases on goods trade.

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[12] Smith et al. (2018) define their sectors using classification GTAP (Global Trade Analysis Project – product classification) while Imbs and Mejean (2017) define their sectors at the ISIC (International Standard Industrial Classification) two-digit level. In our analysis, both classifications are matched to six-digit HS (Harmonized Commodity Description and Coding System) product export data taken from Comtrade using concordance tables from World Integrated Trade Solution (WITS) database of nomenclatures: wits.worldbank.org/product_concordance.html.

[13] The Smith et al. (2018) estimates of non-tariff costs associated with the UK's exit from the EU are based on newly estimated product level ad valorem equivalent rates of a number of NTMs (Cadot et al., 2018). Smith et al. (2018) construct trade weighted costs of two types of NTM (i.e. sanitary and phytosanitary measures, and technical barriers) faced by non-EU countries exporting into the EU which are then summed together to give a total NTMs cost. The

These estimates imply that UK-EU goods trade could be reduced by a further 31 per cent (average impact across countries), around 1.4 times the effect associated with tariffs alone, bringing the total impact on UK-EU goods trade to around 53 per cent. In terms of the aggregate effect, this impact is substantial. It is also worth noting the variation in the impact on a country-by-country basis. This variation reflects in part differences in sectoral trade patterns (i.e. trade structure) between the UK and EU Member States which results in some countries being more exposed to larger NTM increases. As shown in Figure 1, UK exports to Cyprus, Austria and Italy would be relatively adversely affected by the implementation of the NTMs, with potential falls of 47, 42, and 40 per cent respectively. UK exports to Slovenia, Netherlands and Lithuania would be the least negatively affected. Interestingly, the NTM impact on UK exports to Ireland would be just below the EU average of 31 per cent.[15]

FIGURE 1   IMPLIED UK-EU TRADE REDUCTIONS ASSOCIATED WITH NON-TARIFF MEASURES
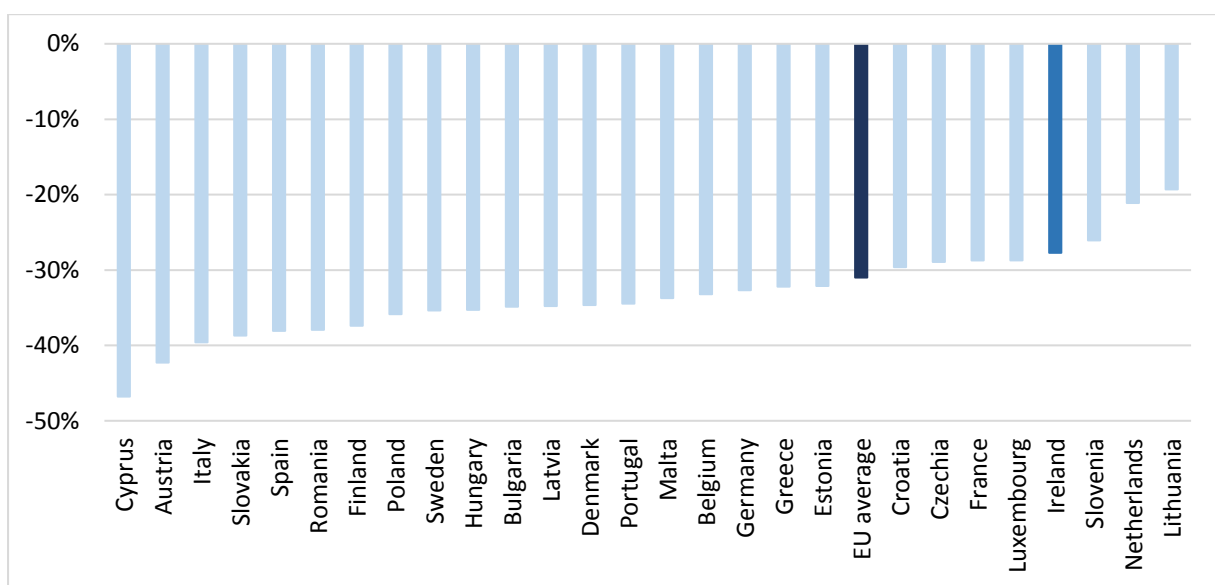
Source: Authors' Estimates.

increase in the non-tariff related costs associated with the UK's exit from the EU to a WTO MFN arrangement is assumed to be half of the total NTM cost. This assumption is influenced by earlier research by Berden et al. (2013). which estimated that the potential reductions to NTMs from a transatlantic trade deal could be in the region of 50 per cent.

[14]   To undertake our assessment of the non-tariff measures implications for trade we assume that Brexit related NTM costs fully feed in to prices.

[15]   We applied the same approach to assess the impacts of NTMs on Ireland's trading activity with the UK. We find that applying the OECD's assumed post-Brexit NTMs increases under a WTO type scenario (Smith et al., 2018) would reduce Irish exports to the UK by 28 per cent. In terms of the sectoral contributions, the Chemical, rubber, plastic products; Meats products; and Other processed foods sectors would experience the largest decreases, making up 60 per cent of the overall decline. Irish imports from the UK would reduce by 24 per cent. The Chemical, rubber, plastic products; Motor vehicles and parts; Machinery and equipment n.e.c.; and Other foods sectors would see the largest reductions contributing approximately 60 per cent to the overall decline in Irish imports from the UK.

At a sectoral level, the size of the reduction in the share of UK exports would vary significantly. The sectors which would experience the largest falls in exports are Motor vehicles and parts; Chemical, rubber, plastic products; Machinery and equipment n.e.c.; Wearing apparel; and Transport equipment n.e.c., contributing close to 80 per cent of the total decline in UK-EU exports. In general, the larger effect on these sectors can be explained as a combination of the level of their exports, with higher non-tariff measures and a relatively elastic sectoral price response.

Turning to the potential Brexit impact on services trade, in terms of a no-deal scenario, reverting to WTO tariffs provides a reference point to base scenarios for goods, yet there is no comparable benchmark for the magnitude of trade impacts for services. Service trade restrictions are determined by non-tariff measures such as recognition of standards, permissions etc. which are harder to measure. Lawless (2018b) using a gravity model approach finds that EU membership has increased services trade by around 26 per cent.[16] We use this estimate to calibrate a shock to services trade.

Overall, the micro-based estimates for the reduction in goods trade including tariff and non-tariff measures and the estimate of the reduction in services trade imply a reduction of around 44 per cent in UK-EU trade in the long run, accounting for the share of goods and services in UK-EU trade. While this estimate is broadly consistent with NIESR's (Hantzsche et al., 2018) assumption of a reduction in UK-EU trade of 56 per cent, it is roughly a quarter below the trade impact that they assume. We prefer this approach as it provides a more direct estimate of the potential impact on trade as a result of Brexit. We adopt this long-run trade assumption in our *No-Deal* and *Disorderly No-Deal* scenarios.

NIESR consider two scenarios associated with a deal. In one scenario, which they describe as 'Deal + Backstop', they assume that total UK-EU trade will fall by around 30 per cent in the long run. They reduce, in particular, their estimate for the fall in goods trade, which they assume to be 25 per cent, as the backstop in the Withdrawal Agreement would keep the whole of the UK in a single customs territory with the EU and this will, on balance, have a much larger impact on goods trade. In the second scenario, which they describe as 'Deal + FTA' the long-run impact on overall trade is assumed to be 46 per cent and, again, most of the adjustment is for goods trade, which they assume to fall by 40 per cent. As both

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[16] This estimate is considerably below that of Hantzsche et al. (2018). Given the questionable assumption that is often incorporated in macro-models that the extra trade associated with EU membership (based on estimates from gravity models) would completely unwind as a result of Brexit, we prefer this lower estimate to calibrate a shock to services trade.

of these assumptions are based on estimates from gravity models, we use the lower bound estimate of 25 per cent for goods trade from the studies NIESR use to calibrate their goods trade shock. We leave our estimate for services trade unchanged from the *No-Deal* scenario so overall this implies a long-run average reduction in UK-EU trade of 24 per cent. As a sensitivity check, we also consider a scenario whereby the average long-run reduction in UK-EU trade is 30 per cent, around one-quarter higher than what we consider in our main *Deal* scenario.

Foreign Direct Investment

Our analysis of the macroeconomic impact of Brexit on the Irish economy includes the potential diversion of some FDI from the UK to Ireland. In aggregate terms, the UK is expected to lose around a quarter of its FDI inflows in the event of a No-Deal Brexit and 21 per cent in the case of a deal (see Ebell and Warren, 2016, for a summary of the relevant literature). Ireland is already an attractive destination for FDI. In 2016, according to Eurostat, Ireland's stock of FDI represented 5.6 per cent of the total stock of FDI of the EU, whereas the equivalent figures for GDP and population were 1.8 per cent and 0.9 per cent, respectively. Furthermore, Ireland and the UK share a number of similarities, in terms of economic structure, language and legal system etc. that make it reasonable to assume that Ireland could act as a competitive alternative destination for FDI. For example, Davies et al. (2016) find perceptions of Ireland and the UK as being similar in terms of alternative locations for FDI, in particular among non-EU investors and in the services sector. In this case, Ireland would be able to capture a significant portion of FDI spillovers from the UK relative to the size of the country.

Our approach of estimating the FDI effect for Ireland follows closely with that of Lawless and Morgenroth (2016). The methodology is refined somewhat by estimating the potential losses for the UK and gains for Ireland at a sectoral level (NACE Rev. 2). We calculate sectoral FDI losses for the UK by combining sectoral data on UK FDI stocks and expected sectoral losses. We use the sectoral distribution of Ireland's non-UK EU FDI stocks to determine the share of FDI inflows (from the UK or diverted from the UK) by sector. These sectoral gains are aggregated and converted to inflows of additional FDI in COSMO.

The first step of this approach is to profile the current stock of FDI in the UK at the sectoral level and to evaluate which of these sectors would be more affected by Brexit. Figure 2 shows the sectoral shares of UK FDI and the expected losses in GVA by sector. The figure shows that FDI in the UK is heavily concentrated in Services, in particular Financial Intermediation, which represents approximately 30 per cent of total FDI. Other services, which includes categories such as Communications, Professional Activities and Support Services, account for 16.7

per cent of the total. Other notable sectors include Food and beverages (10.7 per cent), Mining and quarrying (9.0 per cent), and Other manufacturing (6.5 per cent), which includes the manufacture of computers and other machinery.

The impact of Brexit in the case of no deal is expected to vary by sector. We use the distribution of expected sectoral losses of gross value added (GVA) as weights to calculate the expected loss of sectoral FDI. Sectoral losses of GVA can be calculated based on the different price elasticities of the different sectors and the projected barriers to trade in a Brexit scenario, which in turn are used as an approximation for sectoral losses of FDI. Sectoral losses are calculated by aggregating the results of studies that have estimated sectoral impacts of a no-deal Brexit, including HM Government (2018), Felbermayr et al. (2018) and IMF (2018b). The results are shown in Figure 2. In percentage terms, the sectors with largest expected losses are Chemicals and Pharmaceuticals, although both represent a small share of the UK's FDI stock, followed by Financial Intermediation and the manufacture of Computers, electronic and optical products. We apply these implied sectoral losses to the total inward FDI reduction. In absolute terms, i.e. by multiplying the size of the stock of each sector's FDI by its expected loss, the loss of FDI in the Financial Intermediation sector represents almost two-thirds of the total expected loss, due to its importance in terms of FDI and its large expected loss of GVA. Other sectors with large absolute losses are Computer and electronics, Chemicals, Information and communication, and Professional activities.

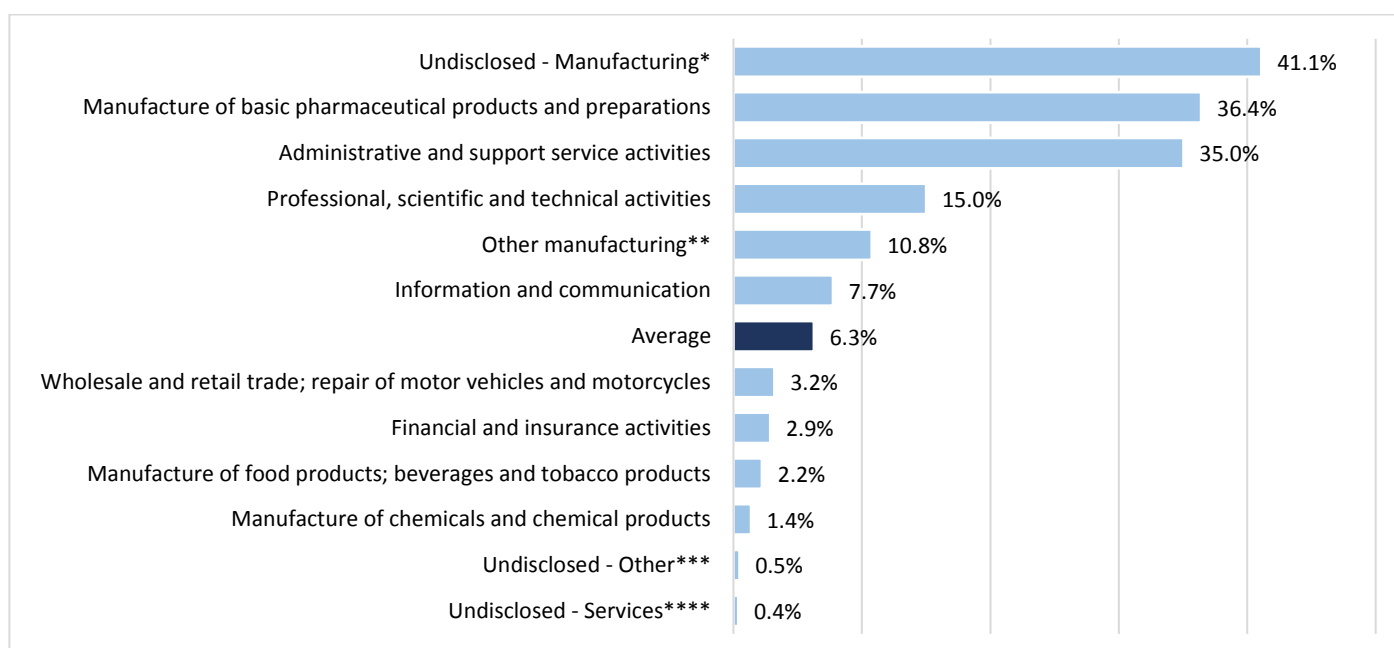**FIGURE 2   UK FDI SECTOR SHARE AND EXPECTED SECTOR LOSS OF GVA**
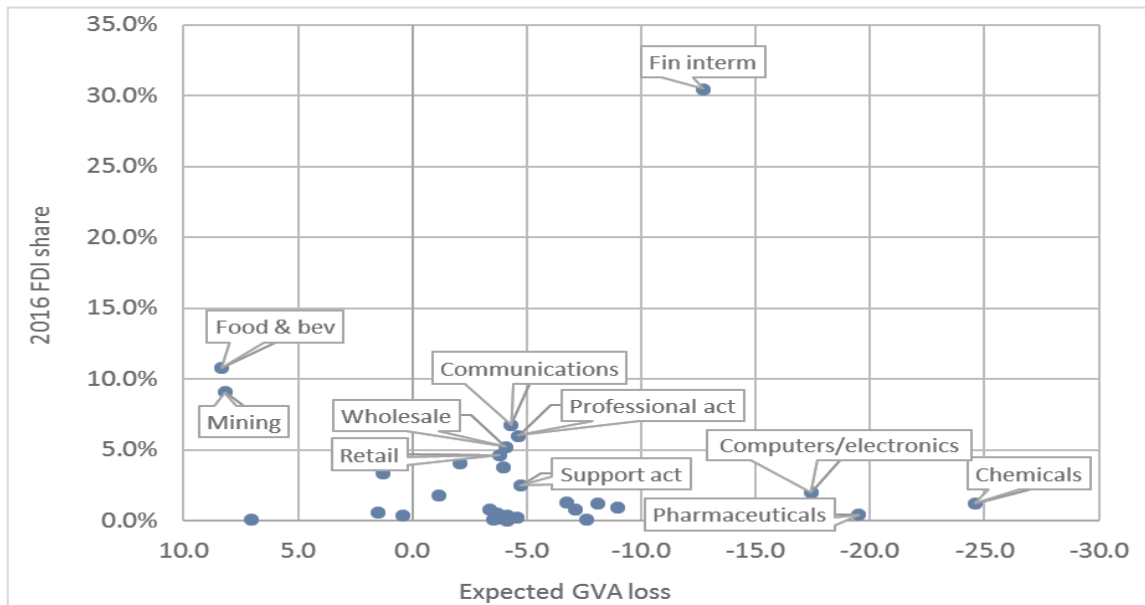
After evaluating the UK sectoral level FDI impacts, the next step is to check which sectors in Ireland are in the best position to attract some of this potential FDI from the UK. Our approach is to approximate the attractiveness of each Irish sector by their current share of non-UK EU (EU27) FDI stock. Sectoral Irish FDI data contain some non-standard aggregations because of confidentiality reasons, however we can make some inferences. Figure 3 shows the Irish share of the EU (non-UK) FDI stock. The figure shows that there are three sectors where Irish FDI represents more than a third of the total EU27 stock: Undisclosed manufacturing (including the manufacture of computer and electronic products), Manufacture of pharmaceuticals, and Administrative and support activities (including aircraft leasing). Two other sectors represent a share of EU27 FDI of over 10 per cent: Professional activities (legal, accounting, consultancy and engineering activities), and Other manufacturing (including the manufacture of medical devices).

With these shares acting as proxies for the attractiveness of various sectors with respect to FDI inflows, we can estimate how much inward FDI Ireland would be able to capture from the UK by multiplying the expected UK loss of FDI in every sector by the share of Irish EU27 FDI in that sector. This exercise shows that the potential largest gains would be in the Undisclosed manufacturing sector – mainly computer, electronic and optical products – a sector which combines a significant share of FDI in the UK, a large predicted loss in the UK, and a very high attractiveness to Ireland. The gains in this sector could amount to almost 40 per cent of the total predicted gain. Significant gains could also be achieved in the Financial Intermediation sector – despite the relatively low attractiveness of

Ireland in this sector – due to the size of the projected losses on the UK. Other sectors with potentially important gains include Professional activities, Administrative and support activities, Computer services, and Pharmaceuticals. In aggregate terms, the gain could amount to around €26 billion, which would represent an increase of 3.3 per cent over the current stock of Irish FDI and a capture of 7.6 per cent of the FDI spillovers from the UK following a no-deal Brexit. In the *Deal* scenario, the projected capture would imply an increase of 2.7 per cent over the current FDI stock.

FIGURE 3   IRISH SHARE OF EU27 (NON-UK) FDI STOCK, 2016

Sector	Share
Undisclosed - Manufacturing*	41.1%
Manufacture of basic pharmaceutical products and preparations	36.4%
Administrative and support service activities	35.0%
Professional, scientific and technical activities	15.0%
Other manufacturing**	10.8%
Information and communication	7.7%
Average	6.3%
Wholesale and retail trade; repair of motor vehicles and motorcycles	3.2%
Financial and insurance activities	2.9%
Manufacture of food products; beverages and tobacco products	2.2%
Manufacture of chemicals and chemical products	1.4%
Undisclosed - Other***	0.5%
Undisclosed - Services****	0.4%

Sources: CSO and Eurostat.
Notes: *Manufacture of basic metals and fabricated metal products, except machinery and equipment (C24-25); Manufacture of computer, electronic and optical products (C26); Manufacture of machinery and equipment n.e.c. (C28); Manufacture of motor vehicles, trailers, semi-trailers and of other transport equipment (C29-30)
** Manufacture of leather and related products (C15); Manufacture of other non-metallic mineral products (C23); Manufacture of electrical equipment (C27); Manufacture of furniture (C31); Other manufacturing (C32); Repair and installation of machinery and equipment (C33)
*** Agriculture, forestry and fishing (A); Mining and quarrying (B); Electricity, gas, steam and air conditioning supply (D)
**** Transportation and storage (H); Real estate activities (L).

As in Lawless and Morgenroth (2016), we also assume that part of the exports associated to the activity of MNCs in the UK would reallocate to Ireland in a proportion similar to the captured FDI. This reallocation would produce an increase in Irish exports of 2.8 per cent above the baseline (2 per cent in the case of the *Deal* scenario), with a proportional increase in traded sector production because of the additional exports. Due to the uncertainty about the timing of the FDI relocation decisions, we simply assume that the increase in investment, exports and traded sector production is gradual, starting in 2019 in the *No-Deal* and *Disorderly No-Deal* scenarios and at the end of a transition period, in the *Deal* scenario.

Finally, there are some elements in the FDI literature that suggest that this exercise should be considered as a best-case scenario. We have implicitly assumed that all FDI no longer destined for the UK in case of Brexit will remain in the EU, with Ireland capturing a share similar to its current share of EU27 FDI stock. Given that the EU economy is expected to experience a larger economic loss relative to the rest of the world as a result of Brexit, it may be the case that some of the FDI projects would actually leave the EU, as the EU's market potential is reduced by comparatively more than its competitors. Similarly, the economic impact of Brexit is expected to be larger in Ireland than in the rest of the EU, so it may be the case that the attractiveness of the Irish economy to FDI would be reduced by relatively more than other EU countries due to the loss of market potential, so that Ireland may capture a smaller share of FDI than its current share. Blonigen et al. (2007) use spatial econometric techniques to estimate the importance of nearby third markets, such as the UK, through a measure of surrounding market potential. By accounting for proximity to other large markets, the study finds market potential to be highly influential in attracting FDI. In Ireland's case, as the form of exit intensifies from a 'soft' to 'hard', the domestic growth path could lower directly due to reduced UK demand and indirectly due to effectively poorer market potential in Ireland.

Technical Assumptions

The estimates from the empirical literature around the impacts on trade and FDI are generally based on static estimates of EU membership and so to a great extent apply to the long run (typically assumed to be around ten years after the UK leaves the EU). There is considerable uncertainty about the transition path to the long run. As such, we place a larger emphasis on the long-run impacts as these effects are anchored in estimates from the empirical literature. We broadly follow the approach of NIESR (Hantzsche et al., 2018) in determining short-run dynamics.

In the *No-Deal* scenario, the trade shock is front-loaded with approximately half of the adjustment in trade taking place in 2019 with the remainder of the adjustment taking place over the period to 2028. In the long run, UK-EU trade is 44 per cent below the counterfactual where the UK remains in the EU. The 3.3 per cent increase in FDI inflows to Ireland is assumed to begin in 2019.

In the *Disorderly No-Deal* scenario, we use our estimate of non-tariff measures to capture the fact that there could be an additional large disruption to trade especially in the short run. Specifically, we increase our estimate of non-tariff measures by a factor of three until the end of 2019 to capture this potential additional disruption. There are many channels through which a disorderly Brexit

could impact the economy (including consumer confidence, business investment decisions etc.); the mechanism we use here is additional trade disruption given the importance of trade in determining the overall impact of Brexit. We assume that this additional trade disruption is relatively short-lived so that by 2020 the impact on trade reverts to that in the *No-Deal* scenario. The assumptions on FDI are the same as in the *No-Deal* scenario.

In the *Deal* scenario, the adjustment to the long-run trade impact is more gradual. We assume that an adjustment of 10 percentage points takes place by the end of the transition period (2020 Q4), with another 10 percentage points after the end of the transition period (2021 Q1), and trade adjusts gradually to the long-run impact thereafter. In the long run, UK-EU trade is 24 per cent below the counterfactual where the UK remains in the EU. In this scenario, the 2.7 per cent increase in FDI inflows to Ireland is introduced at the end of the transition period.

IMPACT OF BREXIT ON IRELAND

This section presents the results of our modelling of the projected impacts of the UK leaving the EU on the Irish economy, relative to a baseline scenario where the UK remains in the EU. Table 3 summarises the main results for key macroeconomic aggregates under the *Deal*, *No-Deal*, and *Disorderly No-Deal* scenarios across short-, medium- and long-term horizons. We emphasise the long-run impacts for Ireland as there is uncertainty about the timing associated with changes in the future relationship between the UK and EU. Overall, in each scenario, the level of Irish output is permanently below where it otherwise would have been were the UK to decide to remain in the EU. However, the negative impact on Irish output in the long run in the *Deal* scenario is approximately half that of the *No-Deal scenario.*

There are two main channels through which the shock hits the Irish economy; the negative trade shock will serve to reduce economic activity below where it otherwise would have been while the positive FDI shock will help to partially offset some of the overall negative impact. Specifically, the trade shock arising from the imposition of tariff and non-tariff measures would lead to lower activity in the international economy and severely reduce the demand for Irish exports. It would also negatively affect Irish competitiveness on impact. However, we would expect some internal adjustment in the economy that would help to restore lost competitiveness over time.[17] As a strong substitute for UK-destined investment,

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[17] The simulation results from NiGEM suggest that the Sterling-Euro exchange rate would depreciate by around 3.5, 5.5 and 7.5 per cent in the short-run in the *Deal*, *No-Deal* and *Disorderly No-Dea*l scenarios respectively. In the long-run,

the additional FDI that Ireland may attract would boost activity and labour productivity in the traded sector, which would positively impact wages and employment. In each of the *Deal*, *No-Deal*, and *Disorderly No-Deal* scenarios, the same channels and transmission mechanisms are at play but the magnitude and timing of the shocks differ and are smallest in the *Deal* scenario.

In COSMO, output in the traded sector is driven by (trade weighted) world demand for Irish exports and competitiveness which means the shock is initially transmitted to the Irish economy through this sector. As described in Section 3.3, the phasing of the trade shock is front-loaded so, for example, in the *No-Deal* scenario global demand for Irish exports falls by 4.2 per cent compared to the baseline by the end of 2019 and by 7.6 per cent by the end of 2028. Overall, the shock leads to output in the traded sector and exports remaining below baseline values over the medium to long term. In the long run, output in the traded sector is 3.1, 5.9 and 6.1 per cent below baseline respectively in the *Deal*, *No-Deal*, and *Disorderly No-Deal* scenarios.

Across the scenarios, while we would expect lower activity to depress prices, higher import prices lead to the level of consumer prices being above base, by around 0.5 per cent in the *Deal* scenario and 0.9 per cent in the *No-Deal* and *Disorderly No-Deal* scenarios.[18] Table 3 also shows the equivalent impact on the inflation rate for particular years. The loss in competiveness as a result of Brexit would lead to pressure for some adjustment in prices in the economy. In particular, there would be downward pressure on wages to help improve competitiveness. In each scenario, there is a negative impact on real wages, with the strongest impacts in the *Disorderly No-Deal* scenario. The implied reaction of real wages is stronger than that of nominal wages because consumer prices are also above base in each scenario.

The fall in traded sector output (relative to the baseline) results in lower labour demand, which has knock-on impacts for employment and the unemployment

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in both the *No-Deal* and *Disorderly No-Deal* scenarios the depreciation in Sterling is closer to 7 per cent, while in the *Deal* scenario it is broadly similar to the short-run result.

[18] This impact is smaller than the results from Lawless and Morgenroth (2018), who report that the effect of the introduction of WTO tariffs and associated NTMs as a result of Brexit could raise the Consumer Price Index by 3.1 per cent. Two arguments help explain this divergence: firstly, COSMO is a general equilibrium model, in which a negative shock to the economy would depress activity and put downward pressure on prices. Secondly, as is mentioned in Lawless and Morgenroth (2018), their methodology does not take account of behavioural changes by consumers, the effect of exchange rate changes or the range of substitutes available, whereas the COSMO model can approximate some of these channels. However, it should be noted that if the availability of substitutes is limited, for example immediately after Brexit in the case of a disorderly exit, in the short term we could potentially observe movements of prices closer to those predicted by Lawless and Morgenroth (2018). Furthermore, if the reaction of prices were to be closer to the one described in Lawless and Morgenroth (2018), we would expect a stronger contraction of internal demand, incrementing the negative impact on GDP by between two- and three-tenths.

rate. In the long run, the unemployment rate is 1 percentage point higher in the *Deal* scenario and roughly 2 percentage points above baseline in the two no-deal scenarios. The increase in the unemployment rate over the long term is in part due to the increasing magnitude of the trade shock over time. As a result of the loosening in the labour market, average wages are lower than in the baseline scenario. This will reduce the incentive to work and have a negative effect on the participation rate and overall labour supply. The combination of lower employment and lower wages leads to lower real personal disposable income for households, and in turn reduces consumption and imports below their baseline levels. As a result of lower domestic demand, activity in the non-traded sector is also negatively impacted, although it takes some time for the effect of the shock to percolate through to the non-traded sector.

With both output and employment below base in all three scenarios, government revenue from taxes will remain below base and the increase in the unemployment rate would lead to higher government spending on welfare payments. The net effect is a reduction in the general government balance (GGB).

Overall in the long run, the level of GDP is 2.6 per cent,[19] 4.8 per cent and 5.0 per cent below where it otherwise would have been were the UK to remain in the EU. Although these are substantial relative reductions in the level of output over the long run, it is important to state that the Irish economy will continue to grow in each scenario but that the growth rate will be lower in the context of Brexit. If we assume the Irish economy would grow by an average of 3 per cent per annum over the long run if the UK stayed in the EU, the impact of Brexit is roughly equivalent to a 0.3 percentage point reduction in the long-run growth rate in the *Deal* scenario and around 0.6 percentage points off the long-run growth rate in the *No-Deal* and *Disorderly No-Deal* scenarios. The short-run impacts are below the long-run impacts in each scenario although they are still quite severe especially in the *Disorderly No-Deal* scenario where the additional disruption to trade leaves Irish output 2.4 per cent below where it otherwise would have been.

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[19]   As a sensitivity check, we also consider a second deal scenario whereby the average long-run reduction in UK-EU trade is 30 per cent, around one-quarter higher that what we consider in our main *Deal* scenario. In this case, our simulation results show that the level of Irish GDP would be 3.4 per cent below the baseline in the long run.

TABLE 3   IMPACT OF BREXIT ON IRELAND, CHANGE FROM BASELINE

	Short-Run (after 2 years)				Medium-Run (after 5 years)				Long-Run (after 10 years)		
	Deal	No Deal	Disorderly		Deal	No Deal	Disorderly		Deal	No Deal	Disorderly
*Per cent deviation from Baseline Level:**											
GDP	-0.6	-1.2	-2.4		-1.9	-2.7	-3.3		-2.6	-4.8	-5.0
Gross Value Added	-0.6	-1.3	-2.5		-2.0	-2.8	-3.4		-2.6	-4.9	-5.1
GVA, Traded sector	-0.9	-2.1	-3.9		-2.9	-3.9	-4.5		-3.1	-5.9	-6.1
GVA, Non-traded sector	-0.2	-0.2	-1.0		-1.1	-1.8	-2.4		-2.3	-4.2	-4.3
Consumption	-0.1	-0.2	-0.9		-0.9	-1.5	-2.1		-2.0	-3.5	-3.7
Real personal disposable income	-0.3	-0.6	-1.3		-1.2	-2.0	-2.5		-2.2	-3.9	-4.1
Employment	-0.1	-0.2	-0.8		-0.9	-1.4	-2.0		-1.8	-3.2	-3.4
Labour force	-0.1	-0.1	-0.3		-0.3	-0.5	-0.7		-0.7	-1.2	-1.2
Average wages, nominal	0.0	-0.1	-0.3		-0.3	-0.2	-0.4		-0.3	-0.4	-0.5
Average wages, real	-0.1	-0.3	-0.5		-0.5	-0.7	-0.9		-0.7	-1.3	-1.4
Exports	-1.0	-2.7	-4.7		-3.6	-5.2	-5.9		-4.6	-8.1	-8.3
Imports	-0.8	-1.7	-3.6		-3.1	-4.6	-5.5		-4.5	-8.0	-8.2
Investment	-0.7	-0.3	-2.0		-2.1	-3.6	-4.6		-4.1	-7.7	-7.8
Personal consumption deflator, level	0.1	0.2	0.2		0.2	0.5	0.5		0.5	0.9	0.9
Deviation from Baseline:											
Unemployment rate	0.1	0.1	0.5		0.5	0.9	1.2		1.0	1.9	2.0
Participation rate	0.0	0.0	-0.2		-0.2	-0.4	-0.5		-0.5	-0.9	-1.0
Personal consumption deflator, p.p.	0.0	0.0	0.1		0.1	0.1	0.1		0.0	0.1	0.1
GDP deflator, p.p.	0.0	0.1	0.2		0.0	-0.1	-0.1		-0.1	-0.1	-0.1
General government balance, % GDP	0.0	-0.1	-0.3		-0.3	-0.4	-0.5		-0.5	-0.9	-0.9

Note: * all impacts are in constant prices/real terms unless otherwise stated.

Further considerations

As COSMO is a three sector model, we cannot consider some aspects of Brexit that require a more granular analysis. For example, the results presented above do not explicitly model supply chain effects. Production processes in many sectors are increasingly fragmented across national boundaries, which leaves firms highly exposed to negative shocks between cross-border trade linkages. Brexit could have significant supply chain impacts that would interfere with critical portions of production processes, inhibiting the completion of final products. Vandenbussche et al. (2019) account for global value chain linkages across industries as a key feature of a more detailed trade channel analysis. Under a hard Brexit scenario, they find that GDP in Ireland could decline by 5.7 per cent relative to a situation of continued UK membership. This estimate is stronger, representing how import frictions could have a compounding effect on exporting ability, but remains broadly in line with the estimates presented in the *No-Deal* scenario above.

In addition, this study cannot capture the heterogeneous effect of Brexit at a detailed sectoral level nor by firm size. Using a partial equilibrium approach, Lawless and Morgenroth (2016) and Department of Finance (2018a; 2018b) analyse the impact of Brexit at a more disaggregated sectoral level and find that some sectors, such as agri-food, would be relatively more affected, given both the expected large increase in trade barriers in these sectors and their relatively greater exposure to the UK market. Firms in these sectors, on average, are more likely to be Irish-owned and more labour intensive. Consequently, the negative effects from Brexit could fall disproportionally on Irish-owned firms meaning our analysis could underestimate the loss of employment. Furthermore, Lawless (2010) shows how NTMs tend to have a larger effect on smaller firms across all sectors. While our analysis does not include a regional distribution of the negative impact of Brexit, recent literature would suggest that regions with a relatively large proportion of small, Irish-owned firms operating in certain sectors such as agriculture or food production to be hit harder as a result of Brexit. Department of Finance (2017) finds that the Border and South-West regions to be particularly vulnerable to the negative impact of Brexit.

Furthermore, it is possible that Brexit could divert future EU migration to other EU countries that would otherwise have gone to the UK and it is reasonable to assume that Ireland would experience higher immigration as a result. While our modelled scenarios will result in net immigration being below where it otherwise would have been because of lower economic activity and higher unemployment in Ireland, it is possible that some of this impact will be mitigated by the potential diversion of future EU migrants to Ireland and other EU countries. Barrett et al. (2015) argue that migration can be part of a process of investment in human

capital. Good English language skills are a valuable form of human capital and this factor combined with Ireland's relatively favourable growth prospects (even in the context of Brexit) may mean that potential EU migrants will be willing to move to Ireland in the future if they are no longer able to go to the UK. However, it is difficult to quantify the potential magnitude of this effect with any certainty.

Finally, our analysis assumes no reaction on the part of firms or government that could help to mitigate some of the economic impact of Brexit. As a result, the scenarios presented here could provide an overestimate of the potential impact of Brexit. For example, firms may be able to find substitutes for imports from the UK or diversify into new export markets which could help to reduce some of the losses associated with Brexit.

SUMMARY AND CONCLUSIONS

The UK is deeply integrated with the European Union and its decision to exit from this trading block has no parallels in modern history. From a macroeconomic modelling perspective this adds to the challenge (or at least the uncertainty, particularly in the short run) of estimating the macroeconomic implications of any future UK arrangement with the EU Member States including Ireland, as there is no past experience or empirical evidence which can be directly relied upon. However, to the extent that the main potential transmission channels are well understood there is a growing number of papers which have modelled the impact of Brexit. This Article adds to this literature by attempting to quantify the potential economic impact of Brexit on the Irish economy.

International evidence suggests that the impact of Brexit on the UK economy could be substantial given its strong inter-linkages with the European and global economy. There is also evidence to show that Ireland could be relatively more negatively affected than other EU countries, because of the openness of the economy and the fact that the UK is its closest economic partner. The potential impact of Brexit on Ireland will ultimately depend on the UK's new relationship with the EU. However, there is still considerable uncertainty around the likely form that this future relationship will take. As a result, we consider several scenarios to cover a broad range of possible outcomes. We consider three scenarios which we label *Deal*, *No-Deal* and *Disorderly No-Deal*.

Even if the new relationship between the UK and EU is known, there is still uncertainty about the economic impact of Brexit. It is generally accepted that the main channels through which Ireland will be impacted are trade, including the impact of tariff and non-tariff measures, and FDI; however the precise scale of the impacts and their duration is largely unknown. In this Article we draw on the

new extensive Brexit literature to help calibrate these impacts and then incorporate them into a macro-modelling exercise to see how these changes feed through the economy. Our approach is different to others in that we combine the latest micro-level estimates (including new estimates of the impact of non-tariff measures) with macro-level analysis. Our scenario results show that the impacts on the Irish economy are large and Brexit will ultimately negatively impact firms, households, the labour market and the public finances. Overall, across the three scenarios, the fall in the level of Irish output below where it otherwise would have been ranges from 2.6 to 5.0 per cent in the long run, depending on the scenario considered. The short-run impacts are also severe and especially so in the context of a disorderly Brexit, where we assume there would be additional disruption to trade.

There are both upside and downside risks to these estimates. On the upside, to the extent that businesses have been preparing for Brexit and finding ways of reducing trade exposures, this will help offset some of the negative impact. On the downside, the impact of Brexit could be more severe, especially in the short run, if there is a continued period of uncertainty which could impact investment decisions or if there are even larger disruptions to trade.

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EXPLORING THE IMPLICATIONS OF MONETARY POLICY NORMALISATION FOR IRISH MORTGAGE ARREARS[1]

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ABSTRACT

The current level of the monetary policy rate in the Eurozone is low both by international and historical standards and will likely rise over the coming years. In this Article we consider what the impact of a rise in ECB policy rates would mean for the Irish mortgage market. First, we examine the structure of the Irish mortgage market in terms of interest rate contract types and explore the link between the mortgage rate and the policy rate. Second, we draw out the results of policy modelling linking arrears and interest rates using a model put forward in Slaymaker et al. (2019). We then use this model to provide some further scenarios exploring the impact of interest rate rises on the arrears rate for particular groups of Irish households. Our findings suggest a 25 basis point increase in the policy rate would lead to a 0.1 percentage point increase in new missed mortgage payments. While households are in a better economic position to withstand policy rate increases given the recovery in the labour market and in house prices, rate rises would lead to payments rising faster than long-term income growth. Younger, lower income households who are at an earlier stage in their mortgage contract are more at risk, as are households on tracker interest rates who have a contractual pass-through from the policy rate to the lending rate.

1. INTRODUCTION

Since the beginning of the financial crisis in 2008, the Irish mortgage market has gone through a period of considerable upheaval. At the peak of the crisis, one-in-five mortgage loans were in arrears as households were confronted with simultaneous shocks in the labour market and to house prices. High origination loan-to-value and loan-to-income ratios, as well as an over-extension of credit to

low income households meant few buffers were available to absorb the macroeconomic downturn which transpired after 2008 (McCarthy and McQuinn, 2017; Lydon and McCann, 2017).

As the domestic economy continued to deteriorate, real earnings fell and unemployment rose strongly. Few policy levers were available to offset the decline in the economy given the requirement to follow a pro-cyclical fiscal policy adjustment under the economic support programme with the International Monetary Fund (IMF), the European Union (EU) and the European Central Bank (ECB). One policy lever that did provide a countervailing force was the decline in the monetary policy rate which was part of a broader package of aggressive monetary policy actions by the ECB and other global Central Banks to offset the financial and sovereign debt crises (Gerlach, 2013).

For a highly indebted economy like Ireland, reductions in the ECB policy rate are beneficial from a financial stability perspective if they reduce the debt repayment burden for borrowers. While not all mortgage holders in Ireland benefited from lower policy rates due to a breakdown in interest rate pass-through, certain cohorts such as tracker rate contract holders saw their repayments decline automatically. This helped provide a buffer to absorb some of the negative economic shocks. Byrne et al. (2017) find that monetary policy rate pass-through in Ireland led to a lower default rate amongst tracker borrowers than would otherwise be the case.

Since 2013 the Irish economy has recovered, house prices have rebounded dramatically and unemployment has fallen to just under 6 per cent. The significant turnaround in economic fortunes has provided a supportive context for improvements in the mortgage market with the share of mortgage loans in arrears falling to just under 7 per cent in the first half of 2018 (Central Bank of Ireland, 2018). An extensive programme of mortgage modification has also played a role in reducing the share of mortgages in arrears (McCann, 2017; Donnery et al., 2018).

More recently, European economies have begun to recover, with inflation now increasing towards the ECB target of 2 per cent or below. With the gradual withdrawal of extraordinary monetary policy measures already underway, and the US Federal Reserve and Bank of England raising policy rates, it is likely the ECB will begin to gradually move the policy rate back up to a more 'normalised' level if economic conditions allow. Such a rise in rates would inevitably have a considerable impact on the repayment capacity of Irish borrowers and their ability to service debt obligations in the mortgage market.

To consider what the impact of a rise in ECB policy rates would mean for the Irish mortgage market, the aims of this Special Article are threefold. First, we consider the structure of the Irish mortgage market in terms of interest rate contract types and explore the link between the mortgage rate and the policy rate. Second, we draw out the results of policy modelling linking arrears and interest rates using a model put forward in Slaymaker et al. (2019). We use this model to provide some further scenarios exploring the impact of interest rate rises on whether or not Irish households would miss a mortgage payment due to financial distress if interest rates were to rise. Our indicator of missed mortgage payments is broader than the strict 90 days past due definition that is used by the Central Bank for reporting and monitoring purposes. Instead, it captures those households who miss any payments due to financial distress. The model documented in Slaymaker et al. (2019) links mortgage arrears to changes in the actual monthly repayment-to-net income level of the household. This provides a direct measurement of the effect of interest rate rises on the affordability of payments for each household. Finally, we discuss the implications for policy.

A number of findings emerge. As outlined in Slaymaker et al. (2019), a 25 basis point increase in the monetary policy rate leads (within one year) to a 0.1 percentage point increase in the flow of new missed mortgage payments based on 2016 data. As noted above, the measurement of arrears is not the standard 90 days past due as measured by the official Basel definition, so the flow to new 90-day arrears would therefore be lower than that provided by our estimates. As the effects of interest rates are non-linear (through the standard non-linear, repayment amortisation schedule), a larger adjustment of 100 basis points (similar to the 2018 US Federal Reserve adjustment) in the policy rate raises the flow of households into arrears by 0.5 percentage points.

Given that the Irish economy is growing at a significant rate at present, it is useful to explore whether a rise in household incomes would offset any of the increase in the policy rate. To address this issue, Slaymaker et al. (2019) raise all household incomes by the long-run average income growth rate in the economy adjusted for the higher policy rate using COSMO (Bergin et al., 2017), a structural model of the Irish economy. They find that the rise in income does not offset the increase in repayments due to higher interest rates. This is because mortgage repayments, owing to the non-linear combination of income and interest rates, rise at a faster pace than income levels. However, this does not take into account a lower unemployment rate which would arise in an improved economy and is a critical determinant of mortgage default.

Finally, we use the model in Slaymaker et al. (2019) to explore the impact of a 50 basis point rise in the policy rate on different groups of households namely: a) those on tracker versus standard variable (SVR) rates; b) young versus older households; c) low versus higher income borrowers; and d) loans with a longer term remaining versus loans closer to maturity. We find that younger, lower income households who are at an earlier stage in their mortgage contract are more at risk. In addition, tracker borrowers, who have a contractual pass-through from the policy rate to the lending rate, will inevitably face larger increases in their repayments compared to standard variable rate borrowers.

Understanding the likely path of ECB interest rates over the coming years is complicated as it is affected by a range of factors. Such factors include the outlook for the European economy, European inflation, and broader developments in Europe around the balance of Central Bank policymaking power. The negative effects of Brexit again may delay normalisation. However, for a highly indebted economy like Ireland with a vulnerable mortgage market, it is prudent to plan for eventual rate rises and ensure buffers are available to absorb these at a household and bank level.

The rest of this Article is structured as follows. Section 2 explores the structure of the Irish mortgage market and discusses the link between lending rates and the policy rate. Section 3 presents the main findings in Slaymaker et al. (2019). Section 4 presents some additional scenarios and Section 5 draws out the implications for policy.

2. STRUCTURE OF IRISH MORTGAGE MARKET AND INTEREST RATE RISK

The degree to which policy rate increases are passed through to borrowers depends on two structural features of the mortgage market. First, the share of new loans and the outstanding stock that are on variable rate contracts determines the degree to which banks can pass through increases in their cost of funding to households. Second, pass-through from the policy rate to the lending rate which depends on a number of factors including the degree of competition, the cost of funds, credit risk, and the ability of households to refinance mortgages in the face of interest rate increases. In Section 2.1, we will document the first of these issues while discussing the second in Section 2.2.

2.1 Interest rate types in the Irish mortgage market

Loans in the Irish mortgage market are issued either on a fixed or variable rate basis, with the vast majority on the latter. There are two types of variable rate loans: those that track the ECB base rate at an agreed margin, typically called 'trackers', and those that do not. In the case of the latter, the lender offers no

specific link to an underlying market or wholesale rate and can choose to increase or decrease the rate at its discretion. In this paper, when we refer to variable rate mortgages, we mean excluding trackers. The most common variable rate product is the Standard Variable Rate or 'SVR'.

Figure 1 panel A outlines the share of outstanding mortgage loan balances[2] on standard variable rate, tracker rate, and fixed rate loans. It can be seen that in Ireland the market is currently dominated by variable rate contracts. As of Q2 2018, by outstanding loan value (loan balances), 37 per cent of the balance of mortgage loans outstanding in Ireland have standard variable rate contracts, a further equal share of 37 per cent of the balance have tracker interest rates. A further 2.5 per cent of the balance have fixed rate loans of less than one-year fixation which is in essence a variable rate loan. In terms of longer-term fixed rates, 12 per cent of mortgage balances had a one- to three-year fixed rate, a further 9.5 per cent of balances had a three- to five-year fixed rate while a total of 2.5 per cent had a fixed rate greater than five years. This indicates that a total of 26 per cent of Irish mortgage balances have some type of rate fixation leaving approximately 74 per cent, or three-quarters of the balance of loans, at risk of rate changes if the ECB adjusts its policy rate. In terms of the number of loans, the *Central Bank of Ireland Credit Market Report 201*8, indicates that as of Q2 2018, 21 per cent of fixed rate contracts were over one year maturity.[3]

This reliance on variable rate contracts leaves the holders of these mortgages very exposed to increases in rates in the future. Indeed, the short-term nature of the fixed rate loans in the Irish market is also a cause for structural concern as, compared to markets such as the US or Denmark where mortgage fixation periods often last 30 years, all the fixed rate products in Ireland are short-term in duration. The longest fixed-term rate on the market in Ireland currently is ten years in duration.[4] In comparison to other European countries, Ireland's share of variable rate origination is higher than the median (See Figure 1, panel C). In 2013, mortgage markets such as France and Belgium had fewer than 10 per cent of loans on variable contracts as compared to 85 per cent of loans in Ireland.

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[2]   This refers to the proportion of the value of outstanding loans by interest rate type, not the proportion of the number of loans.

[3]   https://www.centralbank.ie/docs/default-source/publications/household-credit-market-report/household-credit-market-report-2018.pdf?sfvrsn=4

[4]   Sibley, E. (2018) 'The Irish Mortgage Market – 2018 and beyond', Remarks delivered to the Institute of Banking Breakfast briefing 'The Irish Mortgage Market – past, present and future'.

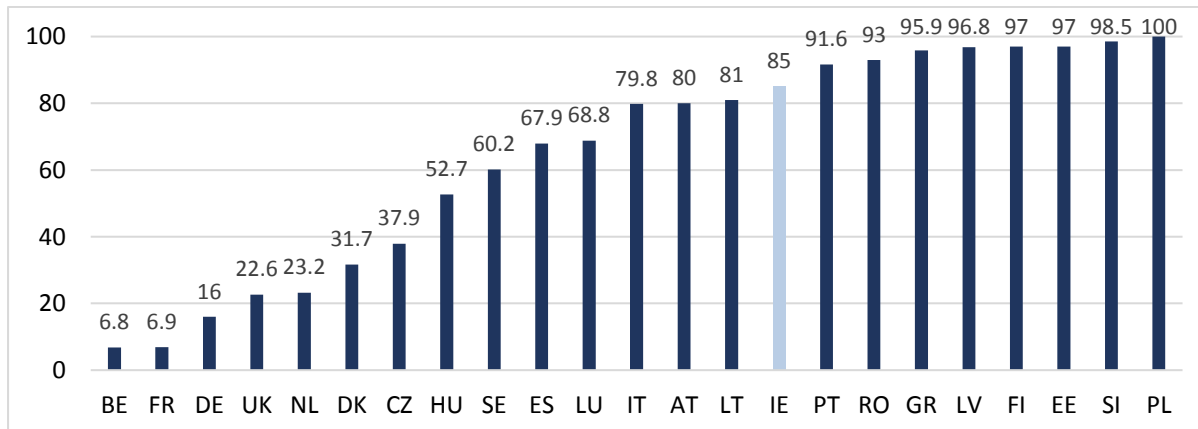**FIGURE 1   OVERVIEW OF INTEREST RATE TYPES IN IRELAND AND EUROPEAN COMPARISON**

A. Share of Outstanding PDH Mortgage Loans by Interest Rate Type – Ireland
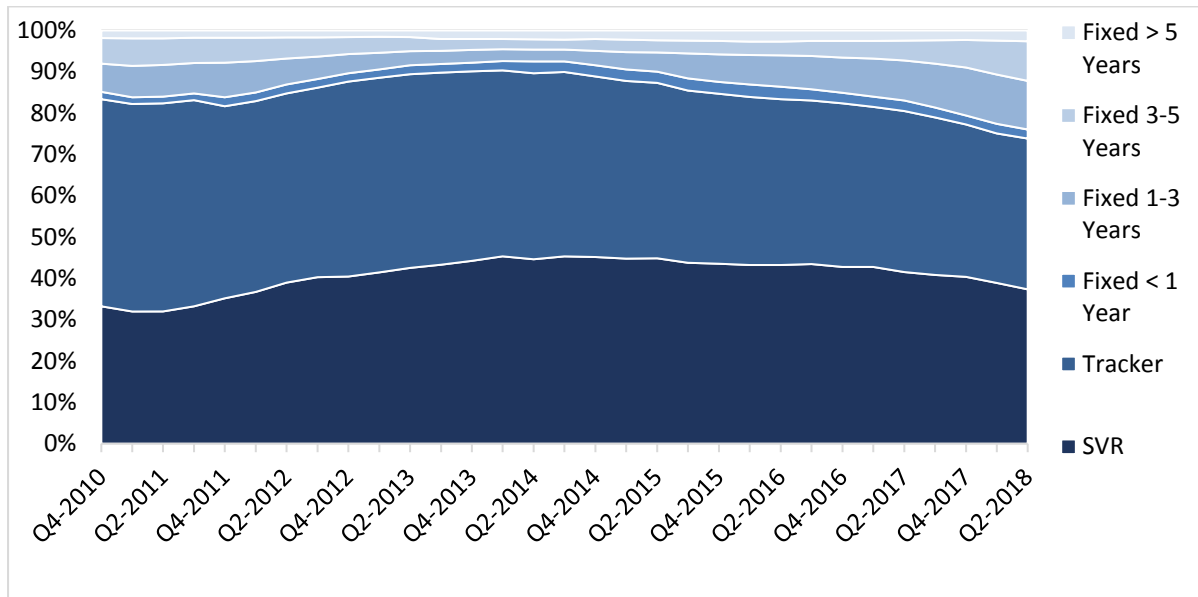
B. Share of New Mortgage Lending by Interest Rate Type – Ireland
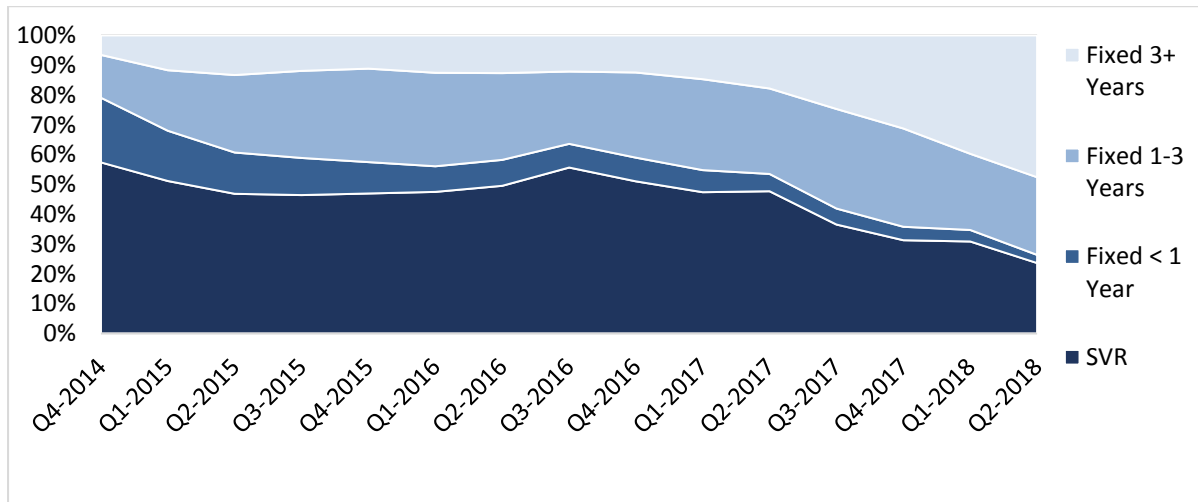
C. Share of Variable Rate Loans Originated in 2013 – EU Comparison

Sources: A: Central Bank of Ireland, Private Household Credit Statistics Table A.18.1.
              B: Central Bank of Ireland, Retail Interest Rates Table B3.1.
              C: European Systemic Risk Board, *Report on Residential Real Estate and Financial Stability in the EU, 2016*.

The high share of interest rates on variable contracts heightens the risk associated with the mortgage market's potential exposure to changes in the banks' cost of funding through the policy rate. The difference in interest rate type has important implications from a modelling perspective when attempting to estimate the impacts of interest rate changes on households' repayment capacity.

For the Irish mortgage market, borrowers holding tracker rate contracts are a substantial source of vulnerability. These loans were originated at the height of the credit boom and the underlying loan sizes are larger than for other contracts. Kelly et al. (2015) show that, while tracker loans are larger, their median repayments have been lower than other contract types as they have benefited considerably from the low interest rate environment and the contractual margin between the policy rate and their mortgage rate. Byrne et al. (2017) further document that tracker borrowers have experienced much lower default rates as a result of the lower ECB policy rate. Naturally, as tracker borrowers have benefited from a fall in the policy rate, these loans will be immediately impacted when the policy rate begins to move.

2.2 Interest rates and the link to monetary policy

It has been well documented that mortgage interest rates in Ireland are high by European standards.[5] Figure 2 plots the average interest rate in Ireland on outstanding mortgage loans relative to other European countries. From 2000 onwards, Irish rates, mainly due to increased competition in the domestic market, were below the median in other countries; since 2014, Irish mortgage interest rates are now the highest of the group of countries for which data are available.

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[5] See ESRI *Quarterly Economic Commentary*, Summer 2018; Central Bank of Ireland *Influences on Standard Variable Rate Pricing in Ireland, 2016*.

FIGURE 2   INTEREST RATES ON NEW HOUSE PURCHASE LOANS TO HOUSEHOLDS – EUROPEAN COMPARISON
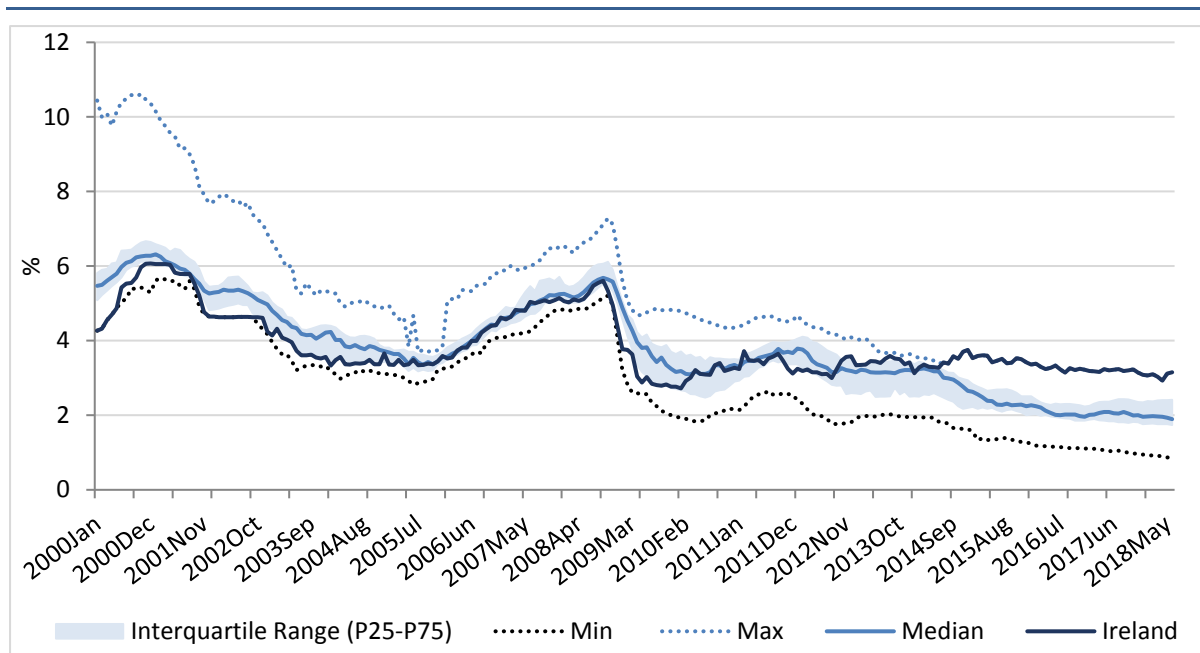
Sources: Central Bank of Ireland, SME Credit Series, Table A.14.1.
Notes: Countries included are: AT, BE, EE, ES, FI, FR, IE, IT, LT, NL, PT, SI. These countries are selected due to data availability. Data differ between this chart presented and the text as the ECB comparison data include restructured mortgages whereas the new business SVR is only for new drawdowns.

Understanding the determinants of interest rates in Ireland is particularly important when considering the extent to which rates will be passed through to borrowers in the event of a monetary policy rate rise. The process of rate 'pass-through' is an important structural feature of any mortgage market and is a critical channel in the functioning of monetary policy (Hofmann and Mizen, 2004; Karagiannis, 2010).

The pass-through inevitably depends on the share of variable and fixed rate contracts in the market as discussed above. Having determined in Section 2.1 that Ireland is a market with predominantly variable rates, this transmission channel of monetary policy is particularly important. However, rate pass-through also depends on a multitude of other factors. A number of studies (including Goggin et al., 2012 and McQuinn and Morley, 2015) conclude that the monetary policy transmission mechanism, i.e. the extent to which European policy rates influence domestic rates, has, in the aftermath of the financial crisis, broken down in the case of the Irish mortgage market. The reasons for this are primarily concerned with the many legacy issues arising in the Irish banking sector after the 2007/2008 crash. Internationally, there is evidence of a weaker pass-through following the crisis. Illes et al. (2015) explore why bank lending rates did not fall as much as the decline in policy rates would have suggested following the crisis. They find this was due to the fact that the policy rate did not accurately reflect the cost of bank liabilities.

Figure 3 plots the Irish SVR, tracker rate and the ECB policy rate over time. As noted in Goggin et al. (2012), mortgage lenders in the Irish market tend to use the three-month Euribor as a benchmark for adjusting the pricing of variable rate mortgages. Euribor in general follows the ECB MRO (Main Refinancing Operations rate), as presented in Figure 3. Up to 2010, it is clear that Irish lenders tended to track the policy rate both for increases and decreases in the Euribor rate. However, since 2011, domestic policy rates have not fallen by as much as the decline in the Euribor would suggest. Goggin et al. (2012) contend that one reason for the divergence is that some Irish lenders are charging higher variable rates to compensate for the losses being made on their tracker loans given the relatively higher funding costs associated with these products. The interest rate on tracker loans has fallen in line with their contractual mark-up to the ECB base rate. Other structural factors such as market competition can also impact the degree of pass-through of the policy rate to mortgage rates. It is clear that competition in the Irish market declined in the aftermath of the financial crisis as a number of institutions left the Irish market.[6] Other factors impacting the degree of pass-through can include the banks' cost of funds and the credit risk of borrowers. Indeed, Illes et al. (2015) find the weighted cost of liabilities to be a good driver of bank lending margins since the crisis. The banks' cost of funds is determined by their liability structure, for example the ability of the banks to access funding internationally as well as domestically through bonds, share issuance, interbank lending, and savings products (household and corporate). More recently, Sibley (2018) has focused on the low rate of repossessions in the Irish market and the inability of banks to repossess collateral which, in turn, undermines the link between lending and security. Sibley (2018) also notes that capital requirements and risk weighting, in an economy with high levels of legacy debts, and the subsequent provisions that must be held against mortgages, may also raise the cost of lending in Ireland.[7]

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[6]   See *Influences on Standard Variable Rate Pricing in Ireland – Central Bank of Ireland* report.
[7]   *Ibid.* and Sibley, E. (2018). 'The Irish Mortgage Market – 2018 and beyond'. Remarks delivered to the Institute of Banking Breakfast briefing 'The Irish Mortgage Market – past, present and future'.

FIGURE 3   STANDARD VARIABLE RATE, TRACKER RATE AND ECB MRO RATE
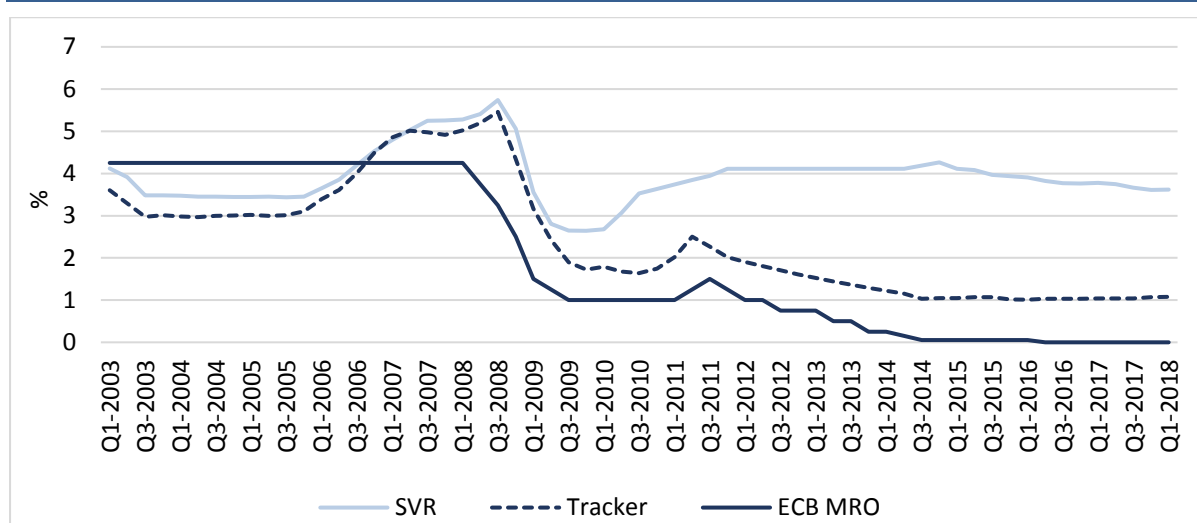
Source: Central Bank of Ireland, Private Household Credit Statistics Table A.18.1.

In more recent years, increased competition has occurred in the domestic market and a marginal decline in the standard variable rate can be seen. Of critical importance from our perspective is how increases in the policy rate would be passed through to borrowers on the ground and in turn how this would impact mortgage arrears. For tracker borrowers it is clear, these would face a contractual 100 per cent pass-through. For standard variable rate holders, the degree of pass-through is less clear. Goggin et al. (2012) found that the pass-through parameter to the standard variable rate in the period before the financial crisis was 0.6 per cent for every 1 per cent change in the policy rate. If this relationship was to continue, then any increase in the policy rate would represent a considerable rate increase for variable rate contracts.

Taken together, the pass-through to Irish households on variable rate contracts (both tracker and standard variable) would certainly pose an additional risk in terms of their repayment capacity and inevitably lead to a heightened risk of arrears.

3.   POLICY RATE NORMALISATION AND ARREARS

3.1   Sample, model and empirical approach

In this section, we present a short overview of the methodology and analysis in Slaymaker et al. (2019) as context for understanding the impact of policy rate changes on mortgage arrears. The dataset used is the EU-SILC survey for Ireland which has been collected annually since 2003. The main aim of the survey is to collect information on poverty, household incomes and deprivation. However, critically for our purposes, the Irish SILC survey has a variable which captures the

level of the monthly mortgage payment. It also has information on the current loan balance outstanding, an estimate of the current house price, originating mortgage conditions (term and balance), current interest rate type and importantly whether or not the household missed a mortgage repayment due to financial difficulties. The interest rate on a loan-by-loan basis can be solved from an amortisation formula given the originating balance, term and current payment. The data do not capture mortgage equity releases or top-ups so these estimates may underestimate the overall effects of rate rises for households with these products. SILC is an annual survey so all variables are measured in annual terms.

The dataset also has a four-year rotating panel with each household remaining in the sample for a maximum of four years. This provides a rich source of within-household variation in key variables over time. For brevity, we do not go into detail in this Article on the specifics of the sample. However, these can be found in Fahy et al. (2018) and Slaymaker et al. (2019).

The combination of current information on income and mortgage payments as well as an arrears flag is relatively unique and is not available in many loan-level datasets available in Ireland, Europe and the US which are used for official stress testing purposes. Having this information allows us to calculate a current debt service ratio as follows:

$$Debt\ Service\ Ratio\ (DSR) = \left(\frac{Payment}{Net\ Income}\right)$$

This current debt service ratio can then be included as a covariate explaining arrears. A noteworthy distinction between SILC and the official Central Bank measure of mortgage arrears is important at this juncture. In SILC, mortgage arrears are measured using responses to the following question:

> *In the last 12 months, did it happen that the household was unable to make a mortgage repayment for the main dwelling on time, due to financial difficulties?*

The Central Bank mortgage arrears data use a more standard Basel definition of mortgage arrears which is 90 days past due. Our measure is therefore a looser indicator and could capture households who are early in the arrears process, even those who are only a very small number of days past due.

The model and empirical findings

To test the impact of the debt service ratio on arrears, Slaymaker et al. (2019) use a standard discrete time logit survival model to estimate the probability of mortgage arrears as a function of the change in the debt service ratio (DSR) to capture payment or income shocks, the lagged level of the DSR to capture indebtedness and repayment capacity, the level of the current loan-to-value (CLTV) ratio, the log of lagged income, employment status, loan vintage, regional macroeconomic controls and other household controls.

$$\Pr(D_{it} = 1) = f\left(\Delta DSR_{it}, DSR_{it-1}, CLTV_{it-1}, lnY_{it-1}, X_{it}, Z_{rt-1}, t\right)$$

Table 1 shows the importance of both the lagged level of the DSR capturing repayment capacity and the change in the DSR capturing payment and income changes as determinants of households falling into mortgage arrears. It also demonstrates that the parameters on these two key determinants of mortgage arrears have changed over time. We therefore focus on the post-crisis period 2010-2016 only in the following scenario analysis to ensure that the parameters provide the most accurate predictions.

TABLE 1   EMPIRICAL MODEL ESTIMATES

	Full Sample	Post-Crisis Only
L.DSR	0.100*** (0.0387)	0.130** (0.0606)
ΔDSR	0.122*** (0.0475)	0.239*** (0.0700)
CLTV	Y	Y
Employment Status	Y	Y
Income	Y	Y
Household Characteristics	Y	Y
Regional Macro Controls	Y	Y
Loan Vintage	Y	Y
Observations	4,239	2,439

Source: ESRI and Department of Finance analysis of EU-SILC.
Notes: Household characteristics include; age, marital status, education, household composition and NUTS3 region. Full sample refers to 2004-2016, while post-crisis sample refers to 2010-2016.

3.2   Scenario analysis

In Slaymaker et al. (2019) we use the model discussed in the previous section to first calculate a baseline predicted probability of falling into arrears for each borrower. We then conduct an interest rate shock scenario by allowing for a different pass-through relationship according to the interest rate type for each household. A new instalment is then calculated using an amortisation formula. The payment for each scenario is then a function of the shocked interest rate, the borrower's mortgage term, and the original loan amount. Once the new payment has been calculated, we then recalculate the debt service ratio which is fed into

the model to calculate a new predicted probability of falling into arrears for each household. We then take the mean predicted probability of falling into arrears across all households in each year and compare to the mean baseline figure to quantify the increase in the average predicted probability of falling into arrears.

Given the uncertainty over the likely magnitude of future policy rate rises, we examine the impact of a range of interest rate shocks from a small 25 to a larger 100 basis point rise. In a speech to the ECB Forum on Central Banking in June 2018, Mario Draghi stated that the ECB 'will remain patient in determining the timing of the first rate rise and will take a gradual approach to adjusting policy thereafter'. We therefore begin with a 25 basis point shock. As our model is annual and looks at the one-year impacts of an interest rate rise, it is plausible that we could see a number of smaller quarterly rises totalling a larger annual increase such as 50 or 100 basis points. At the more severe end of the scale, the 2018 EBA banking stress test adverse scenario for the Irish long-term rate has an increase of 150 basis points; while McCann (2017) implements a 200 basis point shock on tracker loans in work using loan-level data. From the perspective of our static one-year model, we feel that increases of these magnitudes are not realistic within a calendar year and instead undertake three shocks 25, 50 and 100 basis points.

Figure 4 plots the percentage point increase in the predicted probability of households falling into arrears under the interest rate shock scenarios ranging from 25 to 100 basis points. In 2016, a 25 basis point rise in the policy rate increases the flow of households falling into arrears by 0.1 percentage points, a 50 basis point rise leads to a 0.2 percentage point increase and a larger 100 basis point increase leads to just under a 0.5 percentage point increase in the flow of households into arrears.

FIGURE 4   DEVIATIONS FROM BASELINE PREDICTED PROBABILITY OF ARREARS UNDER INTEREST RATE SHOCK
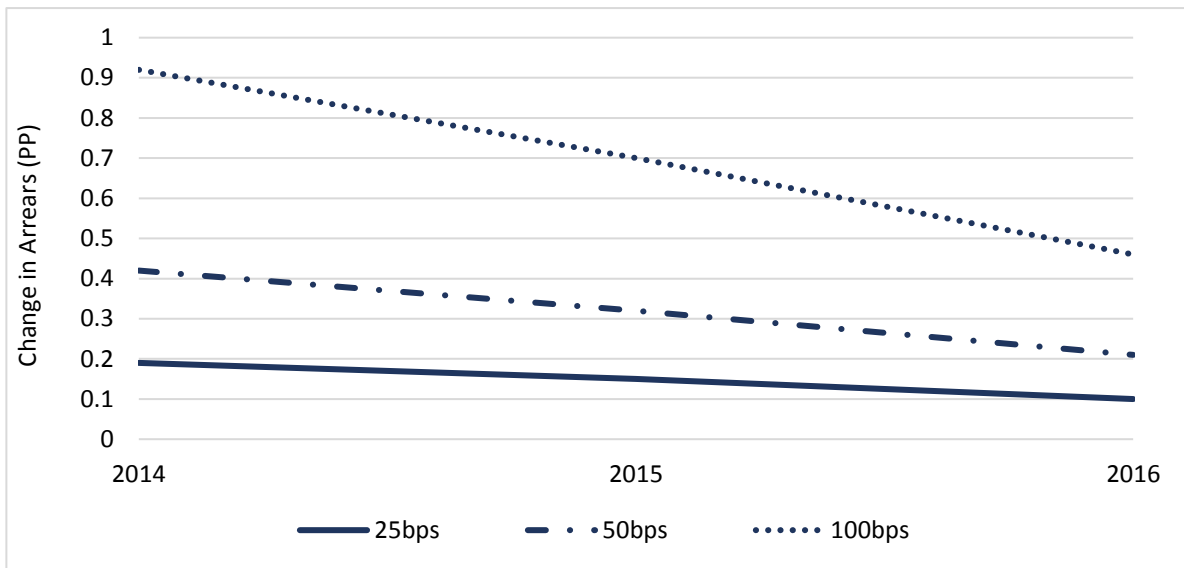
Source: ESRI and Department of Finance analysis of EU-SILC.

Looking more closely at the mechanism through which this occurs, Figure 5 illustrates how both monthly mortgage instalments and the debt service ratio increase in the event of an interest rate shock. A 50 basis point rise increases the mean payment by €100 per month and increases the DSR from 18.2 to 20.2 per cent.

FIGURE 5   MONTHLY INSTALMENTS AND DEBT SERVICE RATIO UNDER INTEREST RATE SHOCK
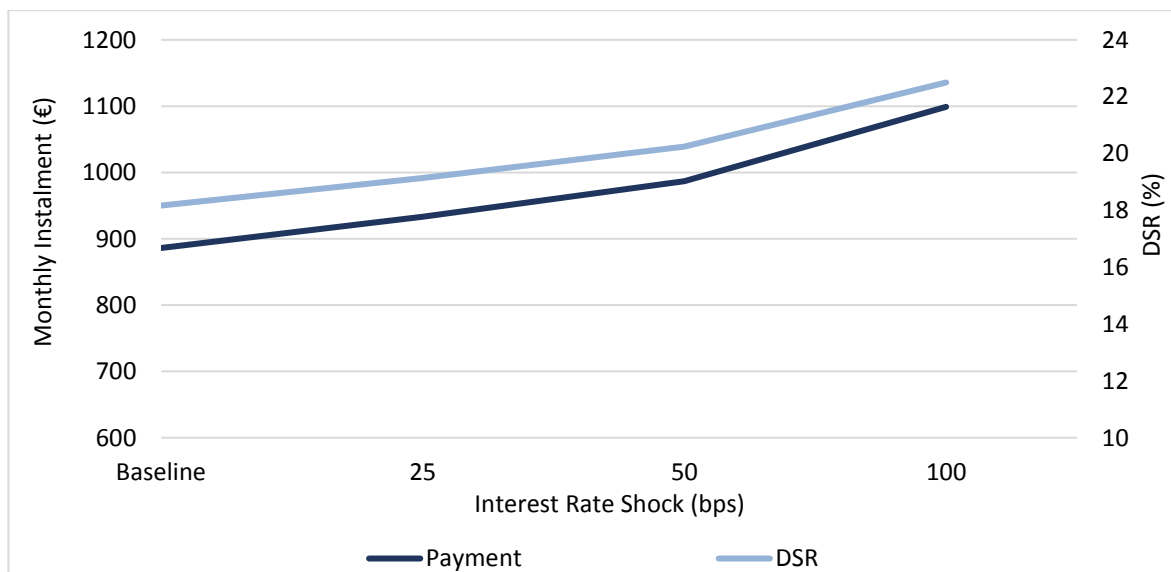
Source: ESRI and Department of Finance analysis of EU-SILC.

Given the recent rapid growth of the Irish economy, it is useful to explore whether an increase in household income could offset any of the increase in the arrears rate caused by an increase in the policy rate. To address this issue, Slaymaker et al. (2019) raise all household incomes by the long-run average growth rate in the economy, adjusted for the sensitivity of income to the higher policy rate using COSMO, the Core Structural Model of the Irish Economy (see Bergin et al., 2017). Figure 6 shows that the increase in the arrears rate is lower in the scenario with rising incomes as households have more buffers to withstand shocks. However, rising incomes do not fully offset the rise in repayments due to increases in the policy rate. This is due to the non-linear nature of mortgage interest rate increases.[8] This non-linearity is clearer in relation to tracker borrowers as illustrated in Figure 7 as these mortgage holders are more exposed to interest rate rises (through a greater pass-through of monetary policy).

FIGURE 6   EFFECTS OF INTEREST RATE SHOCK ON MORTGAGE ARREARS UNDER RISING INCOMES
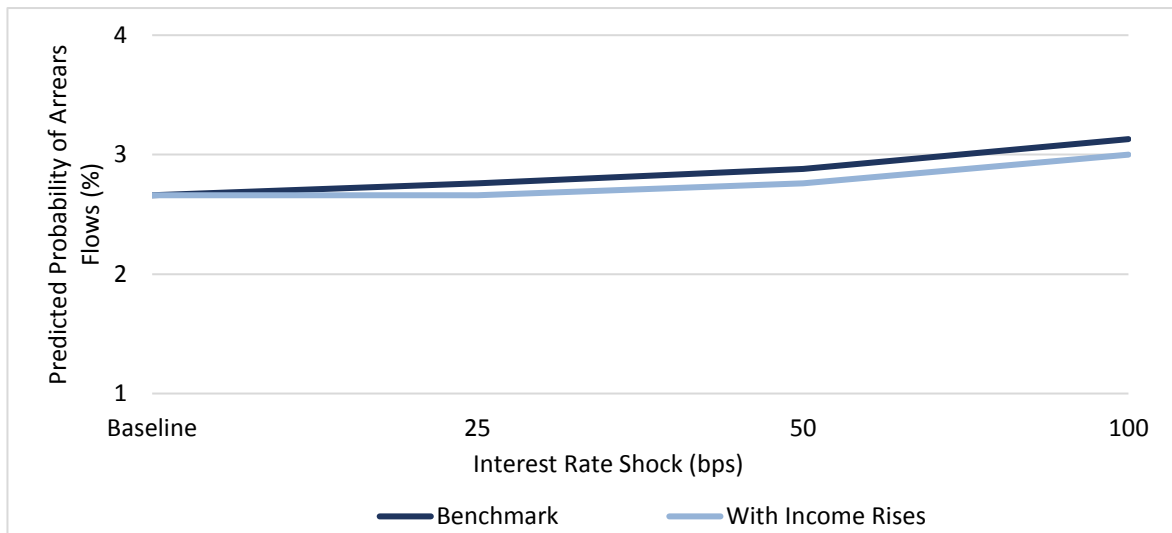
Source: ESRI and Department of Finance analysis of EU-SILC.

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[8]   See McQuinn and O'Reilly (2008) for more on the sensitivity of mortgage repayments due to the non-linear combination of income levels and interest rates.

**FIGURE 7   INSTALMENT AND INCOME CHANGES UNDER INTEREST RATE SHOCK WITH RISING INCOMES**
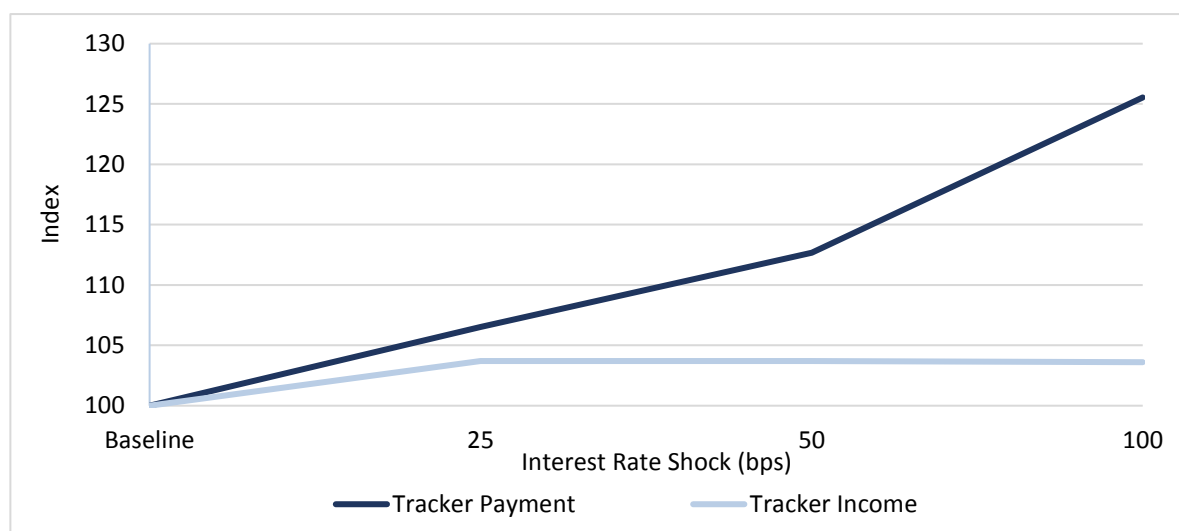
It should be noted that raising incomes for all households is only one channel through which risks would be mitigated. Often households that go into arrears would suffer catastrophic economic circumstances such as unemployment, which would lead to a much larger change in incomes than the standard annual rise posited here. Therefore in a growing economy, as employment increases, this would naturally increase income more than the standard factor increased here. As the unemployment rate has declined rapidly in Ireland in recent years, it is likely that further employment growth would help boost households' ability to manage their mortgage payments and also lead to a smaller increase in the arrears rate than the simple exercise that we calculate here. More generally it is important to note that the most recent data we are able to use for this analysis are for 2016. As the economy has continued to improve into 2017 and 2018, accompanied by a falling arrears rate, it is likely that Irish households would in fact currently be better placed to absorb an interest rate rise. The results from this analysis can therefore be thought of as an upper bound of the likely true effect.

Another channel which may help to moderate the increase in cases of arrears in a growing economy is rising house prices. One of the key features of the mortgage arrears crisis in Ireland was the extent to which short-term arrears cases transitioned into longer-term arrears due to many of these households being in negative equity, leaving them with little option but to remain in their property and fall deeper into arrears. As house prices have rebounded strongly in recent years, this naturally lowers the impact of negative equity on arrears and may lower the increase in arrears due to a policy rate rise.

In the scenario analysis presented here we deploy a range of interest rate increases from 25 to 100 basis points and test the impact on the likelihood of arrears over a one-year horizon. However, at this juncture, it is informative to reflect on what might the path of normalisation look like when the ECB does begin to raise the policy rate. In this context it is useful to consider how other Central Banks have historically changed rates as an indicator of the ECB's path. Figure 8 presents the policy rates of selected global Central Banks including the ECB, US Federal Reserve and Bank of England. It can be seen that policy rates are at a historic low since the aggressive loosening following the financial crisis. The Federal Reserve and Bank of Canada have begun a policy of unwinding low rates on the back of stronger economic fundamentals and rising prices in these economies. Both the Federal Reserve and the Bank of Canada undertook between 25 basis points and 75 basis points increases per annum from 2015-2018. If the ECB was to follow a similar policy it would mean the annual increases of between 25 and 50 basis points are more likely in the short run.

FIGURE 8   POLICY RATES OF SELECTED GLOBAL CENTRAL BANKS 1990-2017
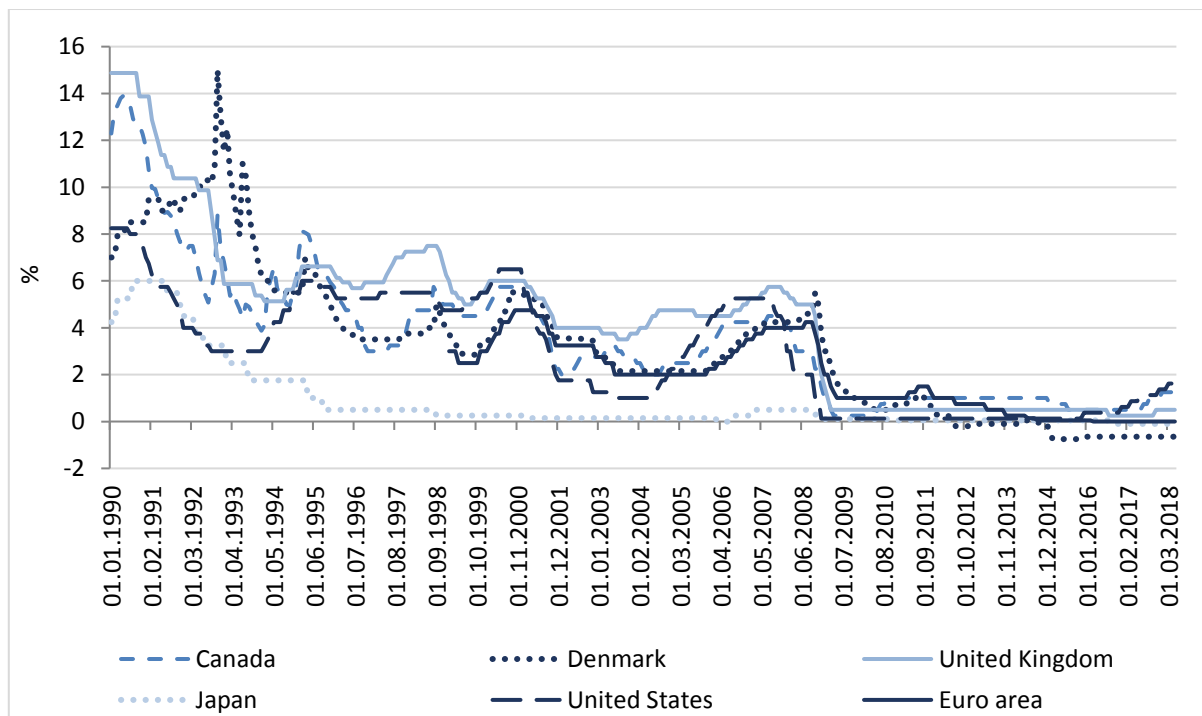
Source: ESRI and Department of Finance analysis of EU-SILC.

However, historically, the ECB has acted aggressively, with a 125 basis points rise in the year between Q1 2006 and Q1 2007. Going forward, how they react will depend on the strength of inflation in the Eurozone economy and, ultimately, the magnitude of the European economic recovery. However, on balance, it is unlikely that any more than a 100 basis points rise within a calendar year would be undertaken without a significant increase in price levels. In this context, our

100 basis points shock is, arguably, the largest increase that would occur within a calendar year in a recovering European economy.

Another point is noteworthy. The research works on a ceteris paribus basis holding all other factors constant. Households could, as an alternative, approach the bank for a temporary restructure to avoid a technical default and we do not take this into account. The household may also be able to delve into savings or other wealth to avoid payment and we cannot model this.

4. ARE PARTICULAR GROUPS MORE EXPOSED?

In this section we explore the impact of interest rate rises on the flow of households falling into arrears for particular groups of Irish households. To do this we calculate the predicted probabilities of falling into arrears for a 50 basis point shock by interest rate type, loan vintage, household age and disposable income.

Figure 9 presents the predicted probability of new arrears flows for households with tracker and SVR mortgage rates (top two panels), and the corresponding percentage point difference between the initial baseline and 50 basis point interest rate shock scenario (bottom two panels). It must be noted that while the SILC survey gives a good representation of the mortgage market in general, it may under- or over-represent the sample for each specific rate type as the survey does not stratify by these criteria. These results must be interpreted with this caveat.

In 2016 the baseline predicted rate of new arrears cases is similar for tracker and SVR households. However, the bottom two panels show that tracker borrowers, who have a contractual pass-through from the policy rate to the lending rate, will inevitably face higher repayments when interest rates rise. A 50 basis point rise leads to a 0.4 percentage point increase in the flows of new arrears for borrowers with tracker mortgages, compared to a 0.2 percentage point increase for those households with SVRs.

FIGURE 9   **PREDICTED PROBABILITY OF ARREARS FLOWS UNDER 50BPS INTEREST RATE SHOCK BY RATE TYPE**
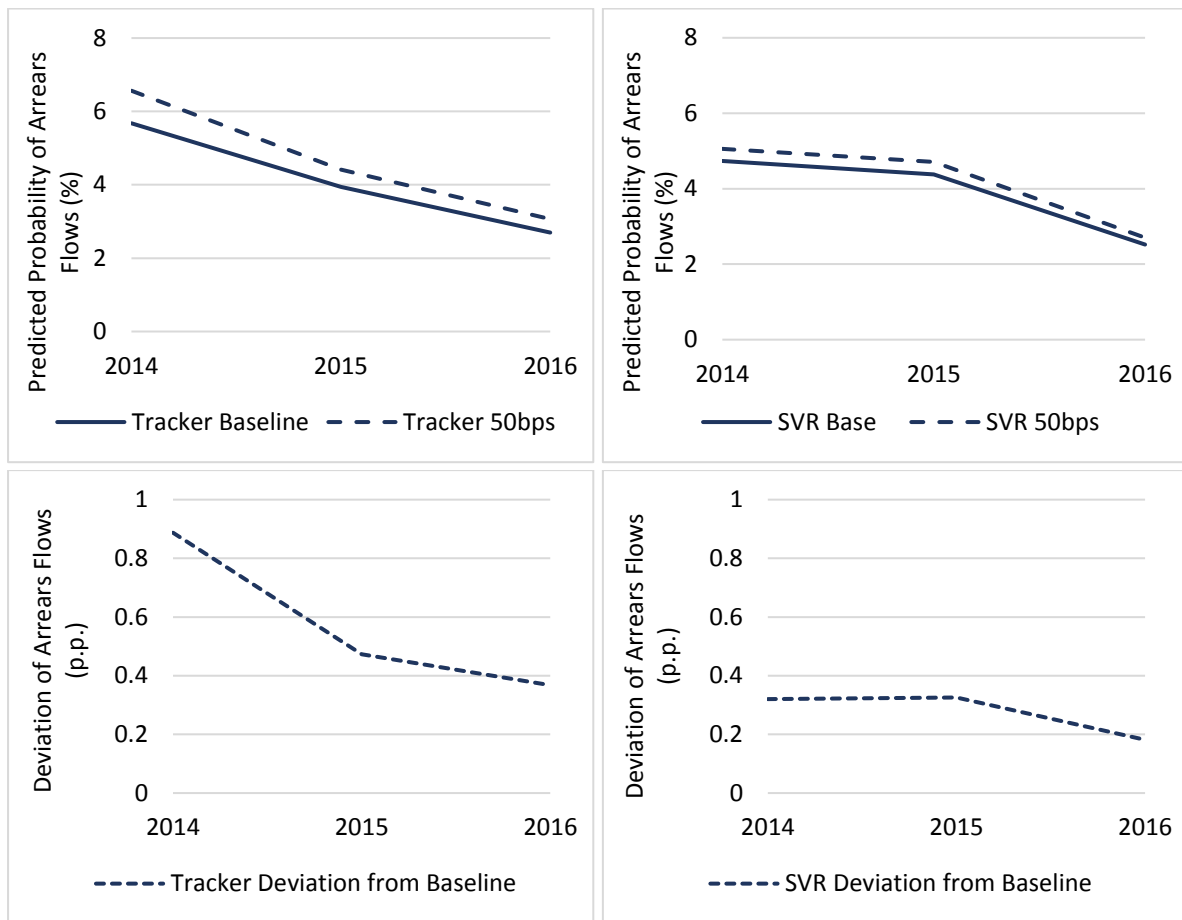
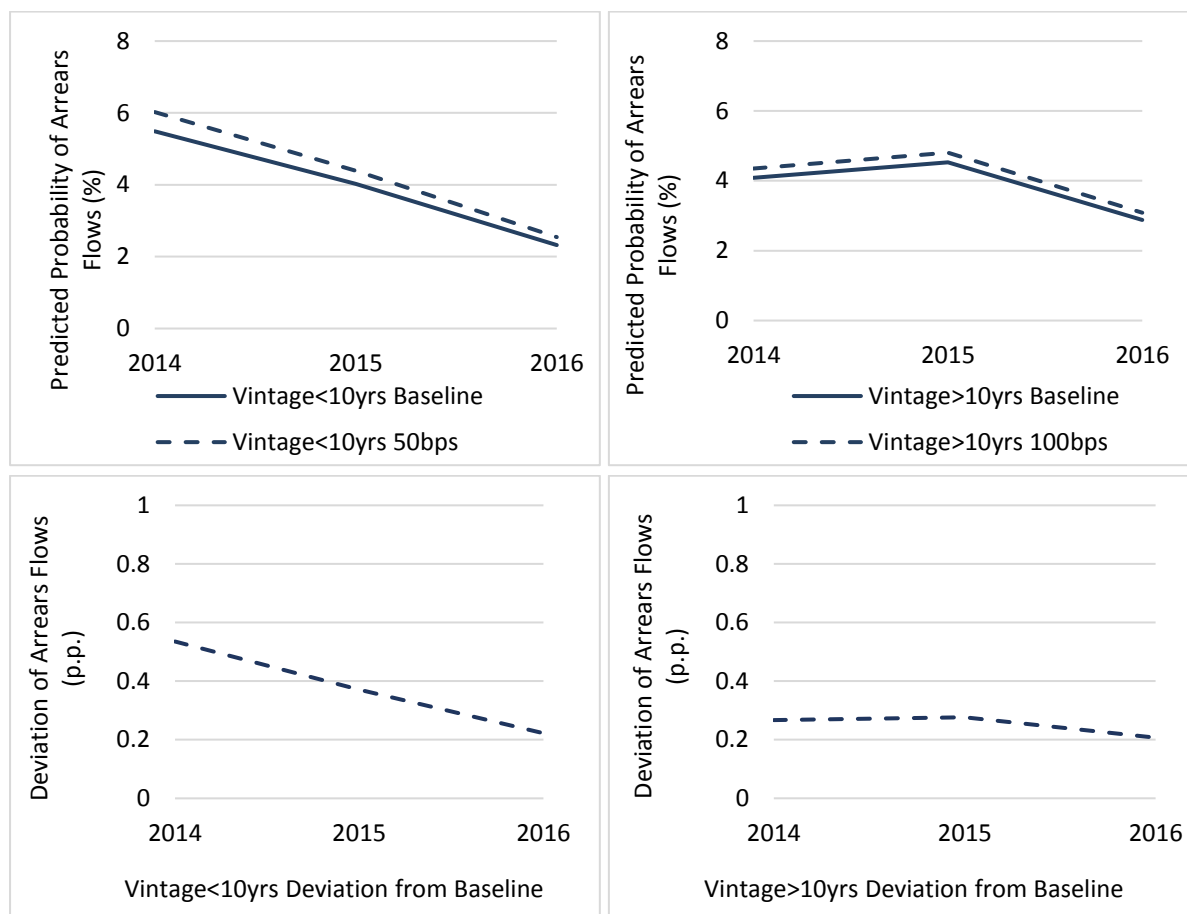*Source:*   ESRI and Department of Finance analysis of EU-SILC.

Figure 10 examines the differing impacts of a policy rate rise by loan vintage, defined as years since mortgage origination. In 2016 younger vintage loans (less than ten years) actually have a lower probability of falling into arrears. However, these households are generally slightly more vulnerable to an increase in the policy rate compared to those with older vintage loans. Drawing any firm conclusions looking at the effects across loan vintage is complicated due to the number of loans issued under loose credit conditions in the early to mid-2000s.

Another potentially vulnerable group of households are younger mortgage holders at the beginning of their income life cycle. In Figure 11 we show that not only do younger households (aged less than 35 years) have a higher likelihood of falling into arrears, they also face a larger increase in their probability of falling into arrears as a result of an interest rate shock.

Finally, turning to income, Figure 12 illustrates that households outside the top quartile of the income distribution have a higher likelihood of falling into arrears,
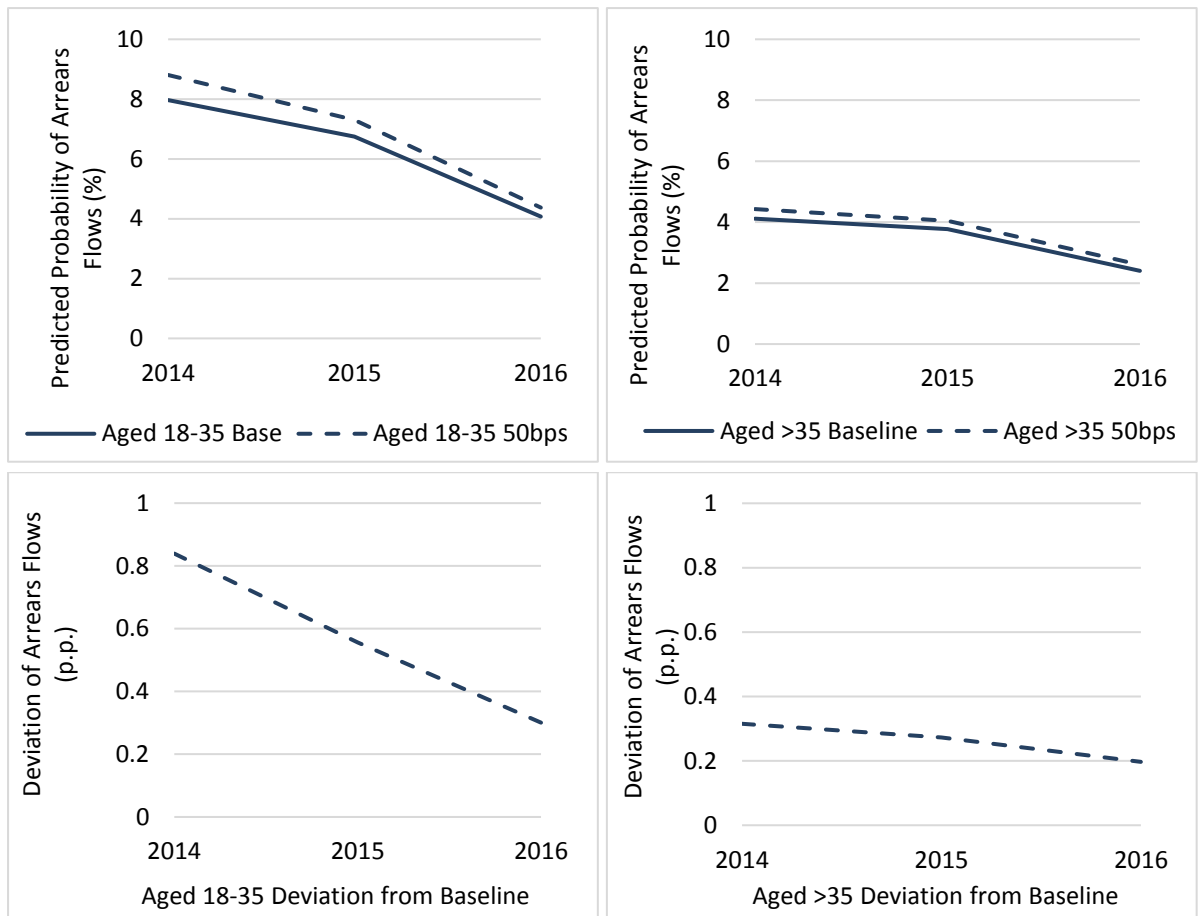
and they also face a larger increase in their probability of falling into arrears as a result of an interest rate shock.

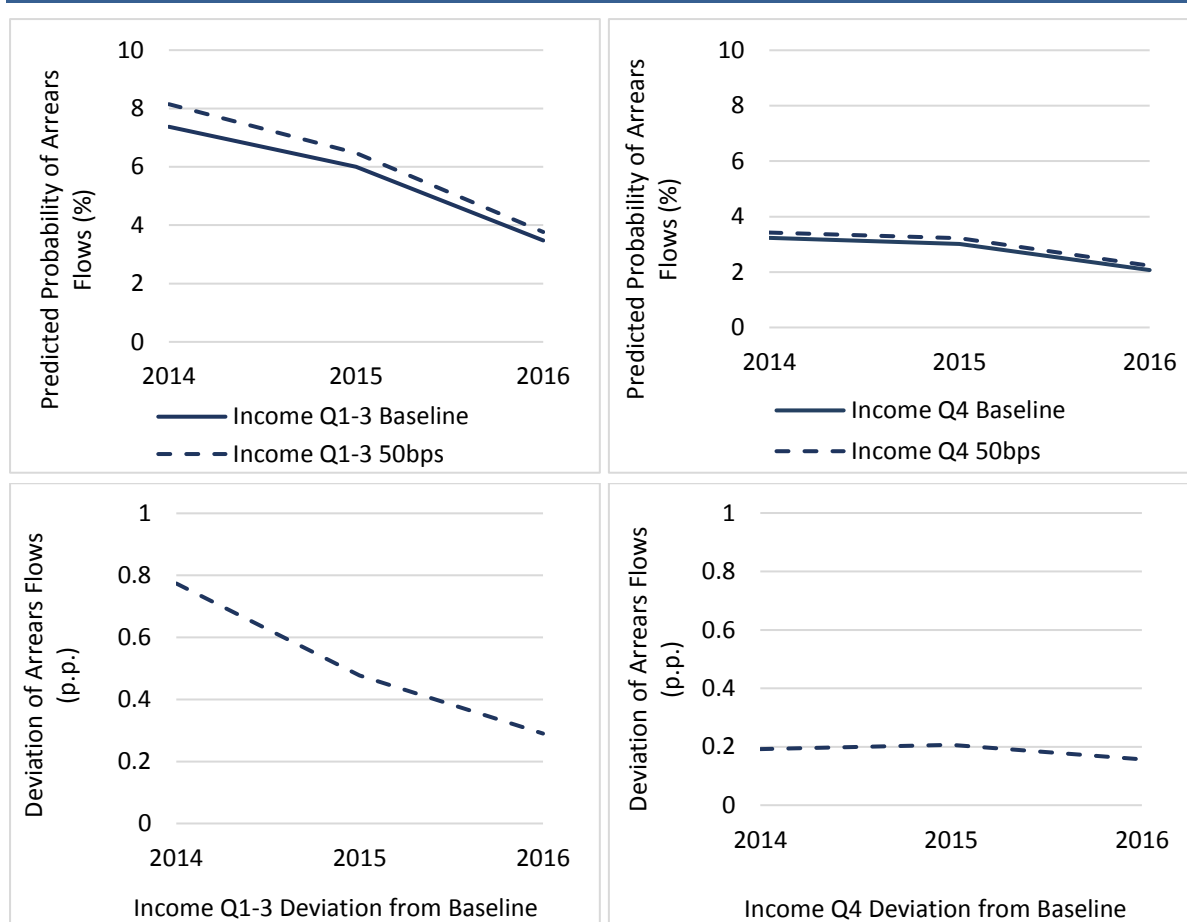**FIGURE 10   PREDICTED PROBABILITY OF ARREARS FLOWS UNDER 50BPS INTEREST RATE SHOCK BY LOAN VINTAGE**

FIGURE 11   PREDICTED PROBABILITY OF ARREARS FLOWS UNDER 50BPS INTEREST RATE SHOCK BY AGE

Source: ESRI and Department of Finance analysis of EU-SILC.

FIGURE 12   PREDICTED PROBABILITY OF ARREARS FLOWS UNDER 50BPS INTEREST RATE SHOCK BY INCOME

Source: ESRI and Department of Finance analysis of EU-SILC.

5.   CONCLUSIONS AND POLICY IMPLICATIONS

A number of policy implications arise from our research. The current level of the monetary policy rate in the Eurozone is low both by international and historical standards and will inevitably rise over the coming years. It is clear that interest rate normalisation poses a risk to many Irish households given high levels of indebtedness and the variable nature of interest rate contracts; an economy with a high share of variable rate contracts is particularly exposed to considerable interest rate risk (Leece, 2000). Our findings show that any increase in the policy rate would be somewhat offset by expected household income growth. The improved economic circumstances in Ireland in the past couple of years, in particular the fall in unemployment and recovery in house prices, does leave households in a better position to manage any increase in interest rates.

The results point to specific households being more vulnerable to any interest rate rises. We find that tracker borrowers, who have a contractual pass-through from the policy rate to the lending rate, will inevitably face higher repayments. As the rates for these borrowers are still well below those for other contract types

(fixed or variable), it would require a steep rise in rates to make it beneficial for these households to switch rate type or to fix. Therefore until such time as tracker rates move towards fixed rates, fixation would not be optimal for these borrowers. For such households, if they have spare financial resources, steps to redeem part of the balance through increased payments would help to reduce indebtedness. However, this will not be possible for households without sufficient resources.

We also find that younger, lower income households who are earlier into their mortgage contract are more at risk. Given the expected upward path of interest rates, encouraging such households to contract longer-term fixed interest rates would ensure these borrowers would be protected from future rate volatility. At present, only two banks offer fixed-rate mortgage products of ten years, and no provider offers fixed rates for the duration of the term (as would be standard in many other countries). From a market structure policy perspective, steps to move towards the introduction of longer-term fixed rate loans in the Irish market would be advantageous for two reasons.[9]

From a household demand perspective, the option to fix for longer-term horizons would allow them to balance repayment risks with other factors such as income volatility. The use of longer-term fixed rate mortgage loans in the Irish market could also benefit households, by increasing transparency and stability for borrowers (CCPC, 2017). However, it is important to note that while in the short to medium term, rate fixation may be desirable for certain households given the expected upward path of interest rates, long-term fixed rates do remove flexibility and the ability of a borrower to potentially benefit from any fall in interest rates during an economic downturn. It has been well established that factors such as financial literacy, risk preference and interest rate expectations all feed into households' choice of mortgage contract (Devine et al., mimeo). Information, increased awareness of the different loan options available in the market, and educational programmes that improve households' understanding of complex choices would likely lead to a more optimal choice of interest rates.

From the supply-side perspective of the financial sector, mortgage providers themselves would benefit from offering longer-term fixed rates if it reduced the likelihood of default and allowed financial institutions to better match the cost of liabilities with the return on assets.

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[9] Similar conclusions for the UK market are presented in the Miles (2004) report. The Rebuilding Ireland Home Loan introduced to the market recently provides 30-year fixed rate mortgages at a 2 per cent rate.

For some households who are exposed to interest rate increases, fixing may not be possible either due to financial circumstances or the fact that they continue to hold tracker rates which are lower than the current market-provided fixed rate options. In these circumstances, providing sufficient and timely information to households of the likely changes to payments when rates rise would be useful and allow them to plan accordingly.

Finally, policies to prevent any future build-up of vulnerabilities through the excess supply of mortgage credit at the household level must remain an accepted, long-term feature of the Irish market. In particular, the loan-to-income restriction introduced in January 2015 as part of the Central Bank's macro-prudential mortgage market measures is a vital part of the financial stability architecture. The use of guidelines on interest rate stress testing by the banking sector on loan applications such as the 2 per cent stress test on short-term fixation and variable products in the Consumer Protection Code are important to limit any loosening of bank credit conditions outside the current macroprudential framework.

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