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Research Report

Quarterly Economic Commentary, Summer 2016

ESRI Forecasting Series

Provided in Cooperation with:

The Economic and Social Research Institute (ESRI), Dublin

Suggested Citation: Duffy, David; McQuinn, Kieran; Morley, Ciara; Foley, Daniel (2016) : Quarterly Economic Commentary, Summer 2016, ESRI Forecasting Series, ISBN 978-0-7070-0404-4, The Economic and Social Research Institute (ESRI), Dublin

This Version is available at:

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Quarterly Economic Commentary

**David Duffy
Kieran McQuinn
Ciara Morley
Daniel Foley**

Summer 2016



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The forecasts in this *Commentary* are based on data available by 14 June 2016.
Draft completed 14 June 2016.

Special Articles

A subscription to the *Quarterly Economic Commentary* costs €327 per year,
including VAT and postage.

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The *Quarterly Economic Commentary* has been accepted for publication by the Institute, which does not itself take institutional policy positions. It has been peer reviewed by ESRI research colleagues prior to publication. The authors are solely responsible for the content and the views expressed.

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Summary Table

	2013	2014	2015	2016	2017
Output (Real Annual Growth %)					
Private Consumer Expenditure	-0.3	2.0	3.5	4.0	3.5
Public Net Current Expenditure	1.4	4.6	-0.8	1.0	1.0
Investment	-6.6	14.3	28.2	21.1	21.9
Exports	2.5	12.1	13.8	8.9	7.9
Imports	0.0	14.7	16.3	12.0	11.9
Gross Domestic Product (GDP)	1.4	5.2	7.8	4.6	4.2
Gross National Product (GNP)	4.6	6.9	5.7	4.8	4.3
Prices (Annual Growth %)					
Consumer Price Index (CPI)	0.5	0.2	-0.3	0.8	1.0
Growth in Average Hourly Earnings	-0.8	1.6	2.0	2.3	2.3
Labour Market					
Employment Levels (ILO basis (000s))	1,880	1,914	1,964	2,009	2,046
Unemployment Levels (ILO basis (000s))	282	243	204	172	152
Unemployment Rate (as % of Labour Force)	13.1	11.3	9.5	7.9	6.9
Public Finance					
General Government Balance (€ bn)	-10.2	-7.6	-4.9	-2.3	-0.2
General Government Balance (% of GDP)	-5.8	-4.1	-2.3	-1.0	-0.1
General Government Debt (% of GDP)	123.2	109.7	93.6	86.4	80.2
External Trade					
Balance of Payments Current Account (€ bn)	5.6	6.8	9.5	11.0	6.8
Current Account (% of GNP)	3.1	3.6	4.4	4.8	2.7
Demand					
Final Demand	0.9	9.4	11.9	8.3	8.3
Domestic Demand	-1.2	5.7	9.3	7.5	8.9
Domestic Demand (excl. Stocks)	-1.5	5.2	8.6	8.3	8.9

National Accounts 2015

A: Expenditure on Gross National Product

	2014	2015	Change in 2015		
	€ bn	€ bn	Value	Price	Volume
Private Consumer Expenditure	89.0	92.4	3.8	0.4	3.5
Public Net Current Expenditure	27.2	27.9	2.3	3.1	-0.8
Gross Fixed Capital Formation	36.5	47.2	29.4	0.9	28.2
Exports of Goods and Services	215.0	260.6	21.2	6.5	13.8
Physical Changes in Stocks	1.9	2.7			
Final Demand	369.6	430.7	16.6	4.1	11.9
less:					
Imports of Goods and Services	180.3	215.7	19.6	2.9	16.3
Statistical Discrepancy	-0.2	-0.2			
GDP at Market Prices	189.3	215.0	13.6	5.5	7.7
Net Factor Payments	-26.2	-31.7			
GNP at Market Prices	162.9	183.1	12.4	6.4	5.7

B: Gross National Product by Origin

	2014	2015	Change in 2015	
	€ bn	€ bn	€ bn	%
Agriculture	3.4	3.4	0.0	1.0
Non-Agriculture: Wages, etc.	70.0	73.4	3.3	4.8
Other	68.4	88.8	20.4	29.8
Adjustments: Stock Appreciation	-0.3	-0.3		
Statistical Discrepancy	0.2	0.2		
Net Domestic Product	141.9	165.6	23.7	16.7
Net Factor Payments	-26.2	-31.7	-5.5	21.0
National Income	115.7	133.9	18.3	15.8
Depreciation	29.3	30.0	0.7	2.3
GNP at Factor Cost	145.0	163.9	18.9	13.1
Taxes less Subsidies	17.9	19.2	1.3	7.4
GNP at Market Prices	162.9	183.1	20.3	12.4

C: Balance of Payments on Current Account

	2014	2015	Change in 2015
	€ bn	€ bn	€ bn
X – M	34.8	44.9	10.1
F	-26.2	-31.7	-5.5
Net Transfers	-2.7	-2.9	-0.1
Balance on Current Account	5.9	10.4	4.5
as % of GNP	3.6	5.7	2.4

National Accounts 2016

A: Expenditure on Gross National Product

	2015	2016	Change in 2016		
	€ bn	€ bn	Value	Price	Volume
Private Consumer Expenditure	92.4	97.0	5.0	1.0	4.0
Public Net Current Expenditure	27.9	28.5	2.4	1.4	1.0
Gross Fixed Capital Formation	47.2	59.0	25.0	3.2	21.1
Exports of Goods and Services	260.6	293.6	12.7	3.5	8.9
Physical Changes in Stocks	2.7	1.0			
Final Demand	430.7	479.3	11.3	2.7	8.3
less:					
Imports of Goods and Services	215.7	247.6	14.8	2.5	12.0
Statistical Discrepancy	-0.2	-0.2			
GDP at Market Prices	215.0	231.7	7.7	3.1	4.5
Net Factor Payments	-31.7	-33.0			
GNP at Market Prices	183.1	198.4	8.4	3.4	4.8

B: Gross National Product by Origin

	2015	2016	Change in 2016	
	€ bn	€ bn	€ bn	%
Agriculture	3.4	3.5	0.1	2.5
Non-Agriculture: Wages, etc.	73.4	76.8	3.5	4.7
Other	88.8	100.8	12.0	13.5
Adjustments: Stock Appreciation	-0.3	-0.3		
Statistical Discrepancy	0.2	0.2		
Net Domestic Product	165.6	181.2	15.6	9.4
Net Factor Payments	-31.7	-33.0	-1.3	4.2
National Income	133.9	148.2	14.2	10.6
Depreciation	30.0	30.0	0.0	0.0
GNP at Factor Cost	163.9	178.2	14.2	8.7
Taxes less Subsidies	19.2	20.3	1.1	5.6
GNP at Market Prices	183.1	198.4	15.3	8.4

C: Balance of Payments on Current Account

	2015	2016	Change in 2016	
	€ bn	€ bn	€ bn	
X – M	44.9	46.1	1.2	
F	-31.7	-33.0	-1.3	
Net Transfers	-2.9	-2.9	0.0	
Balance on Current Account	10.4	10.2	-0.2	
as % of GNP	5.7	5.1	-0.1	

National Accounts 2017

A: Expenditure on Gross National Product

	2016	2017	Change in 2017		
	€ bn	€ bn	Value	Price	Volume
Private Consumer Expenditure	97.0	101.4	4.5	1.0	3.5
Public Net Current Expenditure	28.5	29.1	2.1	1.1	1.0
Gross Fixed Capital Formation	59.0	73.8	24.9	2.5	21.9
Exports of Goods and Services	293.6	325.5	10.8	2.7	7.9
Physical Changes in Stocks	1.0	2.0			
Final Demand	479.3	531.8	11.0	2.4	8.3
less:					
Imports of Goods and Services	247.6	282.2	14.0	1.8	11.9
Statistical Discrepancy	-0.2	-0.2			
GDP at Market Prices	231.7	249.6	7.7	3.3	4.3
Net Factor Payments	-33.0	-34.4			
GNP at Market Prices	198.4	214.9	8.3	3.8	4.3

B: Gross National Product by Origin

	2016	2017	Change in 2017	
	€ bn	€ bn	€ bn	%
Agriculture	3.5	3.6	0.1	3.5
Non-Agriculture: Wages, etc.	76.8	80.1	3.3	4.3
Other	100.8	113.8	13.0	12.9
Adjustments: Stock Appreciation	-0.3	-0.3		
Statistical Discrepancy	0.2	0.2		
Net Domestic Product	181.2	197.6	16.4	9.0
Net Factor Payments	-33.0	-34.4	-1.4	4.2
National Income	148.2	163.2	15.0	10.1
Depreciation	30.0	30.0	0.0	0.0
GNP at Factor Cost	178.2	193.2	15.0	8.4
Taxes less Subsidies	20.3	21.8	1.5	7.5
GNP at Market Prices	198.4	214.9	16.5	8.3

C: Balance of Payments on Current Account

	2016	2017	Change in 2017	
	€ bn	€ bn	€ bn	
X – M	37.5	33.2		-4.3
F	-32.0	-33.0		-1.0
Net Transfers	-2.7	-2.7		0.0
Balance on Current Account	2.8	-2.6	-5.3	
as % of GNP	1.5	-1.3		-2.7

The Irish Economy - Forecast Overview and Summary

Mainly due to domestic sources of growth, the Irish economy is still set to grow significantly in 2016. By May 2016 overall taxation receipts were up 9 per cent on the same time last year with income tax witnessing a 6 per cent increase over the same period. Between Q1 2015 and Q1 2016 total employment grew by almost 50,000. However, the weakening contribution of net trade to economic growth is underscored by recent high frequency economic data suggesting that the global slowdown in world trade may be impacting negatively on the Irish traded sector. Much of this is inevitably related to the lower economic growth rates being experienced in the US and the UK in 2016 compared with recent years.

Overall, reflecting the less than expected contribution from net trade, we have reduced our annual growth rates downwards marginally to 4.6 and 4.8 per cent respectively for GDP and GNP in 2016. Our outlook for 2017 remains unchanged from the Spring *Commentary* with output expected to grow by just over 4 per cent next year.

The slowdown in the UK's economic performance is compounded by the uncertainty engendered by the upcoming 'Brexit' referendum. Most independent assessments of the implications of Brexit suggest an adverse outcome for the UK economy. This would have clear implications for the Irish economy which has seen the domestic economy benefit significantly from the UK's strong post-2010 economic performance.

One aspect of the economic relationship between Ireland and the UK is explored in a Special Article in this *Commentary* by Davies, Siedschlag and Studnicka (2016). The paper examines the attractiveness of Ireland and other EU countries to foreign direct investment (FDI) and finds that Ireland and the UK are perceived to be similar as alternative locations for FDI, in particular, by investors from outside the EU and in the services sector. The analysis indicates that maintaining cost competitiveness in the domestic economy is particularly important for Ireland's attractiveness to FDI.

The Programme for Government, which was published in May, addresses a number of key policy challenges. A significant amount of attention is devoted to the housing issue with commitments given to produce 25,000 new housing units per annum between now and 2020 with additional undertakings provided on the provision of social housing. A Special Article in this *Commentary* by Duffy, Foley and McQuinn (2016) examines the rate of Irish residential construction in a

European context and argues that in the absence of significant policy initiatives it will be a number of years before the domestic investment rate increases so as to meet the number of housing units currently required in the Irish economy. In its recommendations the paper echoes earlier research in the *Winter Commentary* by calling for the adoption of a site tax which incentivises landowners to release development land at a time when it is actually demanded.

The Programme for Government also calls for the presence of a vibrant banking sector with real competition in order to provide more choice to mortgage holders. It is likely however, that the recent legislation proposing to give the Central Bank of Ireland powers to regulate variable interest rates may act as a further disincentive to potential significant new entrants into the Irish market. It is likely that continued, and potentially greater, State involvement in the banking sector is acting as an impediment to increased competition being achieved.

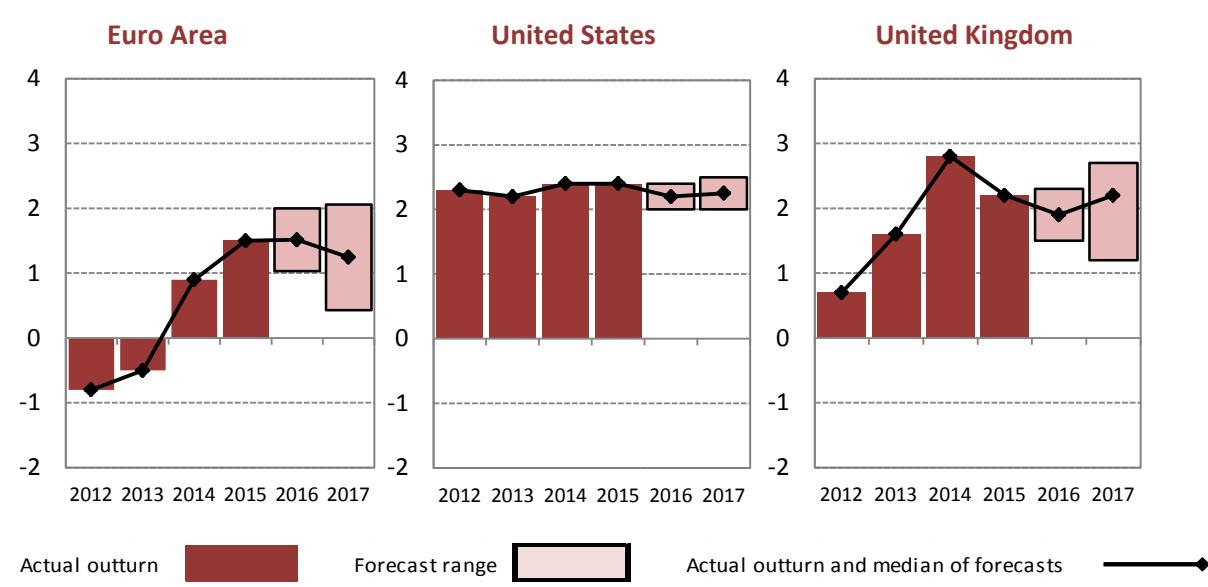
The commitment given in the Programme for Government to adhere to all domestic and EU fiscal rules is highly important; while there is a generally acknowledged need to re-invest in key public services, it is also important that this would take place within the parameters of the agreed fiscal space. It is also important that any sustained increases in government expenditure or reductions in taxation would not cause the domestic economy to overheat, particularly given the continued strong expected economic performance.

Finally, in anticipation of a number of public sector pay demands, we make two general points about any future wage agreements which take place. The first is the need for any such agreements to benchmark Irish unit labour costs with those of key comparator European economies. As a small open economy we cannot afford to undermine the recent hard won competitiveness of the domestic economy. The second point is the fiscal sustainability of potentially trading reductions in personal taxation rates against significant increases in pay. Given the recent experiences of the Irish fiscal position, such a policy option needs to be considered carefully.

The International Economy

Since the Spring *Commentary* there have been a number of revisions to real GDP growth predictions for Ireland's main trading partners. In Spring it was forecast, using data from FocusEconomics, that Euro Area GDP would grow by 1.6 per cent in 2016 and 1.7 per cent in 2017. In the second quarter both figures have been revised downward, most notably the 2017 forecast. Amid growing global uncertainty the Euro Area is now forecast to grow by 1.5 per cent in 2016 and 1.2 per cent in 2017. In spite of the uncertainty regarding a British exit from the European Union, growth forecasts for the UK in 2016 and 2017 have been revised upwards since the Spring *Commentary*. Real GDP is now anticipated to grow by 1.9 and 2.2 per cent in 2016 and 2017 respectively. The US is expected to register the strongest growth of the three trading partners with a growth rate of just over 2 per cent anticipated in each of the next two years. This is unchanged from our expectations in Spring.

FIGURE 1 Real GDP Growth (% Change, Year-on-Year)



Sources: FocusEconomics, IMF, OECD, HM Treasury and Federal Reserve.

The Euro Area Economy

According to flash estimates from Eurostat, seasonally adjusted GDP rose by 0.6 per cent in the Euro Area and by 0.5 per cent in the European Union during the first quarter of 2016 compared to the final quarter of 2015. In the fourth quarter of 2015, GDP grew by 0.3 and 0.4 per cent respectively. Compared to Q1 2015, seasonally adjusted GDP rose by 1.6 per cent in the Euro Area and by 1.7 per cent in the European Union in the first quarter of 2016.

Euro Area inflation was -0.2 per cent in April 2016, down from 0.0 per cent in March and compares to a rate of 0.0 per cent in April 2015. Annual inflation in the European Union was also -0.2 per cent in April. Compared with March 2016, annual inflation fell in 13 Member States, remained stable in seven and rose in eight. In all, negative annual rates were recorded in 17 Member States.

Inflation forecasts for the Euro Area remain stubbornly low in spite of the mix of low or negative interest rates and quantitative easing. The European Commission forecast inflation of 0.2 per cent in 2016 is significantly below the European Central Bank's (ECB) target of 2 per cent. In May the European Commission noted that high levels of public and private debt, vulnerabilities in the financial sector and declining competitiveness remain some of the biggest problems for the Euro Area. Similarly, a report published by the European Court of Auditors in April found that EU rules, which were tightened during the financial crisis, have not proved fully effective in reducing debts and encouraging reforms across the EU.¹ The Commission believes that growth and inflation will remain weak unless governments complement the loose monetary policy with reforms of labour and product markets. Of course, while structural reforms may enhance growth prospects as noted by McQuinn and Whelan (2015)² they will not, in themselves, bring about sustained increases in European economic activity.

HICP inflation in April stood at -0.2 per cent on a year-on-year basis. The deceleration continues to be driven by low energy prices. Consumer price inflation excluding energy remains positive in 2016 ranging from 0.7 per cent recorded in April to 1 per cent recorded in both January and March. As noted in previous *Commentaries*, despite its drag on annual inflation, lower oil prices will continue to support domestic consumption growth through the positive impact on household personal disposable income.

In early June the ECB nudged up its expectations for growth and inflation in the Euro Area for 2016. It upgraded its Eurozone growth forecast to 1.6 per cent this year from the 1.4 per cent it predicted in March and maintained its forecast of 1.7 per cent for 2017.

In March the ECB cut its main interest rate from 0.05 per cent to 0 per cent in an attempt to further stimulate inflation across the Euro Area. The programme of quantitative easing also continues with a monthly bond-buying programme worth €80 billion. The ECB refrained from any further announcements of a stimulus

¹ See www.eca.europa.eu/Lists/ECADocuments/SR16_10/SR_EDP_EN.pdf.

² McQuinn, K. and K. Whelan (2015). 'Europe's Long-Term Growth Prospects: With and Without Structural Reforms', ESRI Working Paper No. 501.

following their June meeting until the new measures have been given time to feed through to the real economy. As noted in the Spring *Commentary* the long-term effects of these strategies need to be considered. For example, ECB bond purchases are distorting the market for Eurozone government debt. It is expected that if the ECB's bond-buying continues at its current rate, the ECB and national central banks will own over 25 per cent of the entire Eurozone government bond market by the first half of 2017.

The Euro Area seasonally adjusted unemployment rate was 10.2 per cent in March 2016, down from 10.4 per cent in February 2016 and from 11.2 per cent 12 months previous. This is the lowest rate recorded in the Euro Area since August 2011. In the European Union the unemployment rate was 8.8 per cent in March 2016 down from 9.7 per cent in March 2015. Amongst the Member States, the lowest rates in March 2016 were recorded in the Czech Republic and Germany, 4.1 and 4.2 per cent respectively. Compared with a year ago, the unemployment rate fell in 25 Member States and increased marginally in three. The fall in the overall rate continues to mask continued deep problems in individual Member States. Greece, for example, continues to have the highest unemployment in the Euro Area at 24.4 per cent. Similarly, Spain, which has enjoyed a recovery in economic growth, continues to struggle with a stubbornly high unemployment rate of 20.4 per cent.

The US Economy

Real GDP increased at an annual rate of 0.8 per cent in the first quarter of 2016, according to the second estimate released by the Bureau of Economic Analysis. In the fourth quarter of 2015, real GDP increased by 1.4 per cent. The upward revision to the first quarter GDP estimate, from 0.5 per cent, reflected a surge in spending on home building and a steady increase in inventory investment by businesses. However, it remains the weakest performance since Q1 2015.

Overall, the US economy continues to be squeezed by a strong Dollar, sluggish global demand and low oil prices. On a technical level, there are concerns that the model used by the US government to strip out seasonal patterns from data is not fully accomplishing its goals despite steps to address the problem in 2015. Slow first quarters followed by a rebound have been common in recent years. In Q1 2014, GDP was -0.9 per cent before jumping to 4.6 per cent in Q2. Similarly in the first quarter of 2015 GDP growth was 0.6 per cent with a jump to 3.9 per cent recorded in the second quarter. The 'GNPNow' model³ used by Federal Reserve Bank of Atlanta, for example, forecasts real GDP growth in Q2 2016 of 2.9 per cent.

³ See www.frbatlanta.org/cqer/research/gdpnow.aspx?panel=1 for more information.

We noted this anomaly in the Summer *Commentary* in 2015 citing research from the Federal Reserve Banks of San Francisco and Philadelphia⁴ which both find that, even after the Bureau of Economic Analysis performs seasonal adjustment in producing the National Accounts, there remains residual seasonality. In spite of this phenomenon we continue to believe that annual growth in the US will be 2 per cent in both 2016 and 2017.

Aside from the issues with seasonality there remain concerns for US growth levels given recent Purchasing Managers' Index (PMI) data which suggest possible soft economic growth in the second quarter of the year. Markit's flash services PMI estimate for May fell to 51.2 from 52.8 in the previous month while the flash manufacturing PMI for May stood at 50.5. On the index, a reading above 50.0 indicates expansion, below indicates contraction. Although services make up approximately 80 per cent of the US economy, manufacturing could act as a drag on second quarter growth.

Total non-farm payroll employment increased marginally by 38,000 in May leading to a small decline of 0.3 per cent in the unemployment rate to 4.7 per cent. Both the unemployment rate and the number of persons unemployed had changed little between August 2015 and April 2016 with the US adding roughly 200,000 new jobs per month for the past two years. These recent figures indicate that the US created the fewest number of jobs in more than five and a half years in May with the increase being the smallest gain since September 2010. Revisions to payroll counts from February to April have also been disappointing. Underscoring the weakness reported in May, employers hired 59,000 fewer workers in March and April than previously reported.

Aside from the official employment rate, also known as the 'U-3' number,⁵ other metrics tend to provide a more nuanced view of employment. A broader figure is the U-6 rate, which is established as a more accurate portrayal of the employment situation. The U-6 rate is defined as all unemployed as well as persons marginally attached to the labour force, plus total employed part-time for economic reasons, as a percentage of the labour force. This means that the unemployed, the underemployed and the discouraged are all represented. As of May 2016 the U-6 rate in the US stands at 9.7 per cent, down from 10.7 per cent 12 months previous. Despite the improvement that government statistics shows,

⁴ Rudebusch, G. D., D. Wilson and T. Mahedy (2015). 'The Puzzle of Weak First-Quarter GDP Growth', Federal Reserve Bank of San Francisco Economic Letter.

Stark, T. (2015). 'First Quarters in the National Income and Product Accounts', Federal Reserve Bank of Philadelphia Special Report.

⁵ See www.bls.gov/lau/stalt.htm for more information.

the labour force participation rate remains sluggish with a fall 0.2 of per cent in May leaving the rate at 62.6 per cent. There is still no consensus on why the participation rate continues to fall.⁶

The Federal Open Market Committee (FOMC) is expected to announce another interest rate hike in the coming months, however, there is uncertainty regarding whether the hike will occur sooner rather than later in the year. The Federal Reserve chair acknowledged that the economy is continuing to improve despite the weak growth reported in the first quarter. Given the economic outlook, the FOMC has maintained the target range for the federal funds rate at 0.25 to 0.5 per cent. It also warned against raising interest rates too steeply as the Federal Reserve has limited tools to respond to another economic crisis.

The UK Economy

Gross Domestic Product in the UK is estimated, by the Office of National Statistics (ONS), to have increased by 0.4 per cent in Q1 2016 compared with growth of 0.6 per cent in Q4 2015. This is the thirteenth consecutive quarter of positive growth since Quarter 1 2013. Between Q1 2015 and Q1 2016, GDP in volume terms increased by 2 per cent, revised down 0.1 per cent from the preliminary estimate.

In Q4 2015 and Q1 2016, the number of people in work increased, the number of unemployed people was little unchanged, but the number of people not working and not seeking or available to work (economically inactive) fell. The current employment rate of 74.2 per cent is the highest since comparable records began in 1971. The unemployment rate was 5.1 per cent in Q1 2016, unchanged compared with the final quarter of 2015 but 0.5 per cent lower than a year earlier. Annual pay growth excluding bonuses slowed marginally to 2.1 per cent from 2.2 per cent in the three months through February 2016. Total pay inflation edged up to 2 per cent from 1.9 per cent over the same period.

Labour productivity remains very sluggish in spite of the employment and unemployment figures. UK labour productivity as measured by output per hour fell by 1.2 per cent from the third to the fourth quarter of 2015 and was some 14 per cent below an extrapolation based on its pre-downturn trend. By contrast, output per worker and output per job were both broadly unchanged between Q3 and Q4 2015. On all three measures, labour productivity was about one half per cent higher in Q4 2015 than in the same quarter of 2014. Sluggish productivity levels are more of an issue on the manufacturing side of the economy. Output per hour in services fell by 0.7 per cent on the previous quarter but was 1.1 per

⁶ Williams, J.C. (2015). ‘Dancing Days Are Here Again: The Long Road Back to Maximum Employment’, Federal Reserve Bank of San Francisco, Economic Letter, 2015-36.

cent higher than Q4 2014 while output per hour in manufacturing fell by 2 per cent on the previous quarter and was 3.4 per cent lower than a year earlier. Despite some study in this area, as yet there is no consensus on the reasons behind this productivity puzzle.⁷

The Consumer Price Index (CPI) rose by 0.3 per cent in the year to April 2016, down from 0.5 per cent in the year to March and far below the target set by the Bank of England of 2 per cent. From late 2015, the rate began to increase gradually from close to zero. The drop in April 2016 is the first fall since September 2015. Inflation has been below 1 per cent since December 2014, providing respite for UK households as prices rise at a slower rate than pay following six years of real wage falls during the financial crisis. Core inflation, which strips out volatile energy and food prices, was also weaker than expected at 1.2 per cent, down from 1.5 per cent in March. It is likely that weak inflation will strengthen the case for the Bank of England to keep UK interest rates at an all-time low of 0.5 per cent.

The Bank of England's Monetary Policy Committee (MPC) maintained a Bank Rate of 0.5 per cent and kept the size of the Asset Purchase Programme at £375 billion following their most recent meeting in May 2016. Given the likely persistence of the headwinds weighing on the economy, when the interest rate does increase it is likely that the Bank of England will do so more gradually than in recent cycles. The MPC clearly states that the most significant risk to their forecast is the Brexit referendum. A vote to leave the EU could materially alter the outlook for output and inflation and, therefore, the appropriate setting of monetary policy.

Polls continue to show a dead heat between the leave and stay campaigns. YouGov note that for most of the campaign their regular polls have shown little movement, with normal volatility around a race that appears to be neck-and-neck. Sterling's value has become increasingly volatile as fears of Brexit have increased. The Sterling volatility index which charts the daily swings in the Pound's value has risen to its highest level of volatility since the first quarter of 2009. It is also double the level seen in April 2016 when the remain campaign commanded a more prominent lead in the polls.

⁷ Riley, R., C. Rosazza Bondibene and G. Young (2015). 'The UK Productivity Puzzle 2008-2013: Evidence from British Businesses', National Institute of Economic and Social Research, Discussion Paper, Number 450, 31 May 2015. Pessoa, J.P. and J. Van Reenan (2014). 'The UK Productivity and Jobs Puzzle: Does the Answer Lie in Wage Flexibility?', *The Economic Journal*, Vol. 124(576): 433-452.

Bryson, A. and J. Forth (2015). 'The UK's Productivity Puzzle', Occasional Paper 45, Centre for Economic Performance.

Several studies have highlighted the negative impact that a potential Brexit could have on the UK, Ireland and the Euro Area. Armstrong (2016)⁸ and Portes (2016),⁹ for example, note that, if there were to be a Brexit, shifting to a free trade agreement would not be a minor matter. It would be uncharted territory, likely to result in significant changes to the structure of the UK economy, particularly in respect to the tradable services sectors. Additional research from the British Treasury¹⁰ documents that a movement towards an alternative trade model (e.g. EEA or WTO) in the event of a Brexit would leave the UK permanently poorer, with productivity and GDP per person lower in all alternative scenarios.

The World Economy

Global growth forecasts for 2016 continue to be revised downward in light of increasing uncertainty and downside risks. In mid-2015, the International Monetary Fund (IMF) *World Economic Outlook* forecast growth in 2016 of 3.8 per cent. This was revised downward in their January 2016 forecast to 3.4 per cent. In their most recent April 2016 forecast the growth rate has been revised downward by a further 0.2 per cent to 3.2 per cent. The downward revision is the fourth straight cut in a year, putting world economic growth just marginally above last year's 3.1 per cent and only 0.2 per cent above the rate the IMF has previously considered a technical global recession. The IMF cites the impact on emerging markets of China's slowdown and weak commodity prices as the main reasons for the downward revisions but also acknowledges the negative impact from developed countries which are still struggling to escape the legacies of the financial crisis.

The key downside risks to global growth continue to be Brexit, emerging market economies (EMEs) financial vulnerabilities and increased financial market volatility. The ECB¹¹ states that the slowdown in EMEs has been broad-based, with growth in 21 of the 23 largest EMEs lower, on average, in the past three years than before the global financial crisis. Because EMEs play an important role in driving the global economy a stronger emerging market slowdown would therefore weigh on global and Euro Area growth. Weakness in the external environment together with moderating growth in China have dampened economic activity in EMEs as a consequence.

Data in the first six months of 2016 suggest continuing challenges for the Chinese economy. China's official PMI for the manufacturing sector remained unchanged

⁸ See <http://ner.sagepub.com/content/236/1/31.full.pdf>.

⁹ See <http://ner.sagepub.com/content/236/1/14.full.pdf>.

¹⁰ See www.gov.uk/government/uploads/system/uploads/attachment_data/file/517415/treasury_analysis_economic_impact_of_eu_membership_web.pdf.

¹¹ See https://www.ecb.europa.eu/pub/pdf/other/eb201505_focus01.en.pdf.

at 50.1 in May – the third successive positive figure after seven months of contraction between August 2015 and February 2016. The PMI for the non-manufacturing sector remains above 50.0 in May 2016 but edged down marginally on the April figure. With export demand continuing to slow, the Chinese economy reported a fall in growth to 6.7 per cent in the first quarter of this year, from 6.9 per cent – its lowest in 25 years – in 2015. China has a growth target of at least 6.5 per cent for 2016.

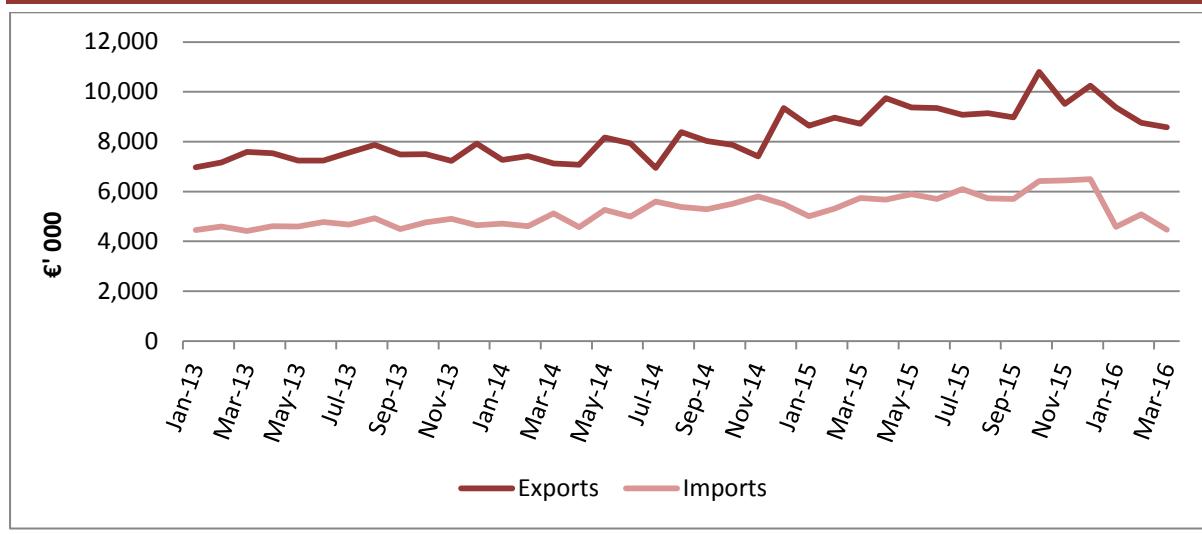
The issues with China, EMEs, oil prices and a potential Brexit are also having an impact on stock market volatility globally. At the start of the year the S&P 500 had its worst start to a year since the Great Depression. While there was a marginal recovery in the following couple of months there has been a return to volatility in more recent weeks. In January, the S&P 500 was down as much as 11.3 per cent on the year while the CBOE Volatility Index (VIX)¹² was above 32. At the end of May, the stock index was down only fractionally on the year-to-date while the VIX lay around 17, up from the 12.5 recorded in April. Underpinning the uncertainty in 2016 has been speculation about the pace at which the Federal Reserve will raise interest rates. Stock markets globally, including Germany and Japan, have followed a similar trend in recent months.

For the first time since November 2015 the price of a barrel of oil broke through \$50 in late May. Initial forecasts from the beginning of the year suggested that the price of Brent Crude oil would remain below \$50 through 2016 amid a lack of oil supply and concern over the Chinese economy, the world's second-biggest consumer of oil. A series of production outages from Canada and Nigeria in the past six months have helped to reduce the gap between supply and demand and, thus, increase the price. In early June, the Organization of the Petroleum Exporting Countries (OPEC) refrained from changing its oil output policy meaning no new production ceiling was agreed. Brent Crude oil prices dipped slightly to \$48.95 in response to the news.

Implications for Irish Exports, Imports and the Balance of Payments

Imports and Exports data released by the Central Statistics Office (CSO) indicate a slowdown in the value of goods exports and imports in recent months. Figure 2 shows that there has been a slight dip in the value of both goods exports and imports in January, February and again in March. The reduction in exports in particular is partially a result of the relative appreciation of the Euro against Sterling since the start of the year as a result of increasing uncertainty regarding Britain's future as a member of the European Union.

¹² The CBOE Volatility Index (VIX) is a key measure of market expectations of near-term volatility conveyed by S&P 500 stock index option prices.

FIGURE 2 Seasonally Adjusted Goods Exports and Imports

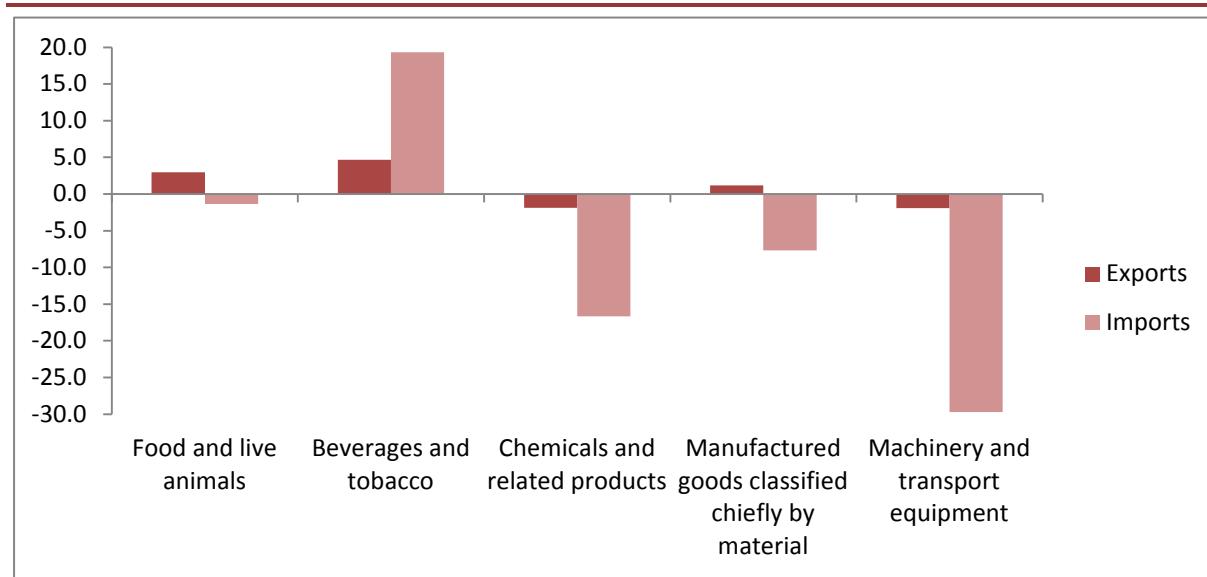
Source: Central Statistics Office.

Looking at data for March 2016, the seasonally adjusted value of goods exports is €8,571 million compared to €8,752 million a month earlier, a change of -2.0 per cent. There has also been a decline in seasonally adjusted goods imports, falling by €619 million or 12 per cent over the previous month. Seasonally adjusted goods exports and imports figures are also down compared to March last year by 1.6 and 22.2 per cent respectively indicating that the global slowdown in trade may be beginning to impact Ireland. The resulting impact on the trade surplus was to increase it by €439 million or 12 per cent in the month to March 2016.

Breaking down goods exports into the relevant components, we see that medical and pharmaceutical products account for the largest proportion of goods exports at approximately 25 per cent. The values of medical and pharmaceutical exports did, however, decrease in the year to March 2016. In particular, there was a decrease of €299 million or 11 per cent compared to March 2015. Other notable changes include exports of electrical machinery, apparatus and appliances which increased by €320 million or 124 per cent and exports of office machines and automatic data processing machines falling by €69 million or 16 per cent. Looking at some of the changes in goods imports reveals that imports of organic chemicals decreased by €100 million or 26 per cent in the year to March. There was also a large drop in imports of machinery specialised for particular industries, falling by 65 per cent or €207 million. If we exclude the volatile component consisting of aircraft, we get a smaller decrease of 12 per cent in goods imports between March 2015 and March 2016.

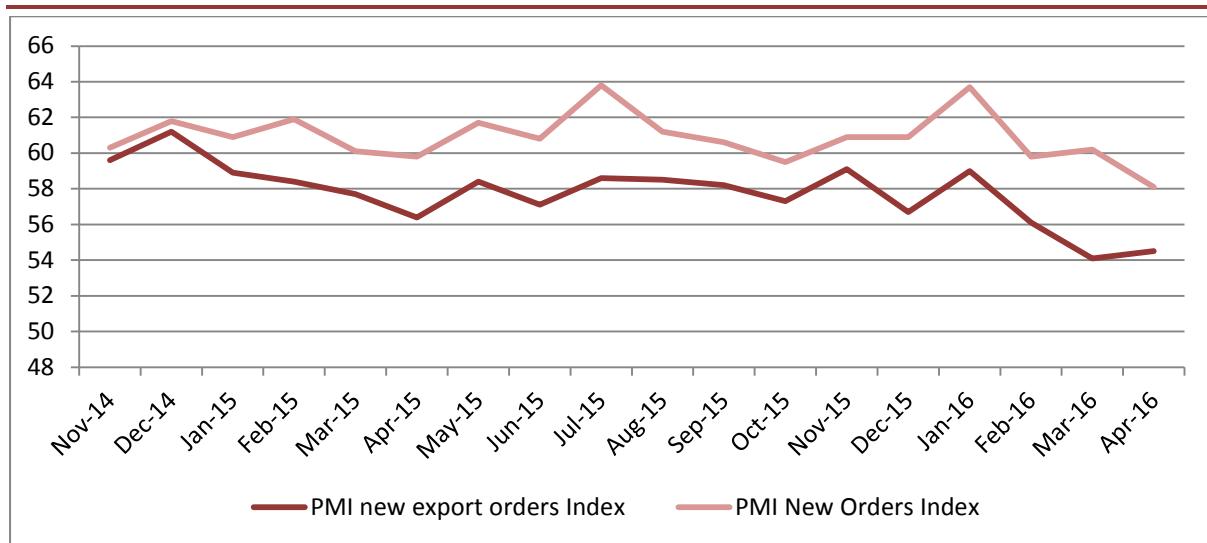
In Figure 3 we show the growth rates in the value of goods exports and imports for selected trading sectors. The slowdown in trade is evident from the Figure. While there are increases in certain sectors over the year such as exports of food and live animals increasing approximately 3 per cent, manufactured goods of 1.1 per cent and beverages and tobacco of 4.7 per cent, there are significant reductions in the value of certain imports. The Figure highlights the volatile nature of certain traded sectors of the economy. For example, a large proportion of the 30 per cent fall in the value of imports in the machinery and transport equipment category can be attributed to aircraft. As well as this, the volatility of the pharmaceutical industry is also highlighted with a 16.6 per cent decline in the value of imports in the chemicals and related products category. We also see a slowdown in trade if we look at high frequency indicators such as the PMI composite manufacturing index (Figure 4). The downward trend over the last number of months is evident and is another indicator that the overall growth rate in exports and imports may be lower in 2016 than previously thought.

FIGURE 3 Export and Import Growth in Selected Trading Sectors March 2015-March 2016 (%)



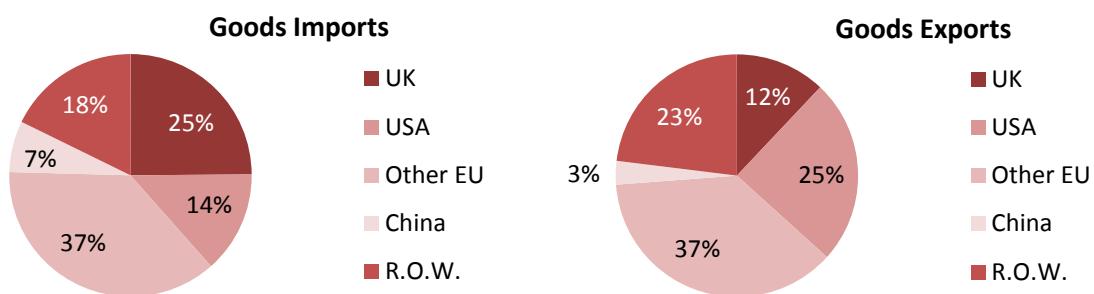
Source: Central Statistics Office.

In 2015, the Euro depreciated against the Pound, largely driven by the ECB's quantitative easing program. This gave Irish exporters a significant competitive advantage in the UK. More recently, the Euro has appreciated against the Pound driven mainly by capital outflows surrounding Brexit uncertainty. This has already caused a decline in trade between Ireland and the UK. More specifically, between April 2015 and April 2016 the value of goods exports and imports has fallen by approximately 8.5 and 9.4 per cent indicating that some of the implications of Brexit are already starting to emerge.

FIGURE 4 Purchasing Manufacturers Index (PMI)

Source: Markit.

The geographical breakdown of goods imports and exports (Figure 5) shows that the US and the UK are still our largest trading partners. The US accounts for about 25 per cent of our exports and approximately 14 per cent of our imports. Within the EU, Belgium accounts for the second largest proportion of goods exported largely as a result of activity in the pharmaceutical sector, which accounts for just over €1 billion of the €4,604 million total.

FIGURE 5 Seasonally Adjusted Goods Exports and Imports March 2016

Source: Central Statistics Office.

The outlook for services trade is less clear as most recent data only cover the period up to the end of 2015. Balance of Payments data for Q4 2015 indicated robust growth in services trade in 2015, with services exports increasing 15 per cent year-on-year. The majority of the growth was accounted for by growth in computer services of 17 per cent. There was also considerably more activity in the financial and business services, growing by 25 and 12 per cent respectively. Services imports also experienced strong growth over the same period, increasing

by 20 per cent, largely as a result of increased activity in the royalties and licenses component.

The biggest risk to the domestic trade outlook remains Brexit, with a largely negative outcome expected if the UK chooses to leave the EU. Were Brexit to occur, in the short run the most significant effect would be increased exchange rate volatility due to capital leaving the UK driven by investor uncertainty.

With recent data beginning to show signs that a global slowdown in trade is impacting Ireland, we expect that growth in both exports and imports will be lower than 2015; however, we still expect both series to grow over the forecast period. In particular, we expect growth in exports to be 8.9 per cent in 2016 and to grow a further 7.9 per cent in 2017. We also envisage import growth to outpace export growth at 12 per cent in 2016 and 11.9 per cent in 2017 as recent trends in consumer lending and increases in wages are expected to fuel high demand for imports over the period.

The Domestic Economy

Output

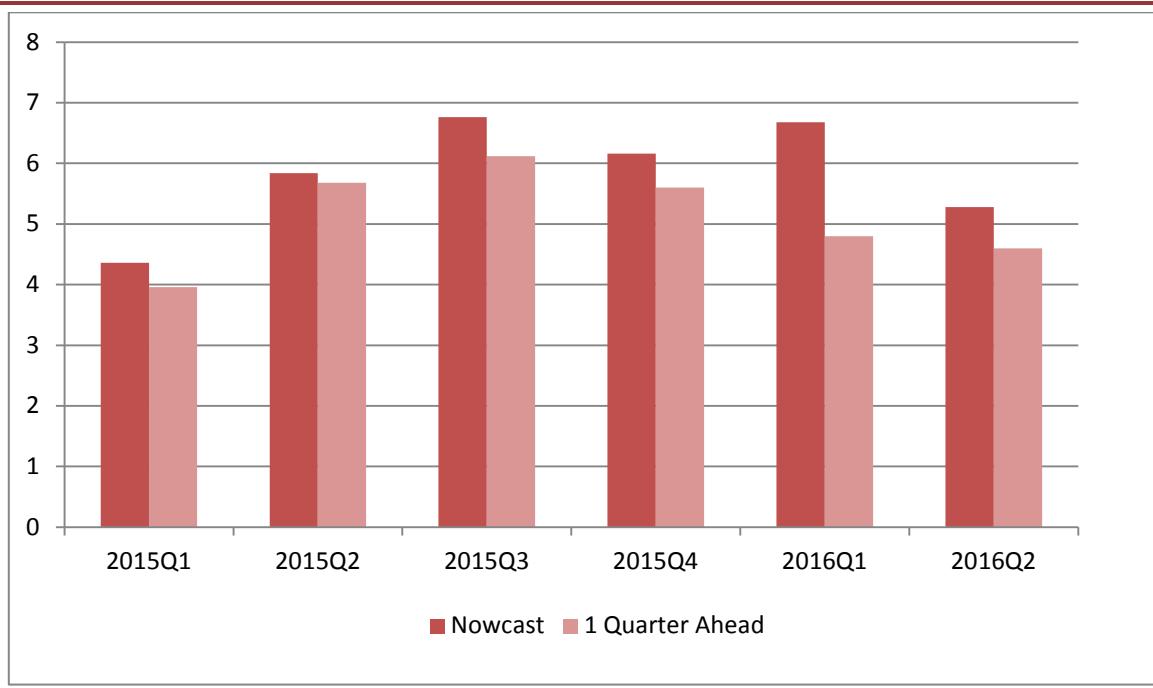
The domestic section of the *Commentary* is organised as follows; we initially review the outlook for output growth before discussing developments in the Irish monetary and financial sectors. Prices and earnings in the economy are then discussed, followed by a review of demand-side factors such as consumption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

We continue to believe that output in the Irish economy will grow significantly in both 2016 and 2017. As noted in the Spring *Commentary*, over the past year domestic sources of growth, investment and latterly consumption, have become increasingly central to Irish economic performance. The significance of the traded sector is expected to decline somewhat with net trade contributing negatively to growth in both 2016 and 2017. This marks quite a reversal from the earlier stages of the Irish recovery where net trade was the dominant factor.

High frequency data presented in the International section of the *Commentary* illustrate the degree to which the recent global slowdown in trade appears to be impacting on the export performance of Irish manufacturing and services firms. Therefore, we have modified downwards the contribution from the traded sector and have accordingly reduced marginally our growth forecast for 2016 to 4.6 and 4.8 per cent for GDP and GNP respectively. We continue to believe that the economy will grow by just over 4 per cent in 2017.

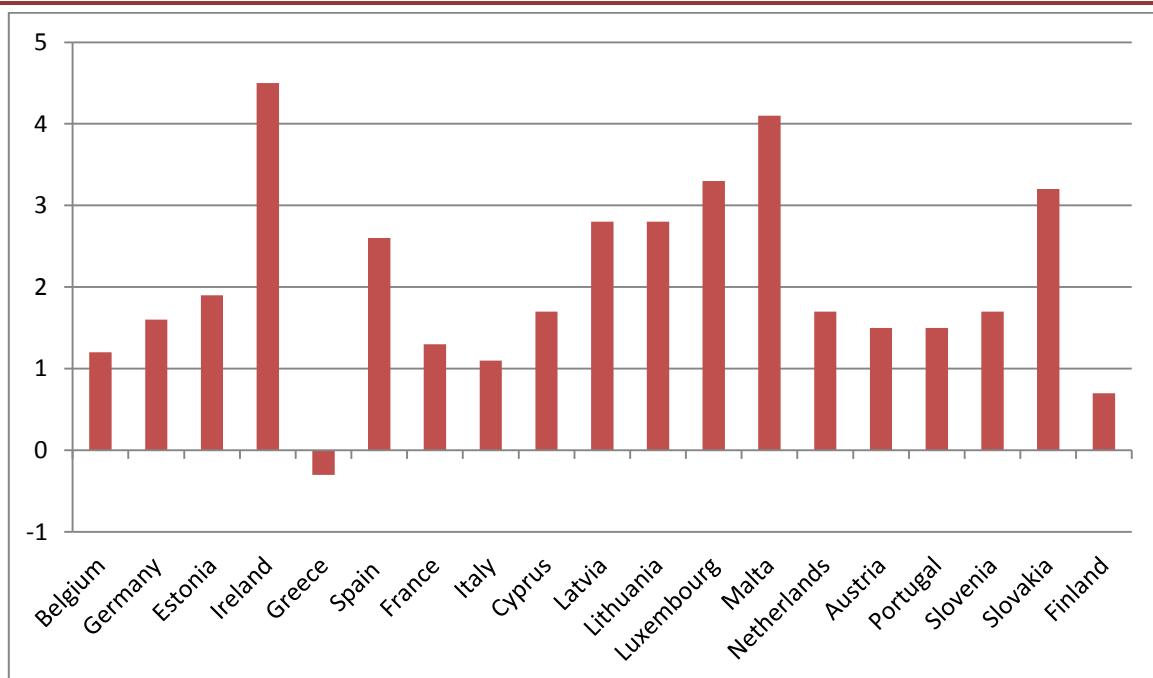
In Figure 6 we plot the annualised Nowcast and 1 quarter ahead forecast from the Nowcasting model since Q1 2015. This gives an indication of how the growth outlook for the Irish economy progressed through 2015 and into the first quarter of the present year. The chart suggests that, over this period, the Irish economy grew at its strongest rate in Q3 2015. It also suggests that, consistent with the high frequency trade data, the forecast outlook for the Irish economy is weakening albeit on a marginal basis.

The extent to which the continued slowdown in global trade impacts on the Irish economy will be one of the most important issues to warrant scrutiny over the coming quarters.

FIGURE 6 Nowcast and 1 Quarter Ahead Forecasts (%) from the Nowcasting Model: 2015 Q1-2016 Q2

Source: ESRI Nowcasting model.

Notwithstanding the marginal decline in the Irish outlook Ireland continues to register the strongest growth across Europe in 2016 (see Figure 7) based on the latest EU Commission outlook for Euro Area states.

FIGURE 7 2016 GDP Forecast (%) For European Union Countries

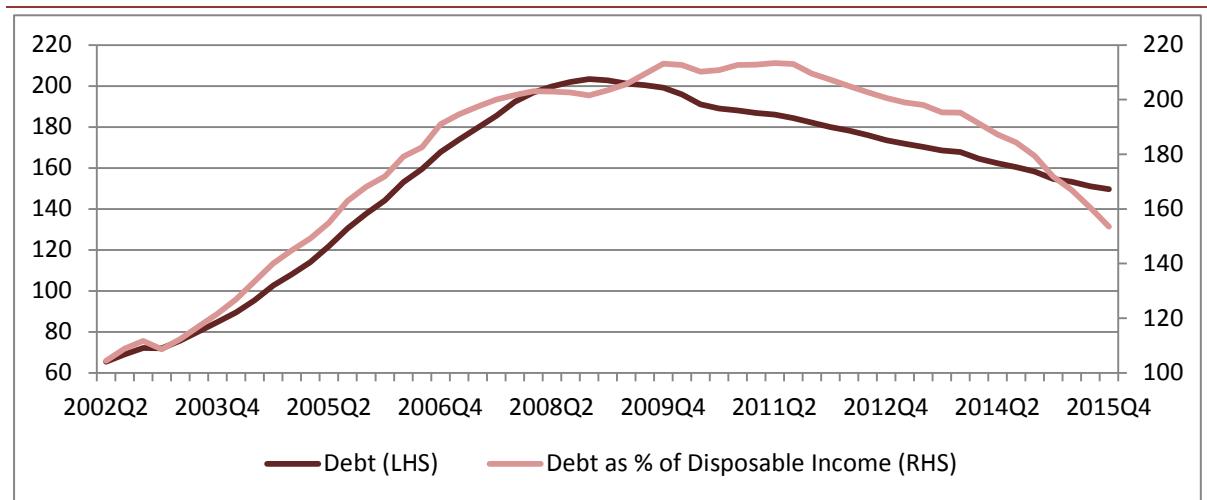
Source: QEC forecasts (Ireland), EU Commission (the remaining).

Monetary and Financial Conditions

The most recent Quarterly Financial Accounts for Q4 2015 released by the Central Bank shows a continuing improvement in household balance sheets. In particular, household debt decreased again in Q4 falling by €1.6 billion or 1.1 per cent. It now stands at €149.6 billion and represents a household debt per capita of €32,269. The fall reflects net debt repayments and debt write-downs/write-offs with a small positive contribution coming from reclassifications. This trend has emerged as a result of debt continuously declining for the last 29 quarters such that it now has fallen by 26.6 per cent since its peak of €203.7 billion in Q3 2008. The latest result marks the lowest level of household debt since Q1 2006.

Indicators of household debt sustainability also continue to improve with the latest Central Bank release. Debt as a proportion of disposable income fell over the quarter, from 159.8 per cent to 155.1 percent. This reflects both a decline in household debt as well as strong growth in annualised disposable income. As can be seen in Figure 8, the overall ratio of household debt has shown a marked improvement over the last couple of years and has fallen by 60.2 percentage points since its peak of 215.3 per cent in Q2 2011.

FIGURE 8 Irish Household Debt as % of GDP (2002-2015)



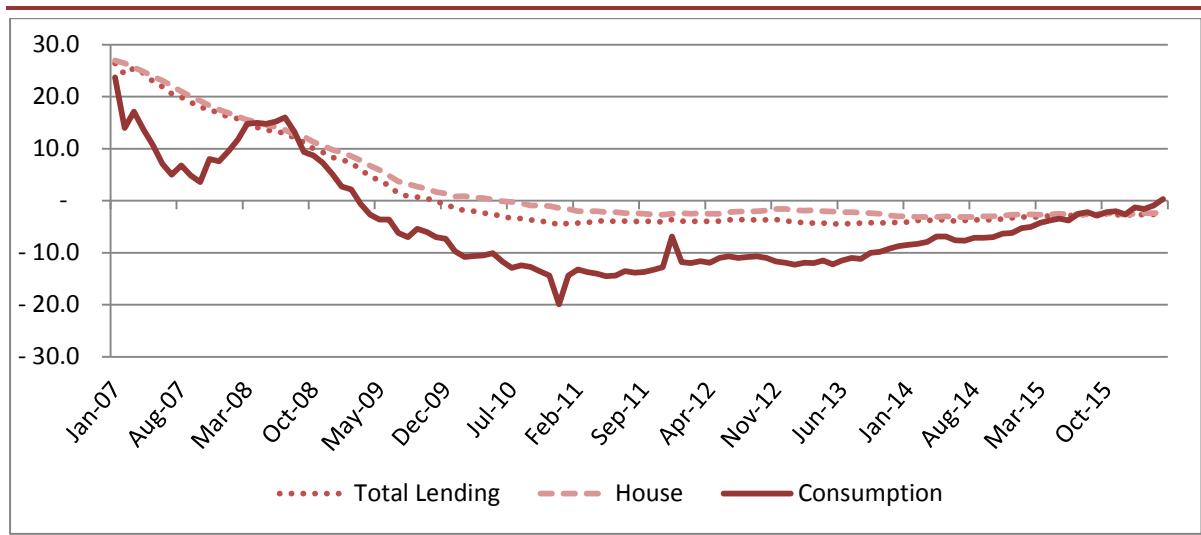
Sources: Central Statistics Office and Central Bank of Ireland.

Compared to other EU countries Ireland's household debt position is still relatively poor, ranking the third highest among the EU,¹³ however, the improvement in the Irish debt position in the last year has been the most significant. Over the year, Irish household debt fell by 21.5 percentage points while countries such as Spain and Portugal experienced declines in their debt positions of 6.1 and 4.6 percentage points respectively.

¹³ The high nature of Irish debt, while reflecting the relatively younger nature of the Irish population, is mainly attributable to the credit-fuelled property boom between 2003 and 2007.

Another factor contributing to the improvement in household circumstances is the increase in household net worth. Over the quarter, household net worth increased by 1.4 per cent to €626.1 billion, or €135,078 per capita. This was largely driven by a rise in housing asset values as well as a decline in household liabilities. Comparing household net worth to the post-crisis low of €444 billion in Q2 2012 shows it has risen by 41 per cent since then. This is still 12.8 per cent lower than its pre-crisis peak of €718 billion in Q2 2007.

FIGURE 9 Growth in Lending to Irish Households (%)

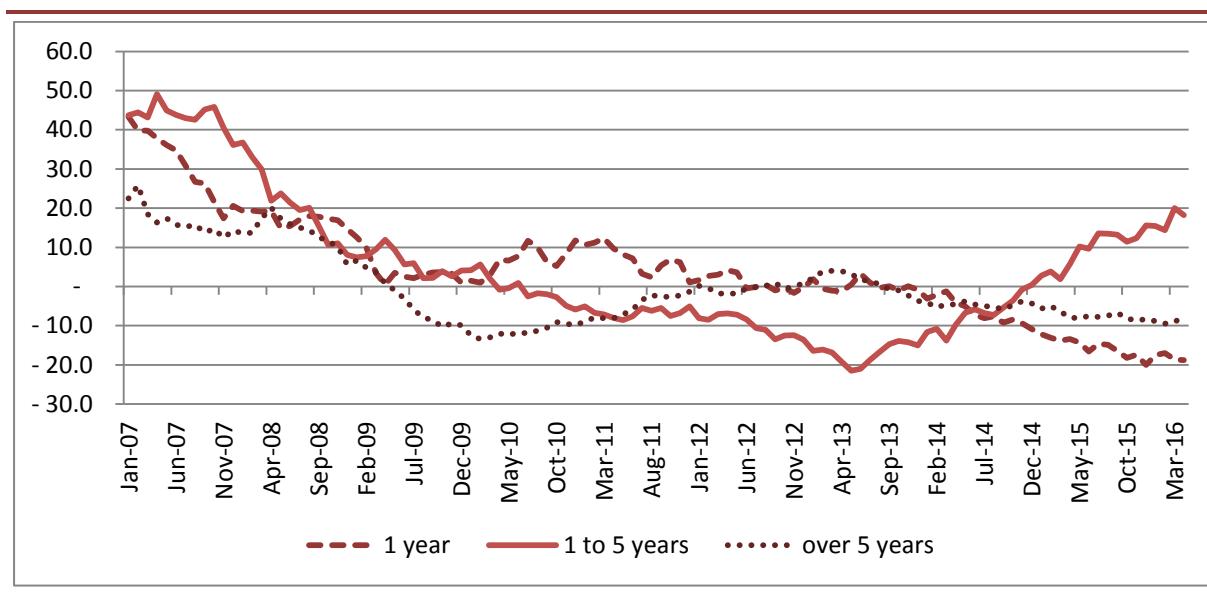


Source: Central Bank of Ireland.

As can be seen from Figure 9 growth rates in lending to Irish households have been negative for the last few years following the crisis. We do, however, see that the growth rates in all three categories have become less negative over the last year. With the latest release of the data, growth in new lending to Irish households for consumption purposes has become positive for the first time since February 2009, albeit at a modest 0.3 per cent. This growth in lending along with the improvement in household net worth underscores the increase in personal consumption we expect to see in 2016 and 2017.

Total lending to Non-Financial Corporations (NFCs) declined by 5.5 per cent in annual terms in April. Decomposing total loans by maturity reveals a difference in trends between short-, medium- and long-term loans. Figure 10 shows growth in lending to NFCs. Short-term and long-term loans appear to still be experiencing negative growth as seen in the previous *Commentary* while medium-term loans of between one and five years continue their upward trend, growing in annual terms by 18.2 per cent in April.

FIGURE 10 Year-on-Year Growth Rate (%) of Lending to Irish Resident Non-Financial Corporations: January 2007-April 2016



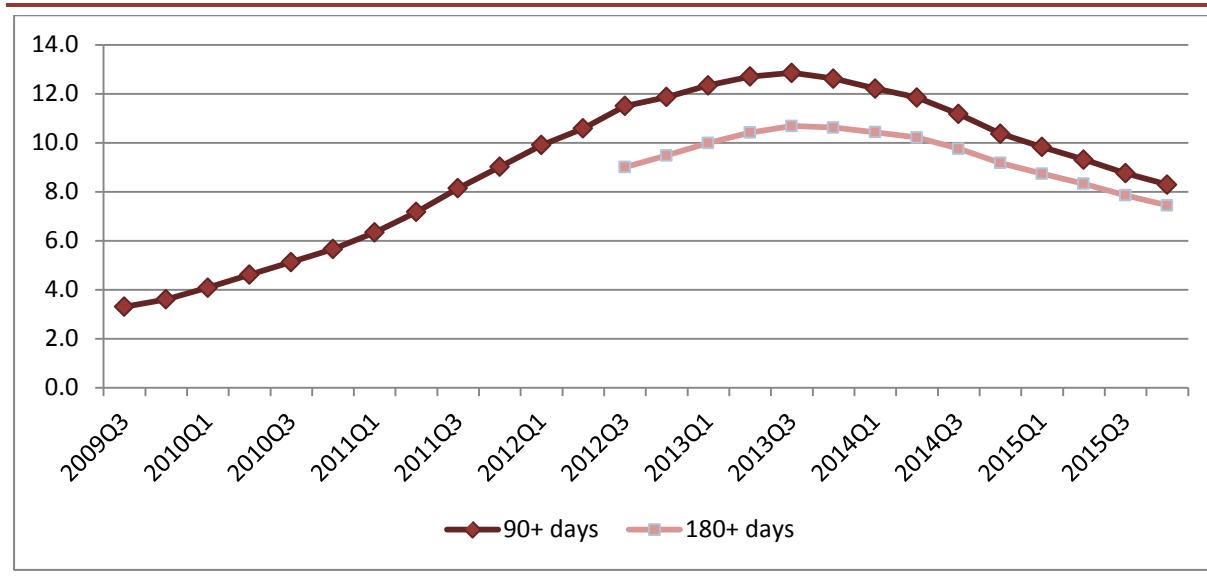
Source: Central Bank of Ireland.

The Central Bank's latest financial statistics release indicates that the majority of credit extended to NFCs is accounted for by small and medium enterprises. Given that many of these companies are indigenous, and given the relatively employment-intensive nature of these industries, increases in credit to SMEs has an important role to play in sustainable growth for the economy. Although the majority of credit is being extended to SMEs, it does not appear to be broadly based. In fact, the growth in credit extended to resident SMEs is negative for the majority of sectors. This negative annual growth in credit has been observed in the data since at least 2012 where nearly all sectors experienced negative growth rates. The latest data release shows that businesses within the information and communication sector, in particular, have been driving the pickup in credit over the last three quarters. If the pickup in credit became broader across a variety of sectors, we would likely see a further improvement in employment and the benefit to the economy would likely be much more robust and sustainable.

The mortgage arrears situation continued to improve in Q4 2015, according to recent Central Bank data. By December 2015, there were 746,618 private residential mortgage accounts for principal dwelling in Ireland with a total value of €101.6 billion. Of these, 88,292 accounts or 11.8 per cent were in arrears, a reduction of 4,069 or 4.4 per cent compared to the previous quarter. Figure 11 shows the proportion of mortgages in arrears of over 90 days and of over 180 days. A clear downward trend can be seen in both series from 2013 onwards with Q4 2015 data showing 61,931 or 8.3 per cent of accounts in arrears for over 90 days. This is the ninth consecutive quarter of decline and compares to 10.4 per cent in December 2014. A similar trend is observed for accounts in arrears of over 180 days. As of December 2015, 7.4 per cent of the total was over 180 days in

arrears, an improvement of approximately 1.8 percentage points compared to this time last year.

FIGURE 11 Select Mortgage Arrears Rates (%): Q3 2009-Q4 2015



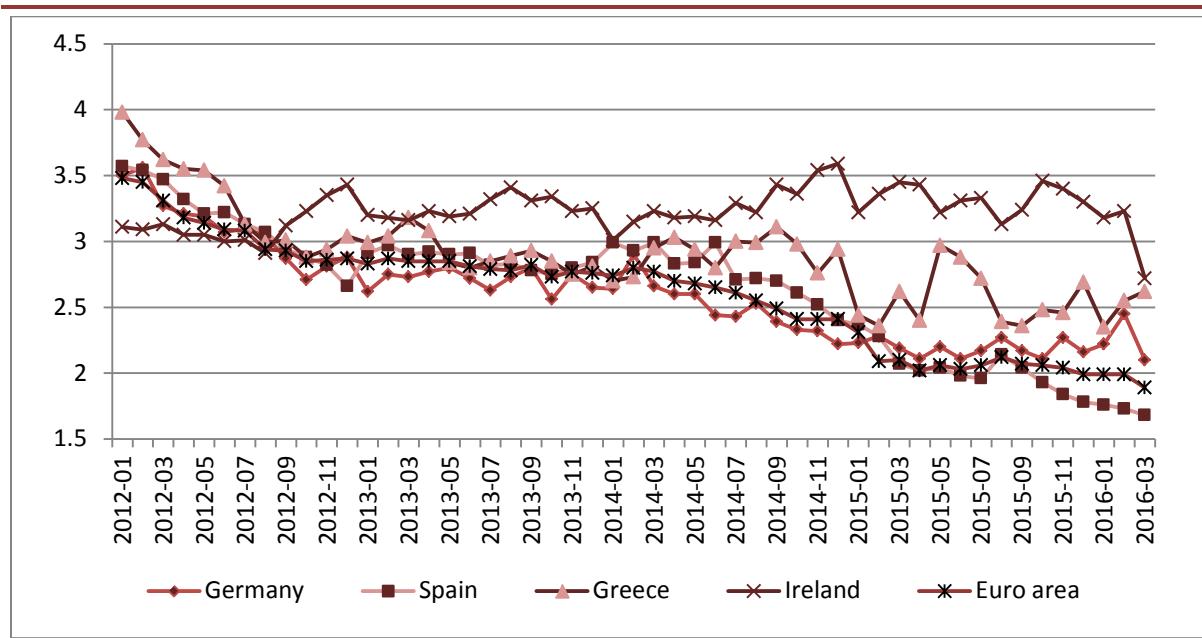
Source: Central Bank of Ireland.

Across a number of sectors, the Irish economy appears to experience some of the highest interest rates in the Euro Area. If we compare interest rates on short-term loans against some of our European counterparts, the divergence becomes apparent. Across the Euro Area, interest rates charged by Irish credit institutions to both the household and the non-financial sector appear to be higher, on average, than rates charged in other countries. McQuinn and Morley (2015)¹⁴ noted the persistence of a ‘wedge’ or significant margin between the ECB policy rate and the standard mortgage variable rate (SVR) charged in the domestic market. This followed earlier work by Goggin et al. (2012)¹⁵ which had explored the issue in some detail. Newly available European cross country data¹⁶ (Figure 12 and Figure 13) highlight the high interest rate environment experienced by Irish customers.

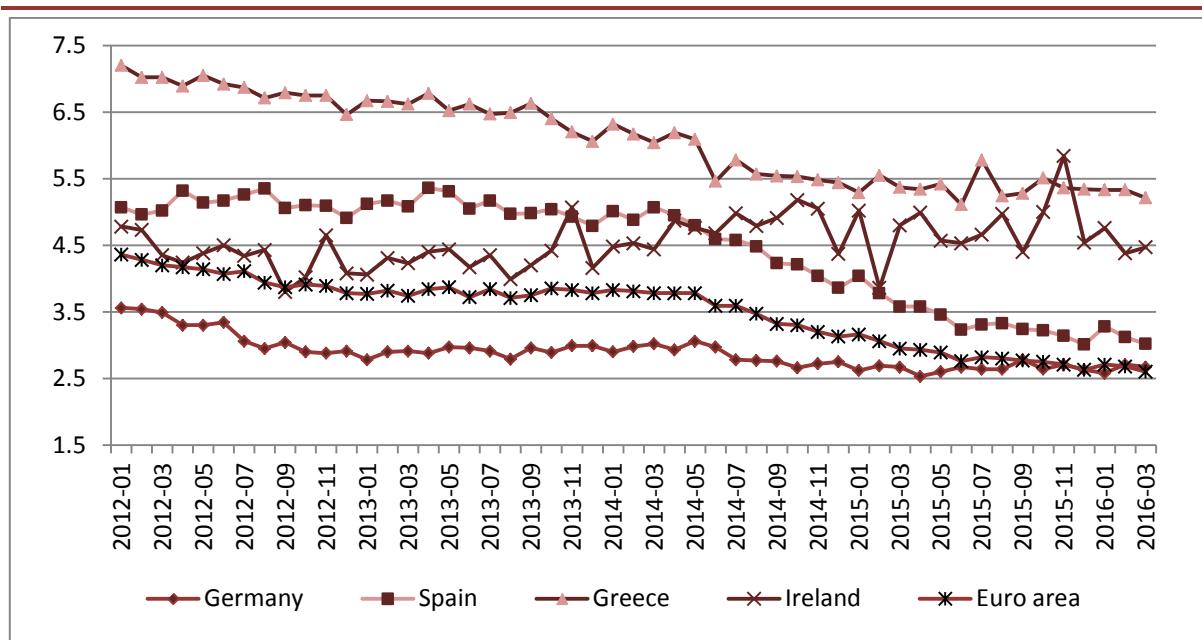
¹⁴ McQuinn K. and C. Morley (2015). ‘Standard variable rate (SVR) pass-through in the Irish mortgage market: An updated assessment’, *QEC Research Note*, June.

¹⁵ Goggin J., S. Holton, J. Kelly, R. Lydon and K. McQuinn (2012). ‘The financial crisis and the pricing of interest rates in the Irish mortgage market: 2003-2011’. Central Bank of Ireland Research Technical Paper 1/RT/12.

¹⁶ See www.euro-area-statistics.org.

FIGURE 12 Mortgage Interest Rates (%) on Home Loans Fixed up to 1 Year (New Business): 2012:01-2016:03

Source: www.euro-area-statistics.org.

FIGURE 13 Interest Rates (%) on Loans Fixed up to 1 Year to Non-Financial Corporate (New Business): 2012:01-2016:03

Source: www.euro-area-statistics.org.

For both lending to households and non-financial corporates, it would appear that Ireland's interest rates are comparable only to Greece's. In both cases, Irish rates would appear to be significantly higher than the Euro Area average and that, if anything, the margin or wedge between the two is actually increasing through time.

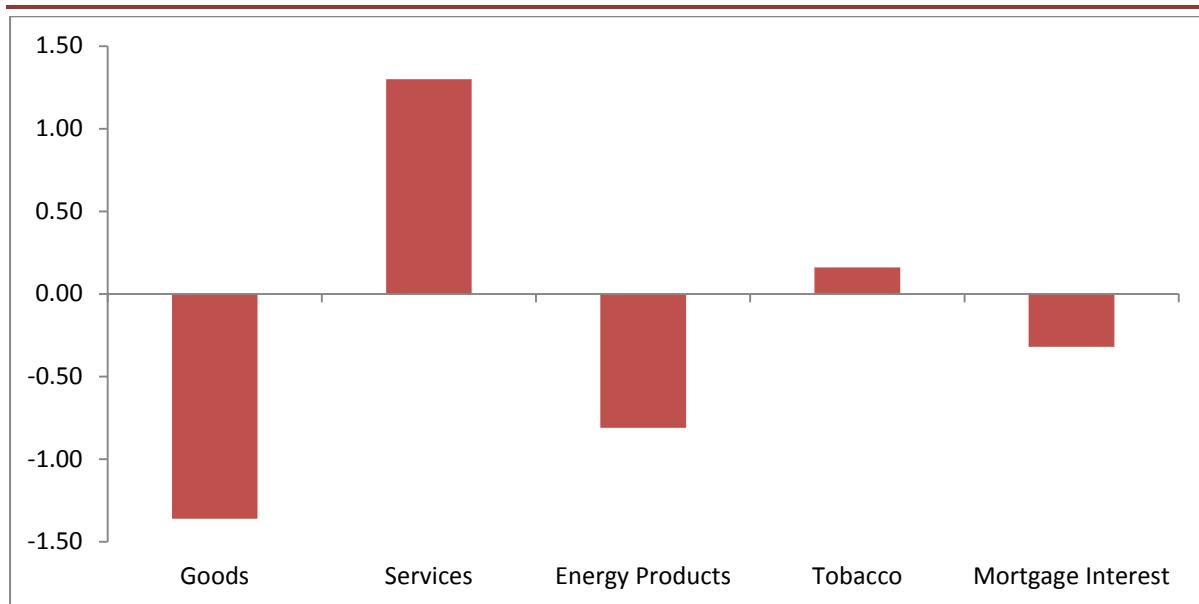
As can be seen from Figure 12, Spain has one of the lowest mortgage variable interest rates in the Euro Area; however, the mortgage market in Spain also has one of the shortest periods of foreclosure proceedings in Europe at less than one year. As noted by Aiyar et al. (2015)¹⁷ weak debt enforcement raises the legal cost of debt restructuring and hampers banks' ability to seize loan collateral, reducing the expected recovery rate on delinquent loans. This ultimately may feed into higher interest rates. This potential relationship between the interest rates charged by financial institutions and the efficiency with which they can work through distressed loans is important in the domestic context.

Prices and Earnings

The annual change in prices was 0 per cent in May. Some of the most notable changes contributing to the annual change were transport at -5.3 per cent, furnishings, household equipment and routine household maintenance at -3.1 per cent and food and non-alcoholic beverages at -1.1 per cent. There were also increases in certain components such as miscellaneous goods and services of 5.6 per cent as well as restaurants and hotels of 2.1 per cent.

In the year to May significant upward contributions to the CPI came from miscellaneous goods and services at approximately 0.65 percentage points as well as from education of 0.1 percentage points. The largest downward contribution to CPI growth over the year came from transport, largely as a result of lower fuel prices. Figure 14 shows the annual growth in the main headings of the CPI.

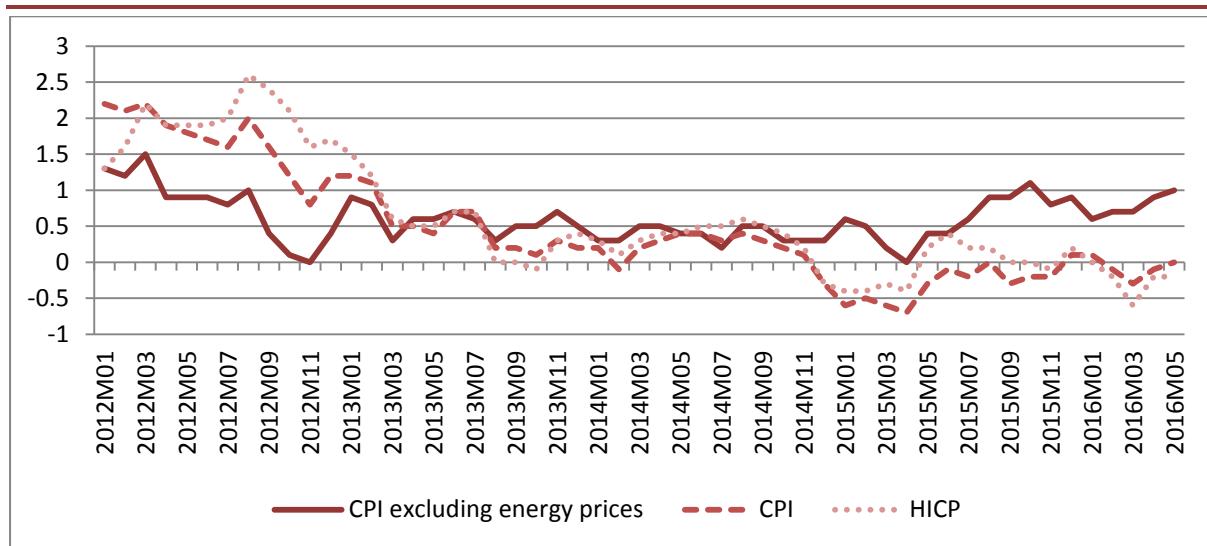
¹⁷ Aiyar, S., W. Bergthaler, J. M. Garrido, A. ILyina, A. Jobst, K. Kang, D. Kovtun, Y. Liu, D. Monaghan and M. Moretti (2015). 'A strategy for resolving Europe's problem loans', IMF staff discussion note, September, SDN/15/19.

FIGURE 14 Annual Growth of Main CPI Headings May 2016 (%)

Source: Central Statistics Office.

Energy prices are still exerting a significant drag on inflation. From Figure 15 we can see that the growth in CPI excluding energy prices has been consistently higher and positive for much of 2015 and 2016.

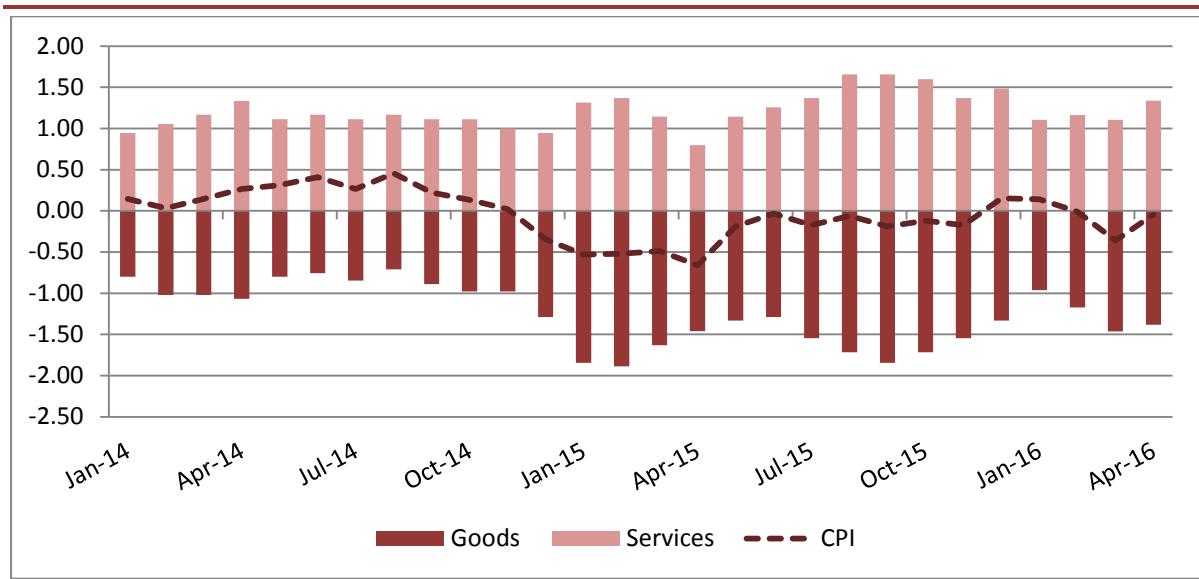
Energy continues to contribute negatively (-0.89 percentage points) to the growth rate in inflation, as seen in Figure 14. As well as the contribution of energy, we can see the respective effects that mortgage interest rates are having and also the contribution of goods and services. We see that over the year, goods and services have had opposing effects on the headline rate. Goods have had an overwhelming negative impact on inflation in part driven by lower commodity prices as a result of low world demand while price growth in services was positive at 1.48 per cent. It is informative to decompose CPI into its relative components as the headline rate can mask the true evolution of prices over time. In order to highlight this we provide a decomposition of CPI growth into growth in goods prices and services prices over time.

FIGURE 15 Annual Growth in Inflation (%)

Source: Central Statistics Office.

Figure 16 shows the decomposition and we observe that there has been a diverging trend in the evolution of prices in the goods and services components since 2014. The goods component has been consistently negative over the period which is acting as a drag on inflation. At the same time there has been consistently strong growth in the services component. As of May 2016, the annual rate of growth in the goods component was -3.3 per cent while the comparable growth for the services component was 2.6 per cent.

The annual rate of growth in the EU Harmonised Consumer Price Index (HICP) was also negative for year to date. Most recent data show that the growth rate was -0.2 per cent in May when compared to May 2015. Some notable changes include a fall in transport of 5.7 per cent, a fall in clothing and footwear of 1.2 per cent as well as increases in education of 3.8 per cent and restaurants and hotels of 2.2 per cent.

FIGURE 16 Decomposition of Annual (%) CPI Growth into Goods and Services Growth

Source: Central Statistics Office.

The latest earnings data from the CSO show a modest increase in annual Average Hourly Earnings of 0.7 per cent, moving from €22.25 to €22.40. There was also an increase of 2.3 per cent or €0.51 on a quarterly basis. Eight out of the 13 sectors of the economy experienced an increase in annual Average Hourly Earnings. Among these, the information and communication sector experienced the largest increase at 4.4 per cent or from €30.56 to €31.91 per hour from Q1 2015 to Q1 2016. The largest decrease was recorded in the public administration and defence sector, falling by 1.3 per cent or from €25.66 to €25.33 per hour.

There have also been increases in annual Average Hourly Earnings across firms of all sizes. Small and medium enterprises consisting of less than 50 and between 50 and 250 employees experienced growth in annual Average Hourly Earnings of 0.2 and 2.0 per cent respectively. Large companies of more than 250 people showed an increase of 0.7 per cent, moving from €25.71 to €25.89 in the year to Q1 2016. Wage increases were common across the private and public sector in the year to Q1 2016. Private sector wages increased by 1.5 per cent while the increase observed in the public sector was more modest at 0.4 per cent.

Looking at a longer time horizon, we see that in the five years to Q1 2016 annual Average Hourly Earnings only increased by a modest 0.8 per cent. The gain, however, was quite broad occurring in ten of the 13 sectors. Again, the largest gains to earnings appear to have occurred in the information and communication sector, which encompasses many of the big international technology companies in Ireland. This sector saw annual Average Hourly Earnings grow from €26.93 to €31.91 or 18.5 per cent which is consistent with the rapid growth of many of

these companies. At the same time, the largest decrease occurred in the human health and social work sector falling from €23.56 to €22.01 or 6.6 per cent.

With a tightening labour market and with close to full employment forecasted by the end of 2017, we expect wages to increase at an annual rate of 2.3 per cent in both 2016 and 2017. Although oil prices are still quite low historically, more recently there has been a moderate increase. This coupled with expected strong consumption growth boosting aggregate demand as well as strong growth in wages results in an expected increase in inflation of 0.8 per cent in 2016 and a further 1 per cent rise in 2017.

TABLE 1 Inflation Measures

	2014	2015	2016	2017
Annual Change				
	%	%	%	%
CPI	0.2	-0.3	0.8	1.0
Personal Consumption Deflator	1.7	0.4	1.0	1.0
HICP	0.3	0.0	0.8	1.2
Average Hourly Earnings	1.6	2.0	2.3	2.3

Sources: Central Statistics Office and ESRI forecasts.

Demand

Household Sector Consumption

A range of indicators suggest that personal consumption will show strong growth this year. As outlined elsewhere in this *Commentary*, we are forecasting that the labour market will continue to improve. In addition, some growth in personal incomes, albeit moderate, is expected both this year and next. Retail sales to April this year have shown strong growth when compared with the same period in 2015, in part reflecting strength in the motor car market. Although there has been some monthly volatility, the longer-term trend for the KBC Bank/ESRI Consumer Sentiment Index continues to point upward suggesting that confidence is still broadly positive.

FIGURE 17 KBC Bank/ESRI Consumer Sentiment Index

Sources: KBC/ESRI Consumer Sentiment Index.

As reviewed in the Monetary and Financial section, data from the Central Bank clearly demonstrate that, while Irish household debt is still quite high by European standards, overall household net worth continues to improve steadily. Thus, on the basis of the evidence available so far this year, we expect that growth in personal consumption to be 4 per cent in volume in 2016. Many of the factors outlined above will continue to influence personal consumption in 2017 and so our forecast is for growth of 3.5 per cent in the volume of personal consumption.

Property Market Developments

The Irish property market continues to deal with the legacy of the crash, with low levels of supply being exceeded by demand. In the year to April, residential property prices at a national level were 7.1 per cent higher compared with an increase of 7.4 per cent in March. In Dublin property prices were 4.6 per cent higher on an annual basis. Outside of Dublin, residential property prices were 9.5 per cent higher than in April 2015. Nationally, the Residential Property Price Index is just over 33 per cent lower than its highest level in 2007. Property prices in Dublin are still over 35 per cent lower than at their highest level in February 2007, while outside Dublin, the price of residential properties is close to 36 per cent lower than the highest level in September 2007. The PRTB/ESRI Rent Index shows, for the first quarter of 2016, that rents have continued to increase, although the rate of growth slowed in most sectors in the first quarter. At a national level, monthly rent levels rose in Quarter 1 2016, up by 0.5 per cent when compared with the previous quarter. On an annual basis, nationally, rents were 8.6 per cent higher than in Quarter 1 of 2015.

The stock of household mortgage debt outstanding continued to decline over the course of the first four months of the year, to €73.7 billion in April. Compared with April 2015 mortgage loans were 2.3 per cent lower, with households repaying €1.8 billion more than was advanced in new loans.

Activity levels in commercial construction remain strong, particularly in the office market. While estimates vary amongst the different agency firms the view is that the office vacancy rate has continued to decline. There was a large increase in the volume of office space under construction with a resumption of office construction activity during 2015, although much of this supply may not begin to become available until 2017.

Supply

Investment

Investment in building and construction continues to show strong growth. However, housing completion statistics for the first three months of the year suggest that residential output is unlikely to show a significant increase from 2015. Thus, we have revised our forecast for housing completions for 2016 from 14,500 units to 13,500 units. In contrast, the upward trend in commercial construction is likely to continue in 2016, with the perceived shortage of office space in Dublin reflected in the number of new projects being commenced. Thus, the total volume of investment in building and construction is forecast to increase by 11 per cent this year. In the expectation that we continue to see strong levels of commercial construction activity and that the supply of new housing begins to show more significant growth the volume increase in building and construction is projected to reach 19 per cent in 2017.

In general, investment in machinery and equipment is influenced by many of the same factors that underpin construction investment. The rate of growth in this component has been influenced in recent years by aircraft purchases and the acquisition of intellectual property rights. With the economy expected to continue to grow and interest rates remaining relatively low, our expectation is that growth will remain strong, with the volume of investment in machinery and equipment forecast to increase by just under 25 per cent in 2016 and just under 22 per cent in 2017.

Labour Market

The latest Quarterly National Household Survey (QNHS) from the CSO shows that employment increased on an annual basis by 2.4 per cent or 46,900 compared to Q1 2015. This brings the total level of employment to 1,976,500, still below the peak level of 2,169,600 reached in Q3 2008; however, given the strong

performance in the labour market of late, we expect total employment to reach two million by the end of 2016. The increase in employment in the year to Q1 2016 mainly consisted of gains in full-time employment of 30,700 or 2.1 per cent as well as part-time employment of 16,300 or 3.7 per cent.

The last year has been marked by modest but consistent quarterly employment growth. For example, in Q1 2016 employment growth on a seasonally adjusted basis rose by 15,400 or 0.8 per cent. In Q4 2015, employment registered growth of 6,600 or 0.3 per cent and the quarter before that there was growth of 9,400 or 0.5 per cent.

The data also reveal that there was a larger increase in the number of women being employed in the year to Q1 2016 at 27,900 or 3.2 per cent versus 19,000 or 1.8 per cent for men. Employment growth was relatively broad, with growth occurring in 12 out of the 14 sectors reported. The largest increases were recorded in the administrative and support services activities of 6,100 or 9.9 per cent and the construction sector, increasing by 9,500 or 7.8 per cent. Public sector employment also increased over the year to Q1 2016. In particular, employment grew on an annual basis by 3.2 per cent or from 374,500 to 386,600 including 4,600 census temporary staff. The only decrease observed over the period was seen in the defence sector which fell by 200 or 2.1 per cent. Excluding the temporary census field staff, a moderate increase of 0.8 per cent was observed in the public administration and defence sector as a whole. As it stands now, the overall employment rate among 15-65 year olds is 63.6 per cent compared to 62.2 per cent in Q1 2015.

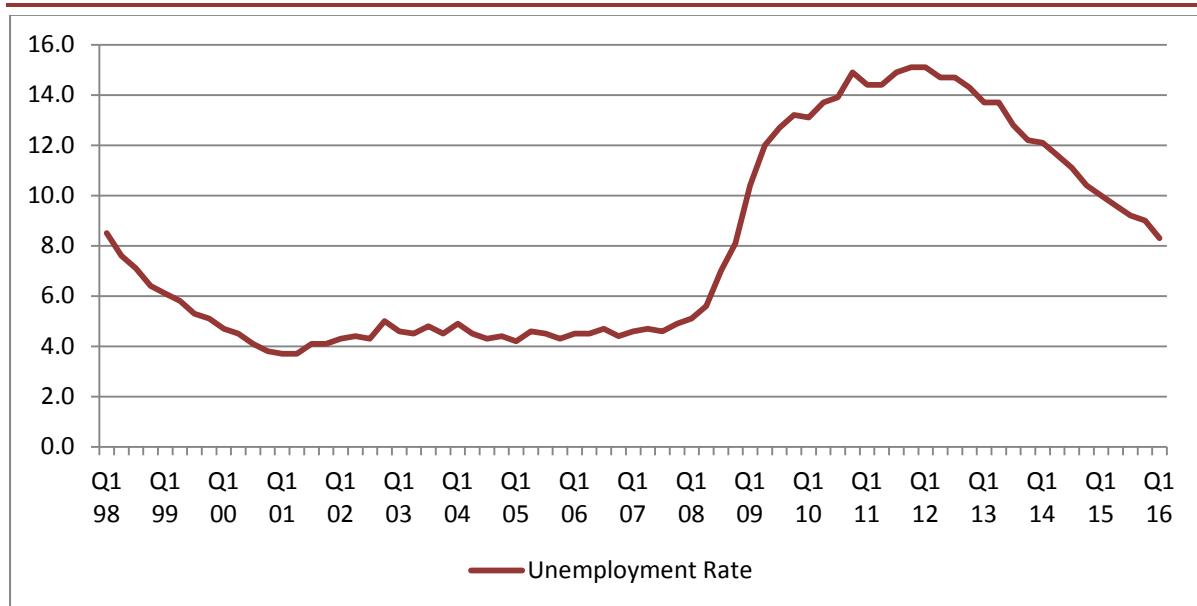
One of the best indicators of economic activity nationwide is labour market developments. In Table 2 we show the change in levels and also the growth in employment observed over the year in all regions in the country. From the Table we can see that employment growth over the year has occurred in all regions bar the West and the Mid-East. There are, however, a variety of different growth rates over the period with the largest growth occurring in Dublin at 26,800 or 4.6 per cent. As well as this, there was an improvement in the level of unemployment across Ireland. The largest drop in unemployment levels occurred in Dublin at 10,700. Some other notable falls in unemployment include the border, decreasing by 3,300 and the Mid-West where there was a decline of 3,500 persons.

TABLE 2 Employment Growth by Region

Employment (000's)	Q1 2015	Q1 2016	Level Change	YoY
				(% change)
Border	190.7	195.7	5.0	2.6
Midland	114.0	117.4	3.4	3.0
West	177.0	176.6	-0.4	-0.2
Dublin	584.9	611.7	26.8	4.6
Mid-East	234.6	231.4	-3.2	-1.4
Mid-West	148.6	153.9	5.3	3.6
South East	201.9	204.4	2.5	1.2
South West	277.8	285.4	7.6	2.7
State	1929.5	1976.5	47.0	2.4

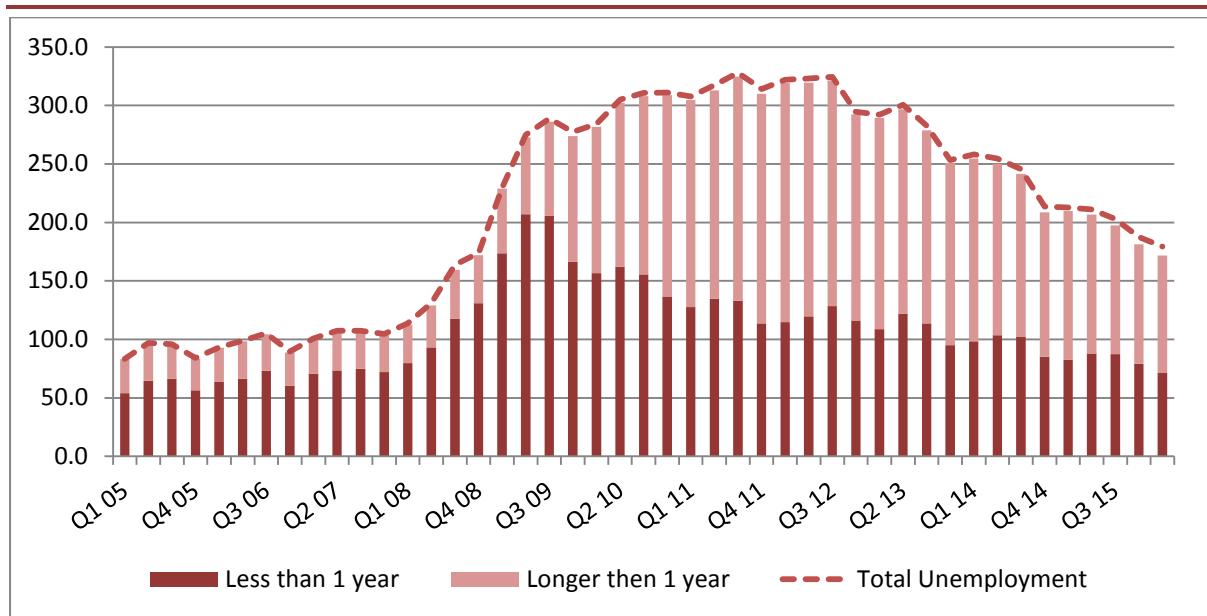
Source: Central Statistics Office.

Over the quarter to Q1 2016, the seasonally adjusted unemployment rate fell from 9 to 8.3 per cent as seen in Figure 18. Breaking the overall Figure into male and female unemployment shows that male unemployment decreased by 18,200 or -13.4 per cent while female unemployment fell by 15,100 or -19.6 per cent in the year to Q1 2016.

FIGURE 18 Seasonally Adjusted Quarterly Unemployment Rate (%)

Source: Central Statistics Office.

As mentioned in the previous *Commentary*, a positive trend in long-term unemployment has been observed over the last few years. This trend has continued with the latest release of the QNHS as seen in Figure 19. Over the year, the number of persons classified as long-term unemployed fell by 26,500 or 20.9 per cent, bringing total long-term unemployment to 100,600. Over the same period, short-term unemployment fell by 11,300 or 13.7 per cent.

FIGURE 19 Level of Unemployment by Duration (000's)

Source: Central Statistics Office.

The crisis period clearly had a significant negative impact on Ireland's youth unemployment levels. More recently, however, the level of youth unemployment in Ireland has begun to decrease. More specifically, the youth unemployment rate decreased from 21.5 to 16.9 per cent over the year to Q1 2016.

Average hourly total labour costs have shown a moderate increase over the last year of 0.6 per cent, moving from €25.70 to €25.86. Given the importance of labour costs in determining unit labour costs, an important measure of competitiveness, it is worth looking at recent and potential future developments in this particular series.

Irish competitiveness has improved significantly since the financial crisis. It was one of the main driving forces enabling an export led recovery and remains a vital component for securing Ireland's continuing strong economic performance in the future. Ireland has benefitted from an array of external tailwinds such as the accommodative interest rate environment, low oil prices and beneficial exchange rate movements. In particular, the depreciation and relative weakness of the Euro to the US Dollar for most of 2013 through to 2015 greatly contributed to the export led growth and in turn to improvements in the labour market observed over that period.

Ireland's relative openness as an economy makes it particularly vulnerable to exogenous economic shocks. For example, the Euro has appreciated against the

US Dollar by around 7 per cent in recent months as a result of uncertainty surrounding Brexit and this has negatively impacted Irish exporters' cost competitiveness. This appreciation would most likely increase further if Brexit is realised and would have a bigger impact on sectors such as the agri-food sector and indigenous SMEs where Britain accounts for a large majority of exports.¹⁸

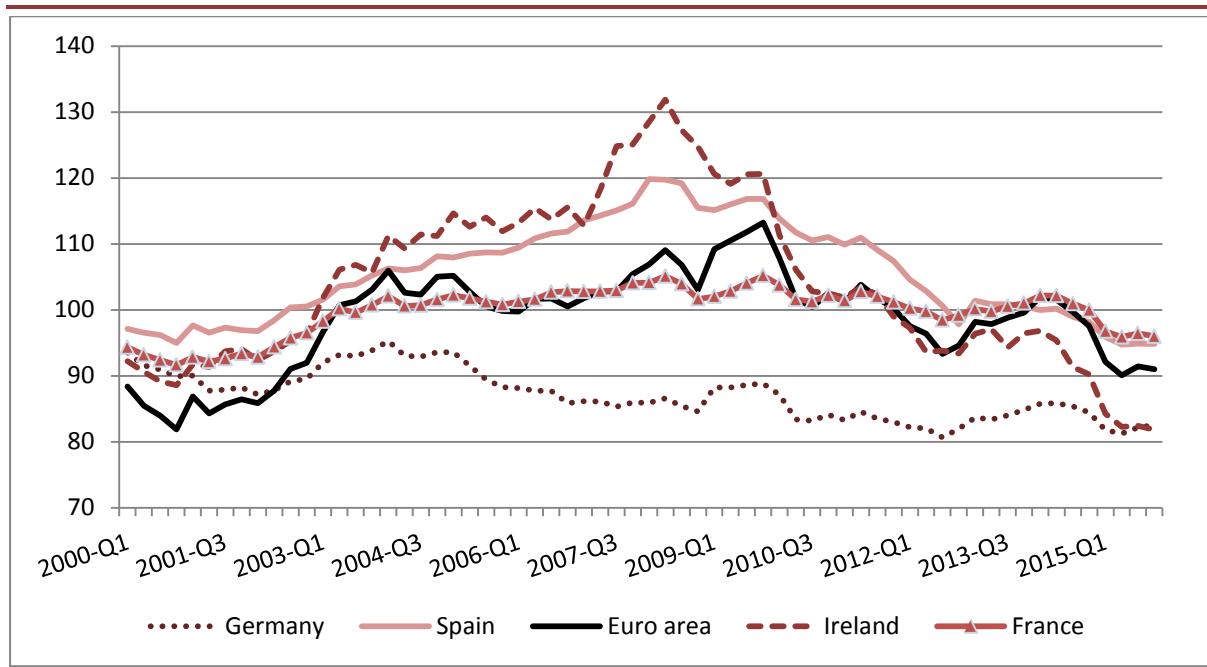
To put into context the evolution of Ireland's competitiveness over time, it is worth comparing Ireland's case with some of our Euro Area counterparts. In particular we focus on the Harmonised Competitiveness Indicator, which is based on unit labour costs indices.¹⁹ This indicator allows for meaningful cross country comparisons and is consistent with other measures such as the real effective exchange rates in the Euro Area. Figure 20 shows selected Euro Area countries' unit labour cost competitiveness indicators since Q1 2000.

From Figure 20, it is clear that all countries, with the exception of Germany, experienced a loss in competitiveness from 2000 up until 2008, indicated by the rise in unit labour costs. The domestic competitiveness indicator rose from 92.25 in Q1 2000 to reach a high of 131.88 in Q2 2008, meaning Ireland's competitiveness position worsened by 43 per cent. From 2008 onwards, domestic competitiveness began to improve as unit labour costs decreased largely prompted by the movement away from the labour intensive construction industry.²⁰ Since the peak in Q2 2008, the indicator has fallen by 38 per cent indicating a significant improvement in competitiveness over the last few years. Ireland is now below the Euro Area average and is just marginally above Germany's level which has remained well below the Euro Area average for nearly the entire period in question.

¹⁸ National Competitive Council (2016). Exchange Rates and Irish Competitiveness, Competitiveness Bulletin 16-4, April.

¹⁹ Unit labour costs for the total economy are calculated as the ratio of compensation per employee to labour productivity. Labour productivity is measured as GDP at constant prices divided by the total number of persons employed using quarterly National Accounts as published by Eurostat.

²⁰ O'Farrell, R. (2015). 'Wages and Ireland's International Competitiveness', *The Economic and Social Review*, Vol. 46(3), p. 429-458, Sept. 2015.

FIGURE 20 Competitiveness Indicator (Unit Labour Costs)

Source: Eurostat.

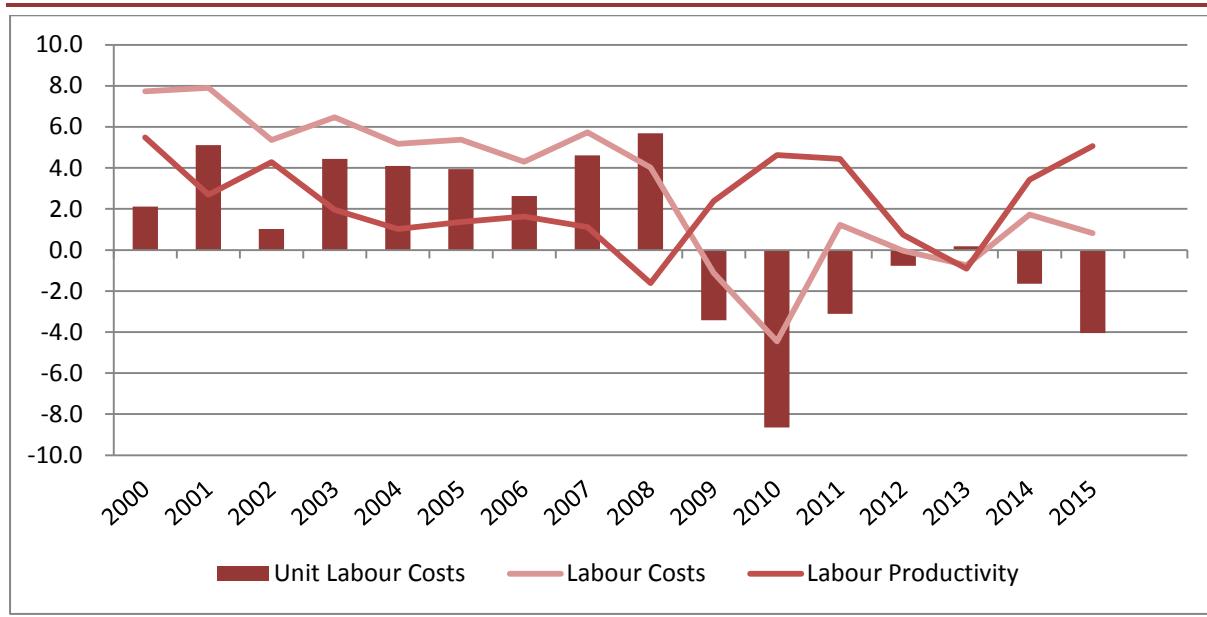
As unit labour costs are calculated as the ratio of total labour costs to labour productivity, the change in unit labour costs in Ireland can be decomposed respectively into these respective components. Figure 21 shows the annual growth rates of unit labour costs and the growth rates of total labour costs and labour productivity from 2000 until 2015. It is clear that the growth rate of total labour costs outpaced that of labour productivity in the early 2000s. This caused positive growth in unit labour costs up until 2008. The trend then reversed and the growth rate in total labour costs became negative. This was prompted by an increase in the growth rate in productivity and a simultaneous negative growth rate in labour costs from 2009 to 2013 with the exception of a marginal increase in 2011. As mentioned above, much of the reversal in trends in 2009 can be accounted for by changes in the construction sector, which resulted in many relatively high paying, low productivity jobs being lost.

More recently, data show that productivity growth is strong while growth in total labour costs has been increasing at a more moderate pace since 2014. The result is a reduction in unit labour costs as productivity growth is outpacing growth in labour costs resulting in an overall improvement in competitiveness. However, unit labour costs could rise in the domestic economy, especially if employment in the construction sector were to increase significantly. As noted in the Special Article²¹ in this *Commentary*, maintaining cost competitiveness and future

²¹ Davies, R.B., I. Siedschlag and Z. Studnicka (2016). ‘Corporation Taxation and Foreign Direct Investment in EU Countries: Policy Implications for Ireland’, *QEC Special Article*, Summer 2016.

productivity growth are essential if the Irish economy is to remain attractive for FDI investment.

FIGURE 21 Decomposition of Unit Labour Costs (Growth %)



Source: OECD database.

In relation to our forecasts, we expect that net migration will be neutral this year with a small positive net migration figure expected in 2017. These assumptions along with the moderate increase we expect in the participation rate, should feed into an increase in the labour force and consequently employment in 2016 and 2017. By the end of the year, we expect employment to be above two million with growth for the year reaching 2.3 per cent and a further 1.9 per cent in 2017. We also expect a further drop in the unemployment rate, reaching an annual average of 7.9 per cent in 2016 before falling to an average of 6.9 per cent in 2017.

Public Finances

As described in the Spring *Commentary*, the performance of the Irish public finances in 2015 was very strong. Exchequer returns for the first five months of 2016 show that this buoyancy has remained, reflecting the continued strength of domestic demand and corporate activity. Some of the strength in tax revenue receipts may reflect timing issues. Even allowing for some deceleration over the rest of the year, tax revenue growth is expected to remain strong. When combined with capital receipts we expect that total revenue will be over €68 billion this year. It seems likely that expenditure levels will be close to the estimate for the year, with underspending by some departments funding overspending in some other areas. On this basis our expectation is that the

general government deficit will improve to -1.0 per cent in 2016. If our general economic forecasts prove to be correct the improvement in the public finances will be maintained and the deficit should improve to just -0.1 per cent of GDP in 2017.

The recently published Programme for Government makes a variety of commitments on the public finance fronts. It indicates that there will be a reduction in some taxes, an additional €4 billion spent on the existing capital investment programme and an overall additional expenditure of €6.75 billion by 2021. While the programme does commit to meet all domestic and European fiscal rules and establish a ‘Rainy Day Fund’, it does not reconcile the overall cost of the various policy proposals with an estimate of the resources that will be available in future years to fund new tax and spending measures. This has led some²² to suggest that the Government should publish detailed plans demonstrating how the policy commitments in the programme will be funded within the estimated remaining fiscal space.

Finally, while our forecasts suggest that the Government finances will be in balance in 2017, it will be particularly important to assess future activity levels in the Irish economy in designing optimal budgetary policy. This is especially true of the residential construction sector; if housing supply starts to accelerate over the coming year, then the economy and the labour market, in particular, may start to overheat. At that stage, while the public finances will be somewhat buoyant, it may be necessary to run a contractionary fiscal policy to prevent unsustainable imbalances developing in the Irish economy.

²² See Irish Fiscal Council (2016) *Fiscal Assessment Report*, June.

General Assessment

Better than expected Exchequer taxation receipts and positive developments in the labour market in Q1 2016, amongst other indicators, confirm that the domestic economy is on course to grow robustly in 2016. However, this strong performance is now almost entirely a function of domestic sources of growth; a point reinforced by evidence suggesting that the slowdown in global trade apparent since the start of the year may be beginning to impact on the traded sector of the domestic economy. In particular, high frequency data presented in the International section of the *Commentary* illustrate that some slowdown has occurred over the past few months in the number of new export orders taken on by firms in both the manufacturing and services sector. This takes place in the context of a reduced growth outlook for both the US and UK economies in 2016 compared with previous years. The relative strength of both the US and UK economic performance post-2010, especially when compared with the corresponding performance of other European economies, has been a key component of the Irish recovery. Therefore, we reduce our growth outlook for 2016 for GDP and GNP marginally to 4.6 and 4.8 respectively. In 2017 we continue to expect growth of just over 4 per cent in both output categories.

The relatively uncertain outlook for the UK economy in 2016 is compounded by the forthcoming referendum on the decision to leave the European Union. ESRI researchers have already examined the potential implications of Brexit for the Irish economy in a report prepared for the Department of Finance in November of last year²³ however, given the proximity of the vote, some additional comments are warranted at this point. While there may be some possible opportunities for sections of the Irish economy in the context of a British withdrawal from the European Union, overall, from an Irish perspective, any diminishing of the economic relationship between the two countries is an unwelcome development. For example, any weakening of the highly integrated relationship between the Irish and UK labour markets could see more volatile outcomes over time for key Irish labour market indicators such as unemployment and participation rates. Additionally, a British withdrawal would almost certainly precipitate a lengthy period of trade negotiations concerning both the UK's relationship with the EU and the rest of the world. Such uncertainty over a prolonged period of time would be most unwelcome for Irish exporters to the UK. This is particularly true for the agriculture and food processing sectors of the

²³ Barrett, A., A. Bergin, J. FitzGerald, D. Lambert, D. McCoy, E. Morgenroth, I. Siedschlag and Z. Studnicka (2015). 'Scoping the Possible Economic Implications of Brexit on Ireland', ESRI Research Series.

domestic economy. From an all-Ireland perspective, the relative importance of these sectors also to the Northern Ireland economy means that as a region in the UK, it is arguably the most vulnerable to the adverse economic implications of Brexit.

In anticipating a future post-Brexit UK trade arrangement with the European Union, it is worth considering some of the conditions experienced by Switzerland or Norway – the only two significant European economies outside the EU. It is worth noting, in this regard, that among the conditions accepted by both Norway and Switzerland in their relationship with Europe are (a) that they abide by all EU single market standards and regulations (without any say in their formulation), (b) they must translate all relevant EU laws into their domestic legislation without consulting domestic voters (c) they must contribute to the EU budget and (d) both Norway and Switzerland must accept EU immigration resulting in a higher share of EU immigrants in the Swiss and Norwegian populations than in the UK.

The attractiveness of Ireland and other EU countries to foreign direct investment is explored by Davies, Siedschlag and Studnicka (2016) in a Special Article in this *Commentary*. The paper finds that Ireland and the UK are perceived to be similar as alternative locations for FDI particularly by investors from outside the EU and for FDI in services. This result suggests that a possible redirection of FDI from the UK to Ireland in the case of Brexit would be more likely by investors from outside the EU and in the services sector. Furthermore the paper examines how changes in corporation tax rates in Ireland and the United Kingdom affect Ireland's attractiveness to FDI. The sensitivity of Ireland's attractiveness to changes in its corporate tax rate is found to be the highest with respect to FDI from outside the EU. A lower corporation tax in the UK is found to reduce Ireland's attractiveness particularly for FDI from non-EU countries. Additional results suggest that, while a competitive tax rate is important to attract FDI to Ireland, it may not be sufficient in itself to continually attract FDI, given tax competition among European countries. The analysis suggests that policies which increase investment in R&D and maintain cost competitiveness are particularly important for Ireland's attractiveness to FDI.

In May, a new Government was put in place after a lengthy negotiation process following the general election in February. The Government, which has an unprecedentedly small number of seats in the Dáil, faces a number of key challenges. First, while there is a common acknowledgement of the need to replenish and reinvest in public services, which were somewhat depleted in the aftermath of the financial crisis, this must take place within the confines of the agreed fiscal space. The Programme for Government commits to meeting all domestic and European fiscal rules but also pledges to spend at least an additional €6.75 billion by 2021. Any loosening of fiscal discipline at this stage

would pose two potential complementary risks (i) a deterioration in key fiscal parameters such as the debt-to-GDP ratio and the general government (GG) balances and (ii) cause the economy, which is growing at a significant rate, to potentially overheat. Our belief is that the output gap, which measures the degree of slack in the economy, will close in 2016. Thereafter, any increases in output which exceed the potential rate of growth (approximately 3.5 per cent) will lead to positive output gaps and ultimately overheating in the domestic economy.

The Programme for Government also commits to delivering 25,000 new housing units per annum between now and 2020. There is also a renewed commitment to expedite the delivery of social housing units, with the pledge that 18,000 additional housing units will be supplied by 2017, and 17,000 additional housing units by end 2020. Overall, however, despite a number of initiatives cited in the programme, it is not clear how the supply of housing will be particularly accelerated from its present low base. It is also worth noting that in terms of current developments, we have, in the present *Commentary*, revised downwards our forecast of housing units in 2016 from 14,500 units to 13,500. In that context, in a Special Article, Duffy, Foley and McQuinn (2016) examine the likely supply-response of the Irish market within a European context. Duffy et al. (2014)²⁴ estimate a long-run fundamental rate of housing supply and we then examine the degree to which the actual rate converges to this fundamental rate. Duffy, Foley and McQuinn (2016) find that residential investment is significantly impacted by real GDP per capita, real house price, as well as the ratio of population aged 25-39 to total population. As well as this, co-integration analysis indicates that it takes approximately four years for residential investment to return to equilibrium following a shock to one of the endogenous variables. Counterfactual analysis conducted suggests that actual levels of investment in Ireland were far above levels necessary in the early 2000s and at present are somewhat below the level suggested by fundamentals. The paper concludes by citing the potential policy measures outlined in Morley, Duffy and McQuinn (2015)²⁵ as a means of accelerating supply. In particular the use of a site value tax, which would provide an incentive for landowners to release this land for development at a time when it is demanded, would appear to have been effective in accelerating housing supply in other jurisdictions.

On banking, the Programme for Government states that the overall aim of banking policy is to encourage more entrants and the presence of a vibrant banking sector with real competition in order to provide more choice to

²⁴ Duffy, D., D. Byrne and J. FitzGerald (2014). 'Alternative Scenarios for New Household Formation in Ireland', Special Article in ESRI *Quarterly Economic Commentary*, Spring 2014.

²⁵ Morley, C., D. Duffy and K. McQuinn (2015). 'A Review of Housing Supply Policies', Special Article in ESRI *Quarterly Economic Commentary*, Winter 2015.

mortgage holders. While most will agree with this aim, the continued involvement of the Government in the Irish banking sector may be one of the key impediments to credit institutions from outside the jurisdiction seeking to come into the Irish market. As a significant stakeholder in certain Irish credit institutions, the State has a particular motivation in seeing these institutions maximising their profit levels. Inevitably, greater competition between the existing institutions and from outside the market is required to ensure that Irish households and SMEs are not subjected to significant ‘wedges’ or margins between official policy and domestic interest rates. Such increased rates of competition would almost inevitably have adverse implications for the profitability of the main Irish credit institutions. Recent research (McQuinn and Morley, 2015)²⁶ indicates that this wedge between domestic rates and the ECB policy rate is actually increasing in an Irish context and the relatively high rates charged in the Irish market are confirmed by Euro Area cross country data presented in the *Commentary*. Unfortunately, the recent legislation proposing to give the Central Bank of Ireland powers to regulate variable interest rates may act as a further disincentive to new competition entering the Irish market. It merely confirms the extent to which the different institutions of the State are intervening and, potentially, distorting the domestic banking market.

It is likely that the new Government will face increased pressure on the public sector pay front. A number of public sector representative groups have signalled their intention to look for pay increases in the short- to medium-term. In that regard, a few points are worth making; the recent recovery has witnessed a significant increase in labour as well as (total factor) productivity, consequently some pay increases are warranted. However, it is crucially important that the Irish economy maintains its hard won competitiveness if a sustained reduction in unemployment and increases in employment levels are to be generated. In the Labour section of the *Commentary*, evidence on the changing relationship between Irish and other select Euro Area countries’ unit labour costs over the period 2000 to the present are presented. The improvement in competitiveness post-2009 and the export led growth which accompanied this was arguably one of the main reasons for the significant recovery in the Irish economy. Any future public sector pay agreements must take cognisance of such cross country indicators with agreed pay levels influenced by significant variations in Irish costs vis-à-vis key European comparator countries. This merely reflects the fact that Ireland is one of the most open economies in Europe (and the OECD) and is, accordingly, particularly sensitive to changes in relative wage levels and costs. Another key point regarding public sector pay negotiations is that in the past reductions in personal taxation rates were, at times, ‘traded off’ against significant increases in pay. However, the vulnerability of the Irish fiscal position

²⁶ McQuinn, K. and C. Morley (2015). ‘Standard Variable Rate (SVR) Pass-Through in the Irish Mortgage Market: An Updated Assessment’, Research Note in *Quarterly Economic Commentary*, Summer 2015.

due to the sustained reduction in the taxation base in the period preceding 2007 indicates that such a policy option needs to be carefully considered.

Detailed Forecast Tables

FORECAST TABLE A1

Exports of Goods and Services

	2014	% change in 2015		2015	% change in 2016		2016	% change in 2017		2017
	€ bn	Value	Volume	€ bn	Value	Volume	€ bn	Value	Volume	€ bn
Merchandise	113.3	27.0	14.8	143.8	12.8	8.5	162.3	10.3	7.6	179.0
Tourism	3.7	18.2	6.0	4.3	4.2	3.2	4.5	5.0	4.0	4.7
Other Services	98.1	16.8	11.2	112.5	12.8	9.5	126.9	11.8	8.5	141.8
Exports Of Goods and Services	215.0	21.2	13.8	260.6	12.7	8.9	293.6	10.8	7.9	325.5
FISM Adjustment	0.0			0.0			0.0			0.0
Adjusted Exports	215.0	21.2	13.8	260.6	12.7	8.9	293.6	10.8	7.9	325.5

Forecast Table A2

Investment

	2014	% change in 2015		2015	% change in 2016		2016	% change in 2017		2017
	€ bn	Value	Volume	€ bn	Value	Volume	€ bn	Value	Volume	€ bn
Housing	3.8	13.1	7.3	4.3	21.6	11.5	5.2	38.2	41.9	7.2
Other Building	8.0	15.6	11.0	9.2	15.4	10.4	10.6	13.9	8.9	12.1
Transfer Costs	0.7	-2.5	1.6	0.7	26.0	20.0	0.9	20.8	15.0	1.1
Building and Construction	12.5	13.8	9.4	14.2	17.8	11.2	16.8	21.9	19.0	20.4
Machinery and Equipment	24.0	37.6	37.4	33.0	28.1	24.9	42.3	26.1	22.9	53.3
Total Investment	36.5	29.4	28.2	47.2	25.0	21.1	59.0	24.9	21.9	73.8

FORECAST TABLE A3

Personal Income

	2014	% change in 2015		2015	% change in 2016		2016	% change in 2017		2017
	€ bn	%	€ bn	€ bn	%	€ bn	€ bn	%	€ bn	€ bn
Agriculture, etc	3.4	1.0	0.0	3.4	2.5	0.1	3.5	3.5	0.1	3.6
Non-Agricultural Wages	70.0	4.8	3.3	73.4	4.7	3.5	76.8	4.3	3.3	80.1
Other Non-Agricultural Income	19.5	30.3	5.9	25.3	18.3	4.6	30.0	16.2	4.9	34.8
Total Income Received	92.9	10.0	9.3	102.1	8.0	8.2	110.3	7.5	8.3	118.6
Current Transfers	23.7	0.0	0.0	23.7	-1.5	-0.4	23.4	0.0	0.0	23.4
Gross Personal Income	116.6	7.9	9.3	125.8	6.2	7.9	133.7	6.2	8.3	142.0
Direct Personal Taxes	27.3	6.0	1.6	28.9	4.0	1.2	30.1	3.7	1.1	31.2
Personal Disposable Income	89.3	8.5	7.6	96.9	6.9	6.7	103.6	6.9	7.2	110.7
Consumption	89.0	3.8	3.4	92.4	5.0	4.7	97.0	4.5	4.4	101.4
Personal Savings	0.3	1302.1	4.2	4.5	44.9	2.0	6.5	42.1	2.8	9.3
Savings Ratio	0.4			4.7			6.3			8.4
Average Personal Tax Rate	23.3			22.9			22.4			21.9

FORECAST TABLE A4

Imports of Goods and Services

	2014	% change in 2015		2015	% change in 2016		2016	% change in 2017		2017
	€ bn	Value	Volume	€ bn	Value	Volume	€ bn	Value	Volume	€ bn
Merchandise	70.9	11.7	8.4	79.2	9.9	7.2	87.0	9.5	7.2	95.2
Tourism	4.6	7.1	2.0	4.9	4.9	1.8	5.1	4.3	2.8	5.3
Other Services	104.8	26.1	22.0	131.7	18.1	15.2	155.6	16.9	14.9	181.8
Imports of Goods and Services	180.3	19.7	0.0	215.8	14.8	0.0	247.7	14.0	0.0	282.4
FISM Adjustment	0.0			-0.1			-0.1			-0.2
Adjusted Imports	180.3	19.6	16.3	215.7	14.8	12.0	247.6	14.0	11.9	282.2

FORECAST TABLE A5**Balance of Payments**

	2014	2015	2016	2017
	€ bn	€ bn	€ bn	€ bn
Exports of Goods and Services	215.0	260.6	293.6	325.5
Imports of Goods and Services	180.3	215.8	247.7	282.4
Net Factor Payments	-26.2	-31.7	-33.0	-34.4
Net Transfers	-2.7	-2.9	-2.9	-2.9
Balance on Current Account	5.9	10.4	10.2	6.0
As a % of GNP	3.6	5.7	5.2	2.8

FORECAST TABLE A6**Employment and Unemployment, Annual Average**

	2014	2015	2016	2017
	000s	000s	000s	000s
Agriculture	109.0	109.9	110.2	110.2
Industry	348.4	373.7	383.7	391.3
Of which: Construction	109.4	125.5	133.8	140.3
Services	1,453.2	1,474.1	1,512.4	1,544.9
Total at Work	1,913.8	1,963.6	2,009.0	2,046.4
Unemployed	242.6	203.6	172.3	152.2
Labour Force	2,156.8	2,167.2	2,181.3	2,198.5
Unemployment Rate, %	11.3	9.5	7.9	6.9

Appendix

Nowcasting Appendix

Given the volatility observed in headline Irish macroeconomic indicators over the past period of time, it is essential to base the assessment of domestic economic activity on as broad a set of indicators as possible. In that regard, the Nowcasting approach¹ provides a timely and accurate assessment of the underlying state of the economy and as such plays an important part in generating the overall forecasts of the Irish economy in the *Commentary*.

TABLE 1 Current Backcast, Nowcast and Forecast of Irish Quarter-on-Quarter Growth Rates

Period	Nature of Estimate	GDP Estimate %	95% Confidence Interval	
Q1 2016	Backcast	1.67	0.21	3.14
Q2 2016	Nowcast	1.32	-0.07	2.71
Q3 2016	Forecast	1.15	-0.29	2.60

Source: Own estimates (as of June 2016).

On the back of the high annual growth rate recorded in 2015 the Nowcast estimate for Q2 2016, provided in Table 1, suggests that growth in the Irish economy will remain strong in the first half of 2016. Ahead of the Quarterly National Accounts which are due to be released in late June our Backcast also indicates relatively strong growth of 1.67 per cent in Q1 2016. However, as shown in Figure 6 in the main text, over the past year it would appear that the economy registered its highest rate of annual growth in Q3 2015.

¹ A detailed discussion of the Nowcasting model can be found in Byrne, D., K. McQuinn and C. Morley (2014). ‘Nowcasting and the Need for Timely Estimates of Movements in Irish Output, *Research Note*, 2014/3/1, *Quarterly Economic Commentary*, Autumn 2014, The Economic and Social Research Institute.

Special Articles

Special Articles are substantive articles that are typically of immediate policy relevance and often directly relevant to the associated *QEC*.

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Cross Country Residential Investment Rates and the Implications for the Irish Housing Market

David Duffy, Daniel Foley and Kieran McQuinn

Introduction¹

Even by international standards, the experience of the Irish residential property market over the period 1995 to the present stands out. As the Irish economy rapidly converged to the living standards of other European countries from the mid-1990s onwards, activity in the property market increased dramatically. At that time the stock of Irish dwellings completed per 1,000 inhabitants was one of the lowest across Europe, therefore the combination of improving economic circumstance, a young population and accommodative international financing conditions resulted, almost inevitably, in a housing boom.

This situation was complicated significantly by changes in international wholesale markets in the early 2000s which ultimately enhanced the ability of credit institutions in one Member State of the Euro Area to borrow from institutions in another. The significant returns apparent in the Irish property sector up to this point resulted in a dramatic inflow of bank funding into the domestic market culminating in a substantial increase in the amount of property-related lending. Therefore, while most of the developments in the property sector up to 2002/2003 had been driven by improvements in fundamental variables such as income, interest rates and demographics, activity from then on was more a function of a substantial credit-fuelled bubble. Housing construction which had averaged 30,000 units per annum in the 1990s increased to almost 60,000 units in 2002 before reaching a peak of over 80,000 units per annum between 2004 and 2007.

By 2007, it was evident that house prices in the Irish market were significantly overvalued, driven in part by property speculation which became more frequent in the 2000s. Thus, with Irish financial institutions exposed to property-related lending, the international financial crisis of 2007/2008 had particularly calamitous implications for the domestic market. Over the period 2007-2012, Irish house

¹ This paper was presented at a joint EU Commission/ESRI Seminar: ‘Housing Ireland’s recovery: Policy perspectives’, Radisson Blu hotel, Golden Lane, Dublin, 6 November, 2015.

prices fell, in nominal terms, by 50 per cent while housing supply all but ceased with the number of units built per annum falling to 26,000 units in 2009 and then to just over 8,000 units in 2013.

Given the, albeit nascent, recovery in house prices observed since early 2013, it is timely and pertinent to consider the potential supply response of the Irish residential construction sector. As of yet, this increase in house prices has not been accompanied by an associated increase in housing supply. This is despite the fact that studies such as Duffy et al. (2014) suggest that, on the basis of likely trends in household formation, approximately 25,000 new housing units are required per annum in Ireland over the medium term.

In this paper we assess the future prospects for Irish residential investment. However, in so doing we are confronted by a number of challenges. First is the relatively few studies in the international literature concerned with this issue. Vermeulen and Rowendal (2007) and DiPasquale (1999), amongst others, highlight the lack of empirical studies, particularly outside of the US, on the supply side of the construction sector. Therefore, in examining the likely supply-response of the Irish market we adopt an approach well established on the demand side of the housing market; we estimate a long-run fundamental rate of housing supply and we then examine the degree to which the actual rate converges to this fundamental rate. The fundamental rate is the rate empirically determined on the basis of key economic variables typically judged to influence the rate of housing supply.

Another difficulty in addressing the Irish market is the variability in supply observed over the past 20 years. Therefore, it becomes difficult to ascertain a long-run ‘steady-state rate’ of housing supply. One way to address this issue is to examine the likely supply response of the Irish market in a cross-country, European context. This enables any long-run rate to be determined on the basis of a relatively wide number of housing markets, many of which were not exposed to the volatility seen in the Irish case.

The rest of this article is structured as follows; in the next section we discuss recent trends in European housing investment. We then discuss the empirical approach adopted in the article followed by a counterfactual analysis whereby we determine the long-run fundamental investment rate based on our model. This rate is then compared with the actual rate of investment which enables us to determine the current rate of investment which should prevail in the Irish market. We then discuss the results from our models and finally conclude with some implications and policy recommendations.

Trends in European Investment

Figure A.1 shows residential investment rates for all of the countries in our sample. Most countries with the exception of three appear to have a relatively stable rate of investment from 2003 to 2014. It is clear that Spain, Greece and Ireland diverge substantially from the other countries with very high rates of residential investment from 2003 until 2007 being followed by a substantial decline in 2008. This large increase in housing supply is indicative of the housing bubble and subsequent bust that emerged in each of these countries.

The relatively high rate of investment in these countries is, in many respects, a function of the convergence towards the European average in living standards experienced by these countries from the 1990s onwards. Ireland, Spain and Greece had been amongst the poorest of EU Member States, and all three experienced a relatively late transition from agriculture, compared with the rest of Europe (Dellepiane et al., 2013). The convergence in each country's living standard from the mid-1990s was coupled with historically low interest rates resulting in these countries experiencing a rapid improvement in housing affordability. Changes in European international finance post-2000 meant that the high returns from the property sectors attracted large inflows of capital into these countries, the bulk of which went into construction-related activities. Eichengreen (2006) notes that the availability of new factors of production (whether in the form of human capital or financial capital) may result in an expansion of economic activity which is not easily translated into an upgrading of productivity. This is more likely to result in 'extensive' rather than 'intensive' growth in less developed economies. Consequently it was more profitable to invest in construction activities over other investments such as manufacturing or high-tech software development, or other traded services activities.

Empirical Approach

Long-run model

Given the highly volatile nature of the Irish housing market, we elect to estimate the likely residential supply response in a cross-country European context. This enables the estimates of our empirical approach to be as much influenced by markets, which have experienced relatively stable conditions, as those, such as Ireland's, which are of a less stable nature. In the empirical approach, we employ a two-stage methodology similar to McQuinn and O'Reilly (2007), Addison-Smyth et al. (2008) and Gattini and Ganoulis (2012). In the first stage we estimate the long-run determinants of the residential investment rate using a fixed effects OLS model. We then proceed to model the short-run dynamics using an error-

correction model. The long-run model is estimated on an annual basis over the period 2003 to 2014 covering 12 Euro Area countries.²

To motivate our model and variable choice we consider both economic theory as well as some of the previous literature in this area. In particular we follow closely the methodology and variable choice set out in Gattini and Ganoulis (2012) who propose that residential investment depends on a set of parsimonious long-term fundamental variables that affect demand. As supply should equal demand in the long run, the investment rate depends on supply factors as well as demand factors. In particular, we specify the investment rate (rin) as a function of the following demand shifters: real house prices (rhp), GDP per capita ($gdppc$), the ratio of people in the 20 to 39 age cohort to total population (pop) and the real interest rate ($rrat$). We expect that house prices have a positive relationship with the investment rate. Figure A.2 (located in the Appendix) shows a simple linear regression of investment rates on house prices across all countries in our sample. It is clear that there is a positive upward sloping relationship between the two and this is consistent with the idea that as house prices rise, developers have more incentive to supply houses to the market and therefore the investment rate will increase.

GDP per capita should also have a positive relationship with the investment rate as greater overall wealth in the economy increases the demand for housing and therefore supply. We also expect that as the levels of population at the age where people are most likely to buy a home increases (20-39), the investment rate would also increase. Finally, the real interest rate or cost of financing should have a negative impact as higher rates increase the cost of borrowing for developers and lead to a reduction in the investment rate. This variable likely played a role in the huge increase in the investment rates observed in Ireland, Spain and Greece during the early 2000s. Figure A.3 shows that the real interest rates in these countries were actually negative in the late 1990s and early 2000s which would have facilitated construction-related borrowing.

More formally the long-run model of residential investment rates is expressed as follows:

$$\ln rin_{it} = \beta_0 \ln rhp_{it} + \beta_1 \ln gdppc_{it} + \beta_2 \ln pop_{it} + \beta_3 rrat_{it} + \sum_i^{12} a_i D_i + \epsilon_{it}$$

The model is a fixed effects panel model with all variables log transformed apart from $rrat$ and D_i being the dummy for each country. Including dummy variables

² Data obtained from the AMECO database.

allows us to capture any unobserved cross-country heterogeneity that is constant over time. We apply a Hausman test³ to motivate the use of fixed effects over a random effects model and the results are located in Table A.1.

Results

Our results from the long-run fixed effects model are presented in Table 1. The long-run relationship between the variables seems to coincide with standard economic theory. In particular, the investment rate is positively related to real house prices, income per capita and the ratio of the population in the young age cohort as we would expect. As all variables bar the interest rate have been log transformed, the coefficients represent long-run elasticities. All variables appear to be significant and are greater than one, indicating long-run elasticity between the independent and dependent variables. The results suggest, for example, that a one percentage point increase in house prices increases the long-run investment rate by 1.64 per cent. It appears that in the long run, the proportion of population in the 20-39 age cohort exhibits the largest effect on residential investment with a one percentage point increase in this population cohort increasing the residential investment rate in the long run by 2.86 per cent. This suggests demographics have an important role in determining the dynamics of residential investment in the Euro Area and Ireland, and is particularly relevant given expected demographic trends in Europe in the coming years.⁴ As well as this GDP per capita is an important determinant for the long-run investment rate with the coefficient being greater than one.

The real interest rate variable is signed as hypothesised, negative, however, the variable is not significant; interest rates over the period in question were quite stable for the majority of countries and would not have differed significantly on a cross-country basis. Nonetheless, we retain the variable in our model for simulation purposes. In order to capture the potential differences across countries we include dummy variables for each of the countries in the sample. In particular, including these dummies ensures that our model satisfies the Gauss Markov assumptions and is the best linear unbiased estimator. Since our model includes a dummy variable for all countries, we drop the constant term from our regression. As a result, the individual country dummies now represent separate intercept terms or equivalently the expected value of the log of the residential investment rate when our independent variables jointly equal zero. It is clear that in the absence of our explanatory variables the long-run residential investment

³ See Hausman, J.A., 1978. ‘Specification Tests in Econometrics,’ *Econometrica*, Econometric Society, Vol. 46(6), pp. 1251-71, November.

⁴ See McQuinn K. and K. Whelan, 2015. ‘Europe’s Long-Term Growth Prospects: With and Without Structural Reforms,’ Working Papers 201508, School of Economics, University College Dublin

rate for all countries rate is lower, again highlighting the relevance of these variables.

TABLE 1 Long-run Model of Cross-country Residential Investment Rates

Variable	Parameter	Estimate	T-Stat
$\ln rhp_{i,t}$	β_0	1.64	8.56
$\ln gdppc_{i,t}$	β_1	1.17	2.44
$\ln pop_{i,t}$	β_2	2.86	7.04
$rrat_{i,t}$	β_3	-1.24	-1.01
Additional Controls			
Belgium	α_1	-10.57	-7.74
Germany	α_2	-10.67	-7.90
Ireland	α_3	-11.48	-8.28
Greece	α_4	-10.34	-8.72
Spain	α_5	-10.37	-8.48
France	α_6	-10.43	-7.77
Italy	α_7	-10.52	-8.11
Luxembourg	α_8	-12.59	-7.57
The Netherlands	α_9	-10.92	-7.77
Austria	α_{10}	-11.15	-8.10
Portugal	α_{11}	-10.34	-9.05
Finland	α_{12}	-10.49	-7.55
N		144	
R2		0.81	
F-Test		0.00	

Note: Estimated over the period 2003 to 2014.

Counterfactual Analysis

Next we conduct our counterfactual analysis where we present the actual and *fundamental* investment rate based on our long-run model for each of the 12 countries. The fundamental rate of investment consists of the level of investment that can be explained reasonably due to supply and demand factors. Our long-run model thus captures the dynamics of the residential investment that can be attributed to these factors. We can then compare the fundamental rate i.e. the fitted values from the model with the actual ratios observed in the data. This allows us to assess whether the actual investment rate is in line with what the key fundamental variables in the market over the period would suggest it should be. This kind of analysis can be useful in detecting for the presence of disequilibria in markets and in particular, in housing, assessing whether prices have diverged significantly from fundamentals.

As noted previously, over the period 2003-2007 there was a substantial difference in the actual and fundamental Irish investment rate, suggesting the presence of a bubble in residential construction. This is not surprising as a number of studies⁵ have examined the potential presence of disequilibrium in the Irish market over this period. However, what is notable from the residential investment results is that the bubble existed even when allowing for actual house price levels i.e. the fitted value used to generate the fundamental rate is based on actual house prices. Even with the highly elevated and ultimately unsustainable nature of Irish house prices, the domestic construction sector still supplied more housing than economic conditions suggested. Therefore, it is interesting to explore the implications for the residential investment rate of the acknowledged deviation between Irish actual and fundamental house prices during this period.

There would appear to be two different experiences amongst the countries for the period in question (i) countries such as the Netherlands, Spain and Finland where developments in the residential market appeared to unfold very much in accordance with what key economic variables in those markets would suggest (Figures A.4, A.5, A.6 in Appendix) and then (ii) the remaining countries; Ireland, Greece, Portugal Belgium, Germany, France, Italy, Luxembourg and Austria where there were periods of sizeable differences between the actual and fundamental rate.

In the cases of Ireland, Greece and Portugal there appeared to be an investment bubble in the period preceding the financial crisis of 2007; the actual investment rate was significantly higher than what key economic factors would suggest it should have been. This is particularly interesting in the Irish context where actual house prices (a key right hand side variable) were also commonly regarded⁶ as being overvalued during this period. By contrast, for the larger European countries, Germany, Italy and France, residential investment appeared to be quite subdued during the same period as the fundamental rate is quite a bit larger than what actually transpired in those markets.

If we look closely at the results of the analysis on the Netherlands (Figure A.4), we can see a stark difference vis-à-vis Ireland's results. Although we observe a decrease in investment rates post-2008 we find that there is very little deviation between fundamentals and the actual investment rate through the entire sample. This suggests that the residential investment rate is mainly driven by fundamental factors, which is in contrast to Ireland's position. The lack of divergence between actual and fundamental rates of investment up to the

⁵ See Kelly and McQuinn (2014) for a summary of these.

⁶ See Honohan (2010) for more on this.

present could be a result of strict land use policies in the Netherlands which limits the supply of new housing. As well as this, Vermeulen and Rowendal (2007) found that in the short run, the supply of housing in the Netherlands is nearly entirely inelastic making it significantly more difficult for an oversupply of housing to occur.

Impact of Fundamental House Prices

In the previous section the fundamental investment rate was solved for on the basis of the *actual* house price. However, we now examine the implications of where the model is solved for on the basis of a ‘fundamental’ house price.

To arrive at a fundamental house price, we use the fitted values from a standard house price model, popular in the international literature. The approach, which can be observed in an Irish context in Addison-Smyth and McQuinn (2015) and Kelly and McQuinn (2014), involves inverting the demand function for housing and rearranging such that the dependent variable is now the price of housing as opposed to the quantity. Similar applications can be observed in Cameron et al. (2006), Muellbauer and Murphy (1997), Muellbauer and Murphy (1994), Meen (1996, 2000), Peek and Wilcox (1991). The model, which assumes that the demand for housing services is proportional to the housing stock, can be derived, in log linear fashion, as follows:

$$\ln\left(\frac{h}{pop}\right) = a_1 \ln\left(\frac{y}{pop}\right) - a_2 \ln rent + a_3 \ln pop$$

where h is the housing stock, pop is the population level, y is disposable income and $rent$ is the real rental rate of housing in the economy. The coefficients a_1 and a_2 are the income and price elasticities of demand for housing. In equilibrium, the real rental rate of housing can be assumed to be equal to the real user cost. This can be outlined as follows:

$$p\left(r - \frac{p^e}{p}\right) \equiv p \times uc$$

where r is the mortgage interest rate, p is house prices, e denotes expectations and uc is the user cost of housing. While expressions for the user cost can be augmented to include taxation considerations and expenditure rates of maintenance and repair, very often the main determinants of the expression are

the mortgage rate and expected house price inflation.⁷ Thus, solving the two previous equations provides the following inverted demand equation for housing:

$$\ln p = \frac{a_1}{a_2} \ln \left(\frac{y}{pop} \right) - \frac{1}{a_2} \ln \left(\frac{h}{pop} \right) - \ln uc + \frac{a_3}{a_2} \ln pop$$

House prices are positively related to real income per capita and population levels and negatively related to the per capita housing stock and the user cost of capital.

The actual and fitted values for the house price model are shown in Figure A.16.⁸ In McQuinn (2014), the results are compared with those of three other house price models. In general, as can be seen from McQuinn (2014), the overall result concerning the degree of over/undervaluation is quite similar across the models in question. Therefore, we are not concerned that the estimated housing market disequilibria are unduly *model-specific*.

From the results of our *fundamental* house price model (Figure A.16), it is clear that actual house prices far exceeded fundamental levels in the early 2000s with peak divergence observed in 2006. Prices then had a precipitous decline in 2008 leading to an extended over correction where they remain below *fundamental* levels at present. This is consistent with the housing bubble Ireland faced in the 2000s where price levels diverged significantly from what can be considered sustainable levels.

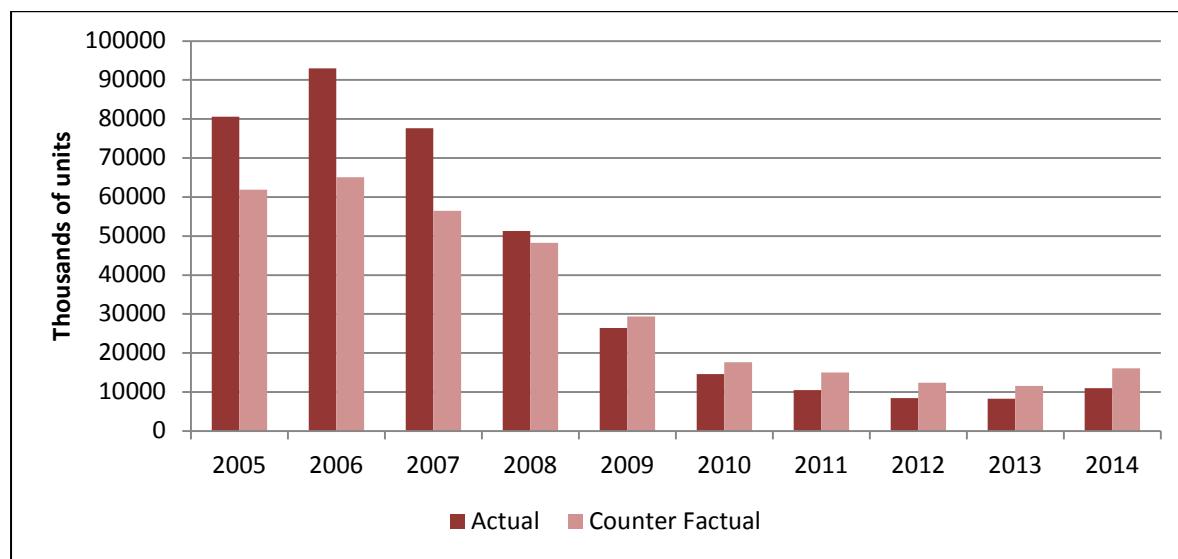
Using our *fundamental* house price model above we next substitute our predicted values from this into our long-run residential investment model. Doing this allows us to present a counterfactual scenario whereby we quantify the *fundamental* level of housing units and compare this to the actual current level observed. Looking at Figure 1 implies that the actual level of housing units in the periods 2005-2007 were far higher than the levels implied by *fundamentals*. This is again consistent with the observed housing boom and means that there was a large glut of housing in the market leading up to the crisis. Perhaps more interesting is what we observe after 2008. There was an over correction and housing supply was consistently below levels implied by our model. In 2014 for example, the model suggests we should have somewhere in the region of 16,000 housing units being supplied where in reality there were only 11,000. Although

⁷ In calculating the user cost expression, Kelly and McQuinn (2014) use a variety of different house price expectations mechanisms, however they find that their results do not change on the basis of the different assumptions.

⁸ Full regression results are available, upon request, from the authors.

somewhat smaller than estimates obtained from other studies of 25,000 per annum,⁹ it is consistent with the overall notion that Ireland is simply not producing enough houses to meet current demand. These results have important implications for Ireland at the moment given the recent surge in rents (9 per cent over the last year)¹⁰ observed in Dublin, which seems to be driven by the consistent under-supply.

FIGURE 1 Supply of Housing Units Actual vs. Fundamental



Source: Authors' own calculation.

Short-Run Residential Investment Model

Given the degree of disequilibrium observed across the different European countries, we also examine the extent to which actual residential investment rates converge back to their long-run rates. To do this we employ an error-correction framework. It is first necessary to check for the presence of unit roots in the data. We then check that all variables are integrated of the same order before proceeding to co-integration tests. We use tests that are specifically designed for panel data. In particular, to test for unit roots we use both the Im, Pesaran, Shin test and the Harris-Tzavalis test. To test for co-integration we use the Kao test. Our tests conclude that the variables are non-stationary at levels and are co-integrated with the results presented in Table A.2. Accordingly, we specify the following error-correction model:

⁹ Duffy et al., 2014. Estimates based on structural demand.

¹⁰ PRTB/ESRI Quarter 4 2015 Rent Index. Available from: www.esri.ie/pubs/RI2015Q4.pdf.

$$\begin{aligned}
\Delta \ln rinv_{it} &= \lambda(\ln rinv_{it-1} - \beta_0 \ln rhp_{it-1} - \beta_1 \ln gdppc_{it-1} \\
&\quad - \beta_2 \ln pop_{it-1} - \beta_3 rrat_{it-1}) + \sum_{i=1}^2 \theta_i \Delta \ln rinv_{it-i} \\
&\quad + \sum_{i=0}^2 \theta_{i+3} \Delta \ln rhp_{it-i} \\
&\quad + \sum_{i=0}^2 \theta_{i+6} \Delta \ln gdppc_{it-i} + \sum_{i=0}^2 \theta_{i+9} \Delta \ln pop_{it-i} \\
&\quad + \sum_{i=0}^2 \theta_{i+12} \Delta \ln rrat_{it-1} + u_{it}
\end{aligned}$$

where the long-run rate is based on the results from the fixed effects model and the error-correction term can be interpreted as the residuals in time $t - 1$. We estimate the short-run model with both OLS and fixed effects results.

The results for the error-correction model are located in Table 2. We present the error-correction model using both long-run models, i.e. the OLS and fixed effects model's lagged residuals are used to calculate the short-run error-correction model. In both cases, the sign of the coefficients on $ect_{i,t-1}$ is negative as we would expect given that theory suggests that this term adjusts the dependent variable back towards equilibrium. The degree of error-correction is very similar at 29 and 24 per cent in both models. Given that this term also shows the speed at which adjustment takes place, this suggests that any deviation between actual and fundamental rates takes approximately four years to close. The results of the F-test indicates that the OLS specification is warranted in this case, thereby suggesting that country-specific factors are important in explaining cross-country differences in the investment rate in the long run but not in the short run.

TABLE 2 Short-run Cross-country Residential Investment Rate models

Variable	Parameter	Estimate (OLS)	T-Stat	Estimate (Fixed effects)	T-Stat
$\text{ect}_{i,t-1}$	λ_0	-0.29	-3.88	-0.24	-2.94
$\Delta \ln rinv_{i,t-1}$	θ_1	0.42	3.46	0.31	2.28
$\Delta \ln rinv_{i,t-2}$	θ_2	0.25	2.01	0.15	1.05
$\Delta \ln rhp_{i,t}$	θ_3	0.88	2.16	0.89	1.97
$\Delta \ln rhp_{i,t-1}$	θ_4	0.28	0.72	0.39	0.95
$\Delta \ln rhp_{i,t-2}$	θ_5	0.19	0.52	0.39	0.96
$\Delta \ln gdppc_{i,t}$	θ_6	0.45	1.81	0.38	1.38
$\Delta \ln gdppc_{i,t-1}$	θ_7	0.24	0.86	0.36	1.17
$\Delta \ln gdppc_{i,t-2}$	θ_8	-0.26	-1.03	-0.24	-0.91
$\Delta \ln pop_{i,t}$	θ_9	3.80	1.47	3.22	1.11
$\Delta \ln pop_{i,t-1}$	θ_{10}	-3.24	-0.92	-2.47	-0.68
$\Delta \ln pop_{i,t-2}$	θ_{11}	-2.03	-0.83	-2.25	-0.87
$\Delta \ln rrat_{i,t}$	θ_{12}	0.56	0.77	0.78	1.02
$\Delta \ln rrat_{i,t-1}$	θ_{13}	-1.65	-2.08	-1.51	-1.82
$\Delta \ln rrat_{i,t-2}$	θ_{14}	-2.15	-2.58	-2.02	-2.33
N			108		108
R2			0.65		0.63
F-Test (Fixed Effects)					0.35

Note: Estimated over the period 2003 to 2014.

Conclusion

Over the period 1995 to 2007 it is estimated that the Irish economy, as measured by real GDP, more than doubled in size. The unemployment rate fell from 8.5 per cent in Quarter 1, 1998 to 4.2 per cent in the first quarter of 2005. Apart from a short interruption in 2001, the Irish housing market grew significantly during this period. This growth is reflected not only in house prices but also in other indicators which show a huge expansion of activity levels within the market. Post-2007 the housing market experience has been very different. House prices declined substantially by almost 50 per cent, and housing supply, which reached a peak of 93,000 units in 2006, fell back to approximately 10,000 levels by 2011.

It is therefore of great interest to understand the mechanics behind residential investment. This Special Article attempts to analyse the dynamics of residential investment throughout selected European countries from the period 2003 to 2014. Our empirical strategy consists of two stages whereby we measure both the long-run and short-run dynamics by means of a fixed effects and error-correction model. Our analysis finds that residential investment can be well described by a set of fundamental factors affecting demand in the long run. We find a significant positive impact caused by real GDP per capita, real house price,

as well as the ratio of population aged 25-39 to total population. As well as this, co-integration analysis indicates that there is error-correction of between 25 and 29 per cent per year, meaning that it takes approximately four years for residential investment to return to equilibrium following a shock to one of the endogenous variables. Our counterfactual analysis suggests that actual levels of investment in Ireland were far above levels necessary in the early 2000s and at present are below the level suggested by fundamentals. Finally, in terms of housing units, our model implies that we are below the level that is currently needed at present and this has important policy implications.

The housing supply problem in Ireland is very clear when one considers that as of 1 February 2016 there were only 3,600 rental homes available on the market across the country.¹¹ With rents having risen 43 per cent since the low in 2010, this shortage has certainly been a major factor in the observed increases. As well as this, there has also been a consistent shortage in housing for sale with data showing as of December 2015 only 25,000 homes on the market.¹² Morgenroth (2014) notes that the need for housing in Ireland is not spread evenly throughout the country. He estimates that 60 per cent of the required additional housing is needed in Dublin with much of the rest being needed in the Dublin commuter belt and other large cities. Given that average total annual housing completions since 2011 is just over 10,000,¹³ this implies that the amount of house being built is not even enough to meet the demand for additional housing in Dublin, let alone the rest of the country.

There are however, a variety of potential policy measures that can be undertaken in order to alleviate this problem. Morley et al. (2015) survey various housing supply measures that have been undertaken over the years in a variety of countries. For example, they review the use of a site or land value tax in Denmark. The value of this tax increases with the price of land and therefore provides an incentive for landowners to release development land at a time when it is demanded. As well as a site value tax, the authors also discuss solutions in relation to planning regulations such as minimum space requirements for housing as well as the timeframe of the planning process. While relatively successful in other countries, it is unclear how some of these policies would work if applied in Ireland. It is therefore worth conducting more research into the potential effectiveness of these policies in the Irish housing market.

¹¹ Lyons, R., 2016. ‘Daft Q4 2015 Rental report’.

¹² Lyons, R., 2016. ‘Daft Q4 2015 house price report’. Available at: www.daft.ie/report/q4-2015-houseprice-report-daft.pdf.

¹³ Based on data from the Department of the Environment, Community and Local Government, Housing Statistics.

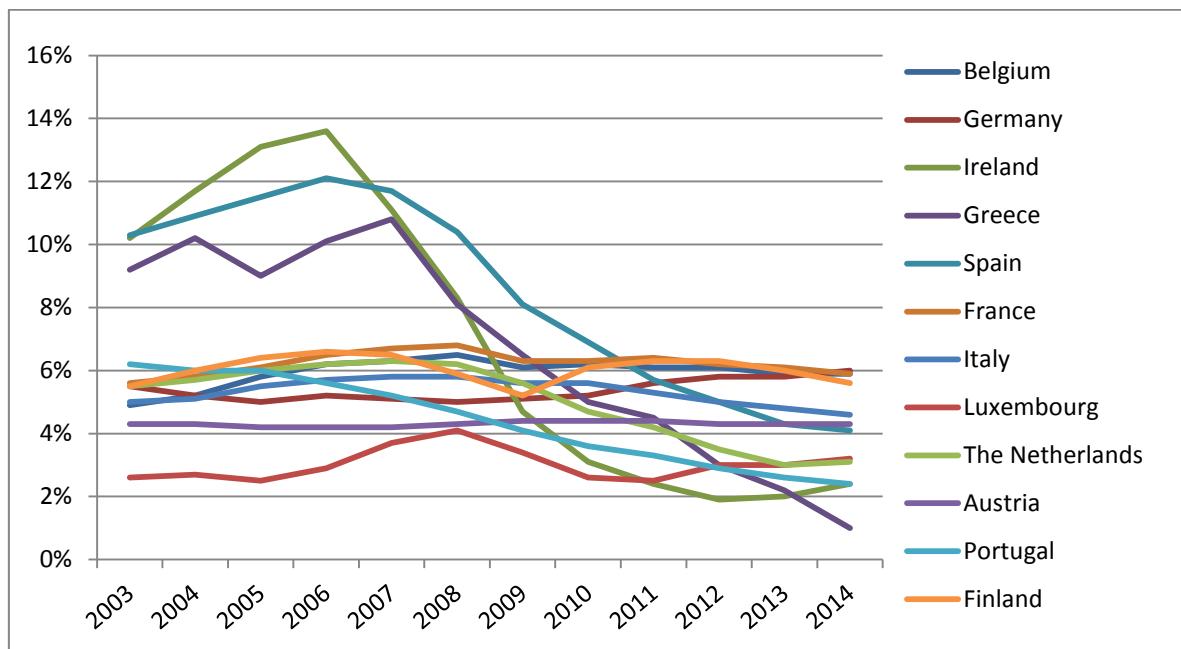
References

- Addison-Smyth D., K. McQuinn and G. O'Reilly (2008). 'Estimating the Structural Demand for Irish Housing,' Research Technical Paper, 1/RT/08, Central Bank and Financial Services Authority of Ireland.
- Addison-Smyth, D. and K. McQuinn (2015). 'Assessing the Sustainable Nature of Housing-Related Taxation Receipts: The Case of Ireland', ESRI, Working Paper No. 503. May 2015.
- Cameron, G., J. Muellbauer and A. Murphy (2006). 'Was there a British house price bubble? Evidence from a regional panel', University of Oxford, Department of Economics Discussion Paper Series, ISSN 1471-0498.
- Dellepiane, S., N. Hardiman and L.J. Heras (2013). 'Building on easy money: the political economy of housing bubbles in Ireland and Spain'. UCD Geary Institute discussion paper series.
- DiPasquale, D. (1999). 'Why don't we know more about Housing Supply?' *The Journal of Real Estate Finance and Economics*. January 1999, Volume 18, Issue 1, pp 9-23.
- Duffy, D., D. Byrne and J. Fitzgerald (2014). 'Alternative Scenarios for New Household Formation in Ireland,' *Quarterly Economic Commentary*: Spring. Special Articles, Economic and Social Research Institute (ESRI).
- Eichengreen, B. (2006). *The European Economy Since 1945: Coordinated Capitalism and Beyond*, Princeton, NJ, Princeton University Press.
- Gattini, L. and I. Ganoulis (2012). 'House Price responsiveness of housing investments across major European economies,' Working Paper Series 1461, European Central Bank.
- Harris, R.D.F. and E. Tzavalis (1999). 'Inference for unit roots in dynamic panels where the time dimension is fixed'. *Journal of Econometrics* 91: 201–226.
- Hausman, J.A. (1978). 'Specification Tests in Econometrics,' *Econometrica*, Econometric Society, Vol. 46(6), pp. 1251-71, November.
- Honohan, P. (2010). 'The Irish banking crisis, regulatory and financial stability policy 2003-2008'. A report to the Minister of Finance. Dublin: The Stationery Office. www.bankinginquiry.gov.ie/The%20Irish%20Banking%20Crisis%20Regulatory%20and%20Financial%20Stability%20Policy%202003-2008.pdf.
- Im, K.S., M.H. Pesaran and Y. Shin (2003). 'Testing for Unit Roots in Heterogeneous Panels', *Journal of Econometrics*, Vol 115, 53-74.'
- Kelly, R. and K. McQuinn (2014). 'On the Hook for Impaired Bank Lending: Do sovereign-Bank_interlinkages affect the Fiscal Multiplier?', Research Technical Papers 01/RT/13, Central Bank of Ireland.
- Lyons, R. (2016). 'The Daft.ie Rental Report. An analysis of recent trends in the Irish rental market, 2015 in Review'. Available at www.daft.ie/report/q4-daft-rental-report-2015.pdf.

- McQuinn, K. (2014). ‘Bubble, Bubble Toil and Trouble? An Assessment of the Current State of the Irish Housing Market,’ *Quarterly Economic Commentary*, Summer. Special Articles, Economic and Social Research Institute (ESRI).
- McQuinn, K. and D. Addison-Smyth (2015). ‘Assessing the Sustainable Nature of Housing-Related Taxation Receipts: The Case of Ireland,’ Papers WP503, Economic and Social Research Institute (ESRI).
- McQuinn, K. and G. O'Reilly (2007). ‘A model of cross-country house prices,’ Research Technical Paper 5/RT/07, Central Bank and Financial Services Authority of Ireland.
- McQuinn, K. and K. Whelan (2015). ‘Europe’s Long-Term Growth Prospects: With and Without Structural Reforms’, ESRI, Working Paper No. 501, May 2015
- Meen G. (1996). ‘Ten propositions in UK housing macroeconomics: An overview of the 1980s and early 1990s’, *Urban Studies*, 33(3), 425-44.
- Meen G. (2000). ‘Housing cycles and efficiency’, *Scottish Journal of Political Economy*, Vol. 47, 2, 114-40.
- Morgenroth, E. (2014). ‘Modelling the Impact of Fundamentals on County Housing Markets in Ireland’, MPRA Paper No. 57665.
- Morley, C., D. Duffy and K. McQuinn (2015). ‘A Review of Housing Supply Policies,’ *Quarterly Economic Commentary*, Winter. Special Articles, Economic and Social Research Institute (ESRI).
- Muellbauer, J. and A. Murphy (1994). ‘Explaining regional consumption in the UK’, Working Papers 199429, School of Economics, University College Dublin.
- Muellbauer, J. and A. Murphy (1997). ‘Booms and Busts in the UK Housing Market,’ *Economic Journal*, Royal Economic Society, Vol. 107(445), pp. 1701-27.
- Muellbauer, J., G. Cameron and A. Murphy (2006). ‘Was there a British house price bubble?’, Evidence from a regional panel, CEPR discussion paper, No. 5619.
- Peek, J. and J.A. Wilcox (1991). ‘The Measurement and Determinants of Single Family House Prices’, *Amer. Real Estate Urban Econ. Assoc. J.* 19, 353-382.
- Vermeulen, W. and J. Rowendal (2007). ‘Housing Supply and Land Use Regulation in the Netherlands,’ Tinbergen Institute Discussion Papers 07-058/3, Tinbergen Institute.

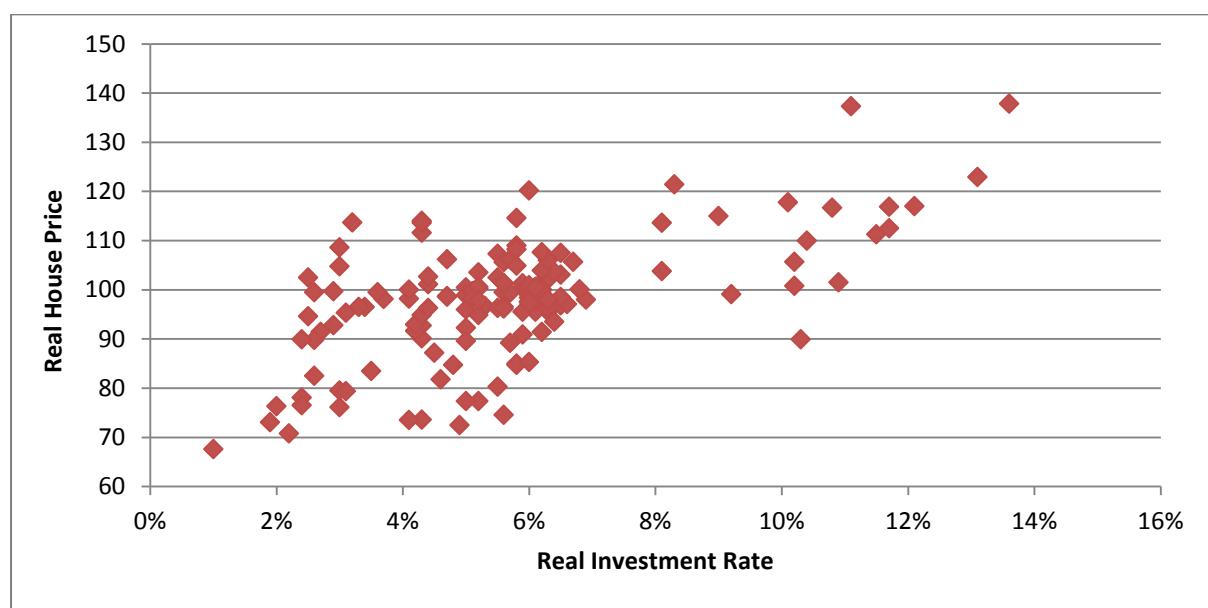
Appendix

FIGURE A.1 Residential Investment Rates

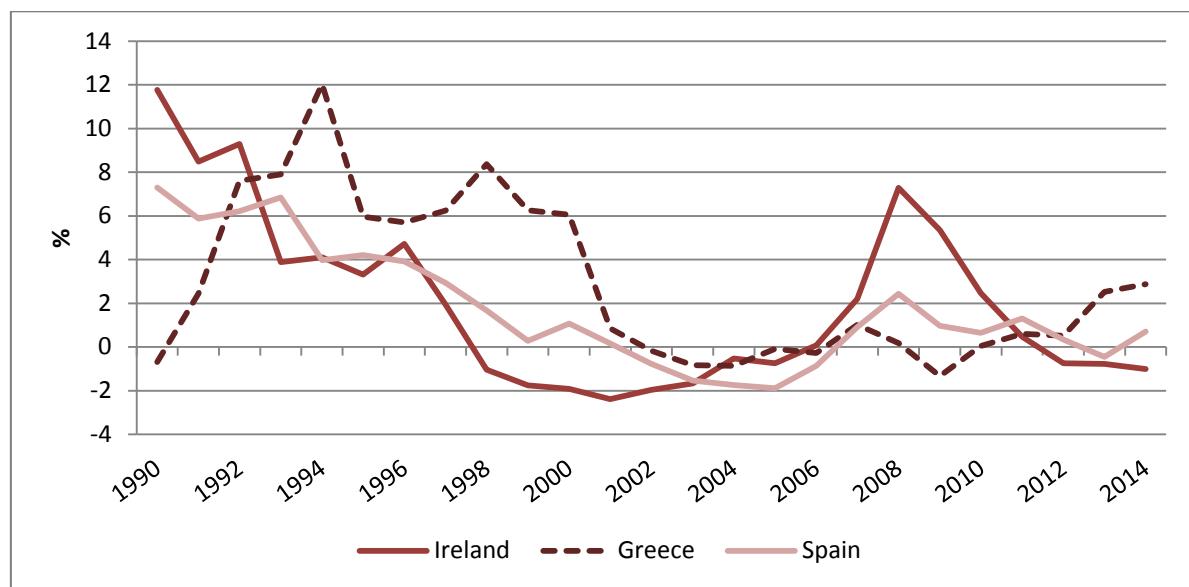


Source: Ameco.

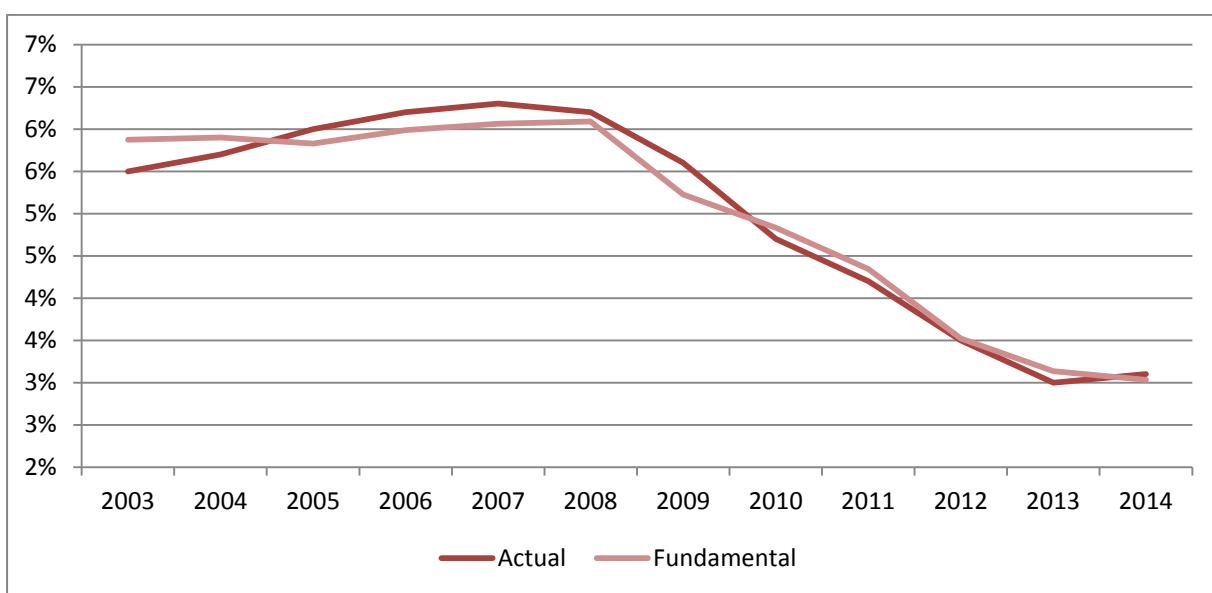
FIGURE A.2 Correlation of House prices and Investment Rates



Source: Authors' own calculations.

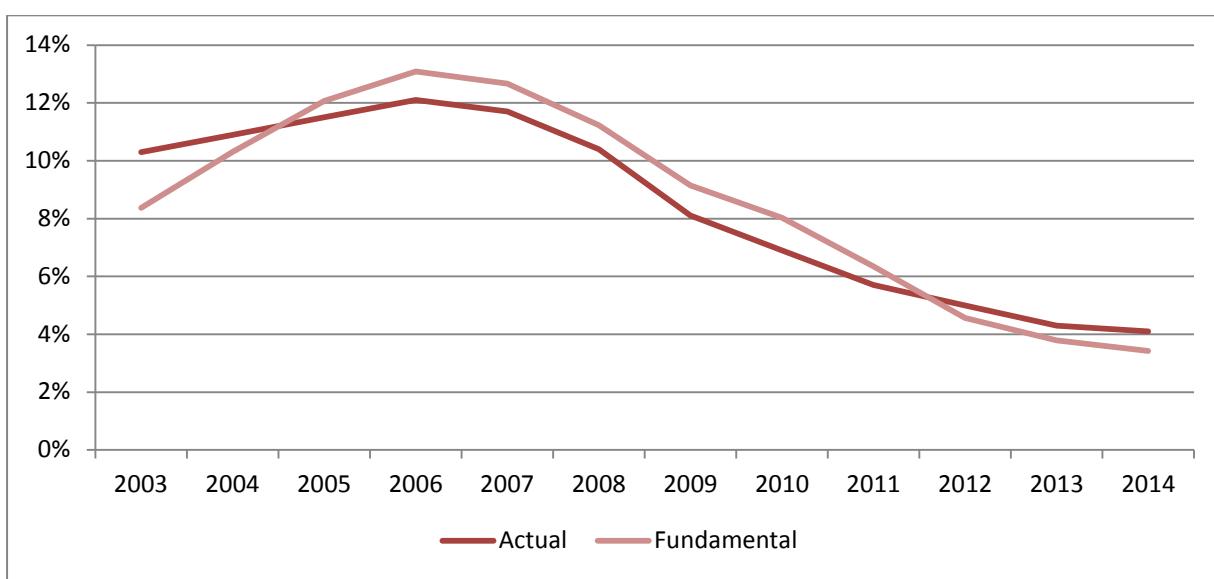
FIGURE A.3 Real Interest Rates

Source: Ameco.

FIGURE A.4 Actual vs Fundamental Investment Rate the Netherlands

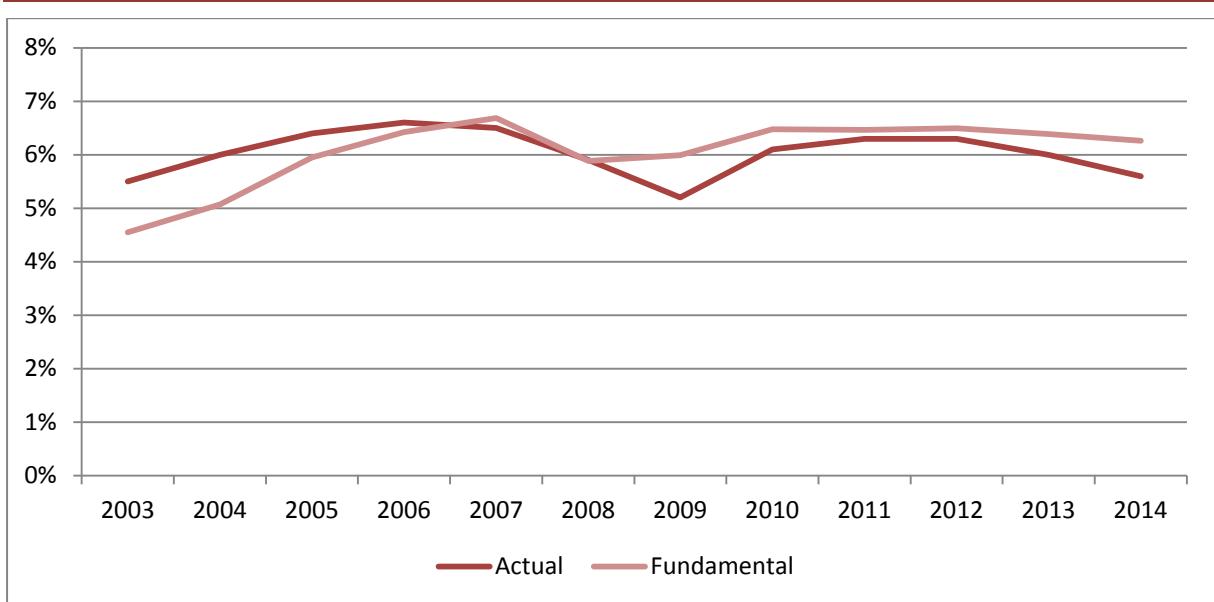
Source: Authors' own calculations.

FIGURE A.5 Actual vs Fundamental Investment Rate Spain

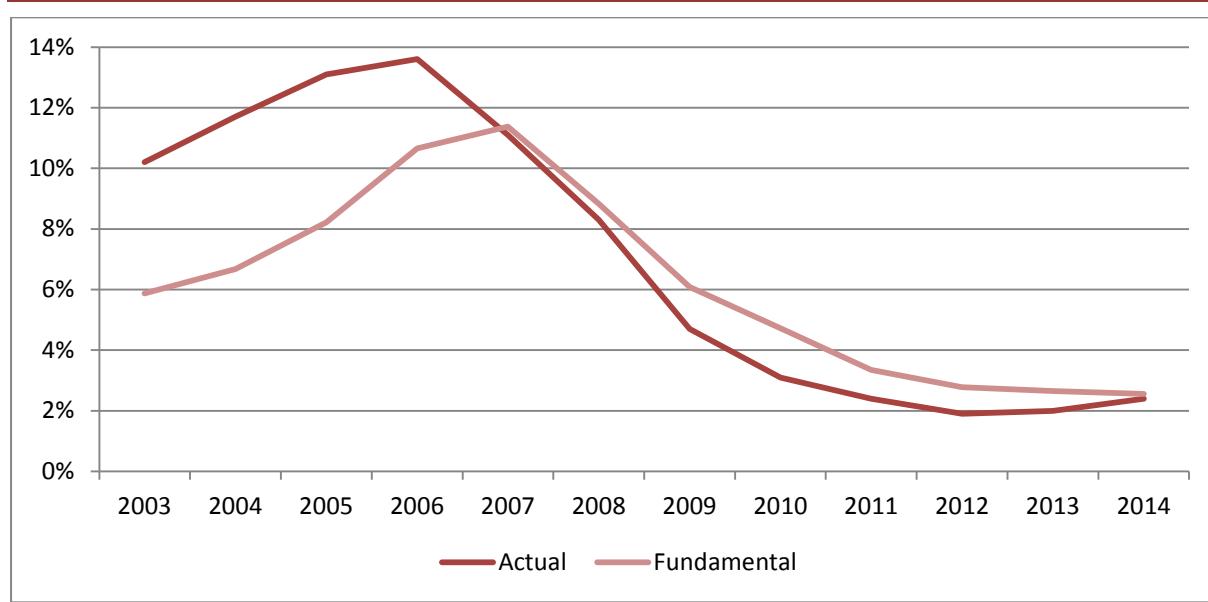


Source: Authors' own calculations.

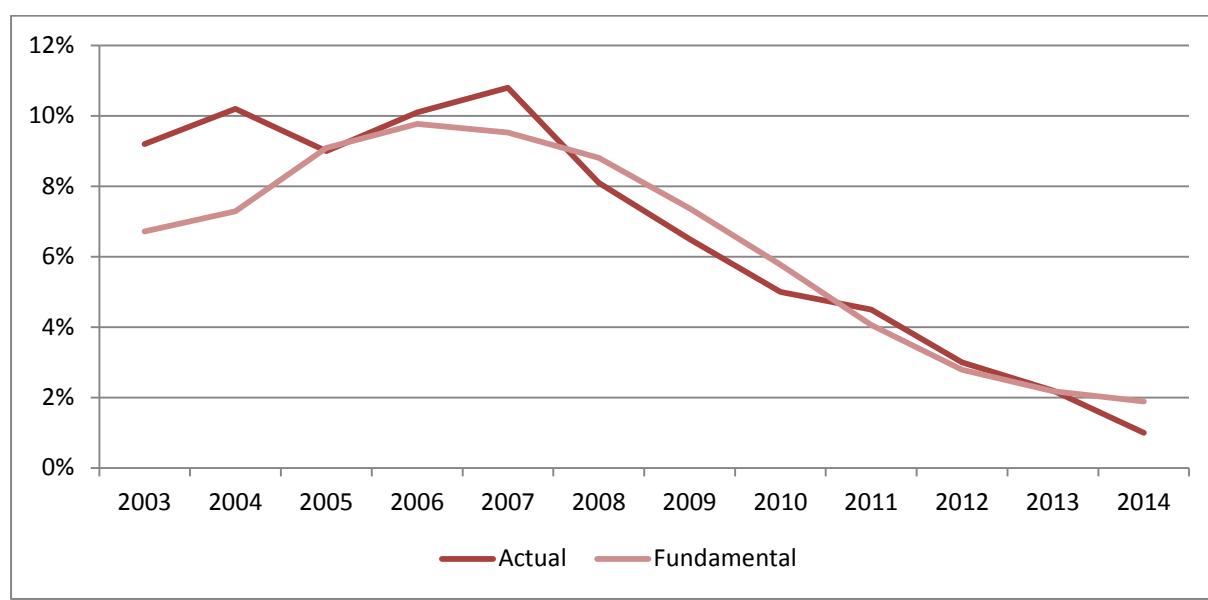
FIGURE A.6 Actual vs Fundamental Investment Rate Finland



Source: Authors' own calculations.

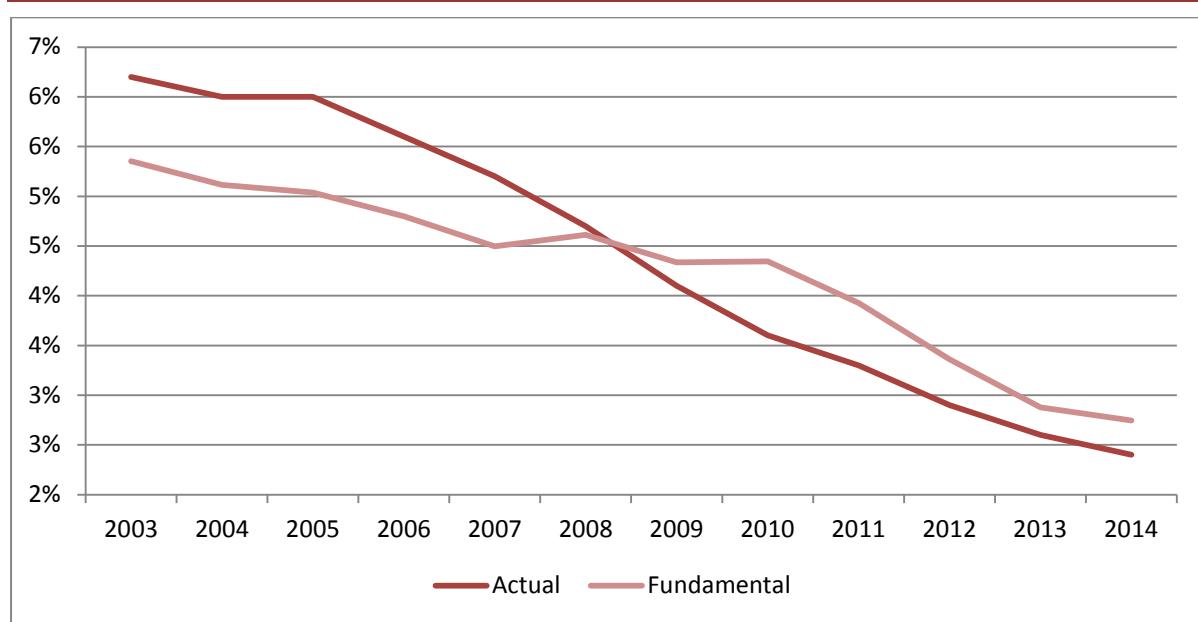
FIGURE A.7 Actual vs. Fundamental Investment Rate Ireland

Source: Authors' own calculations.

FIGURE A.8 Actual vs Fundamental Investment Rate Greece

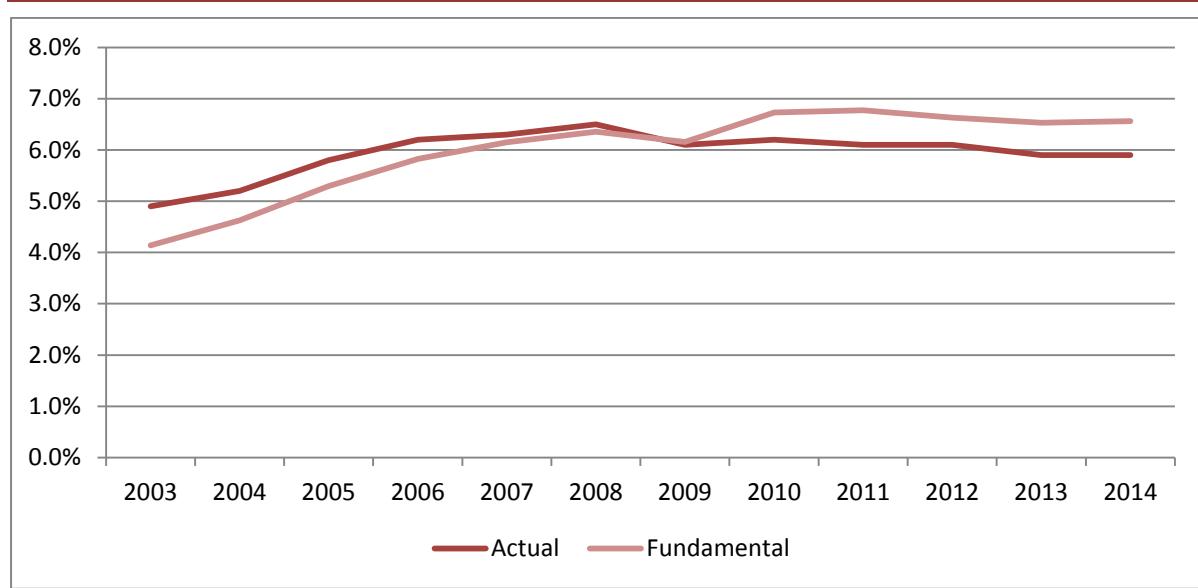
Source: Authors' own calculations.

FIGURE A.9 Actual vs Fundamental Investment Rate Portugal

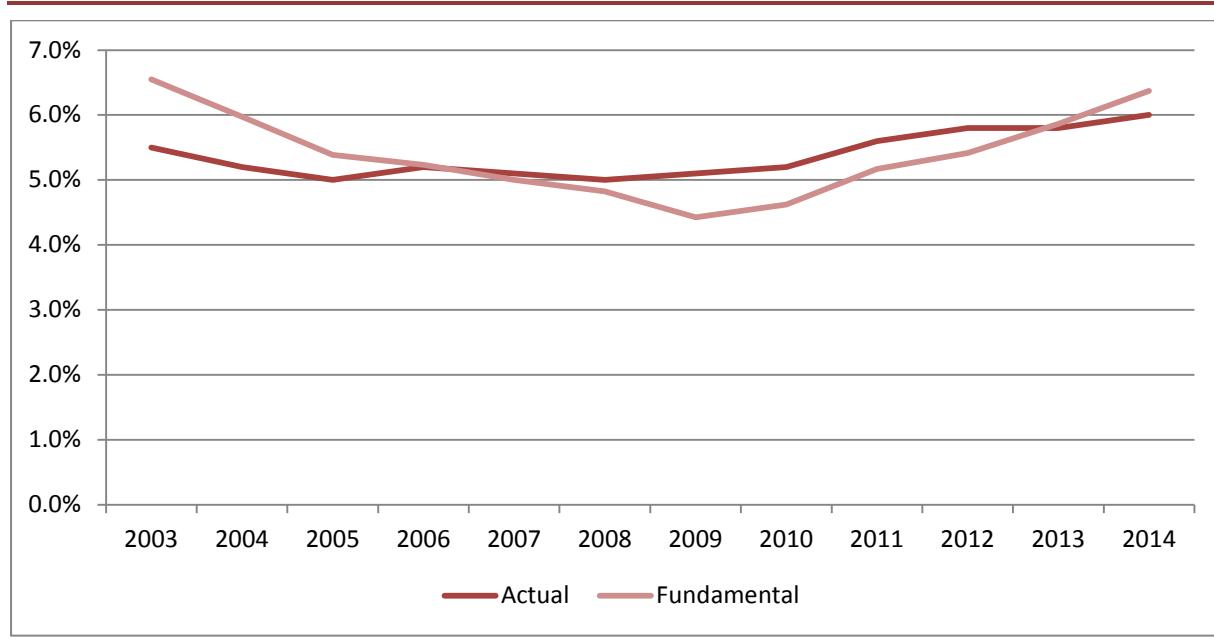


Source: Authors' own calculations.

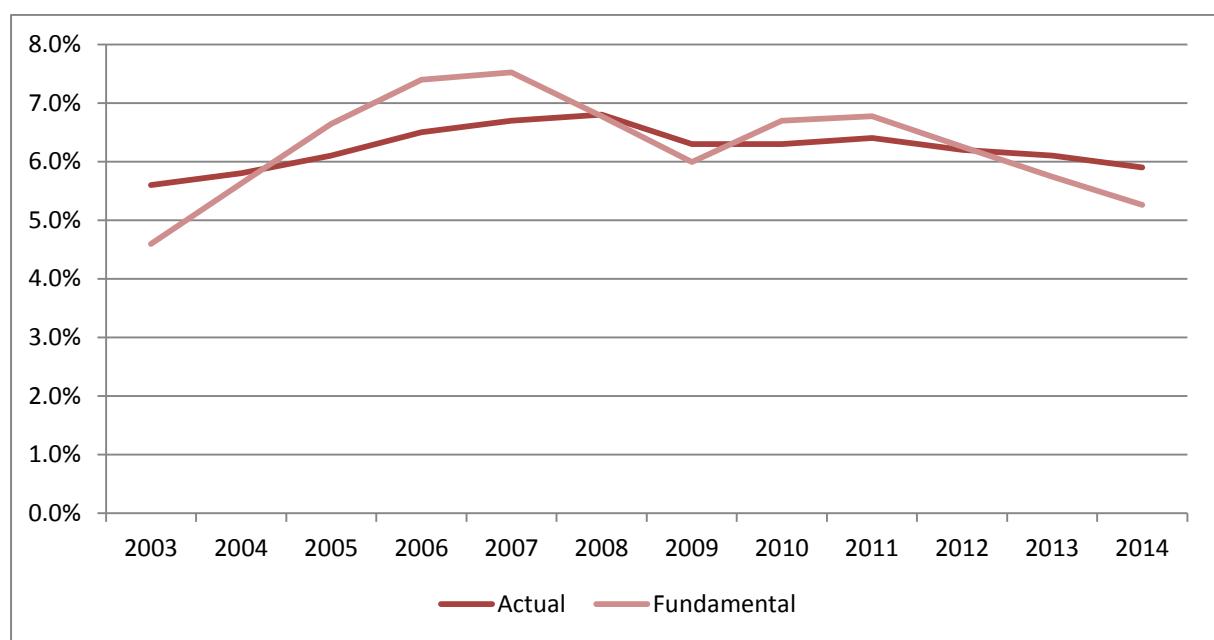
FIGURE A.10 Actual vs Fundamental Investment Rate Belgium



Source: Authors' own calculations.

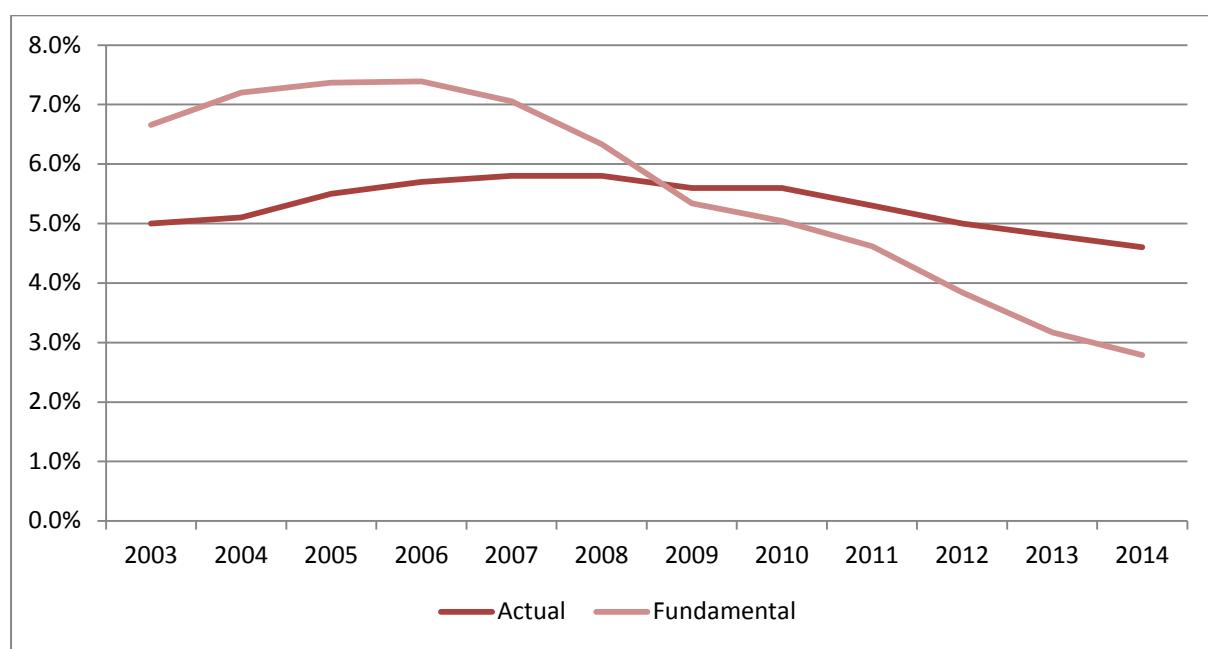
FIGURE A.11 Actual vs Fundamental Investment Rate Germany

Source: Authors' own calculations.

FIGURE A.12 Actual vs Fundamental Investment Rate France

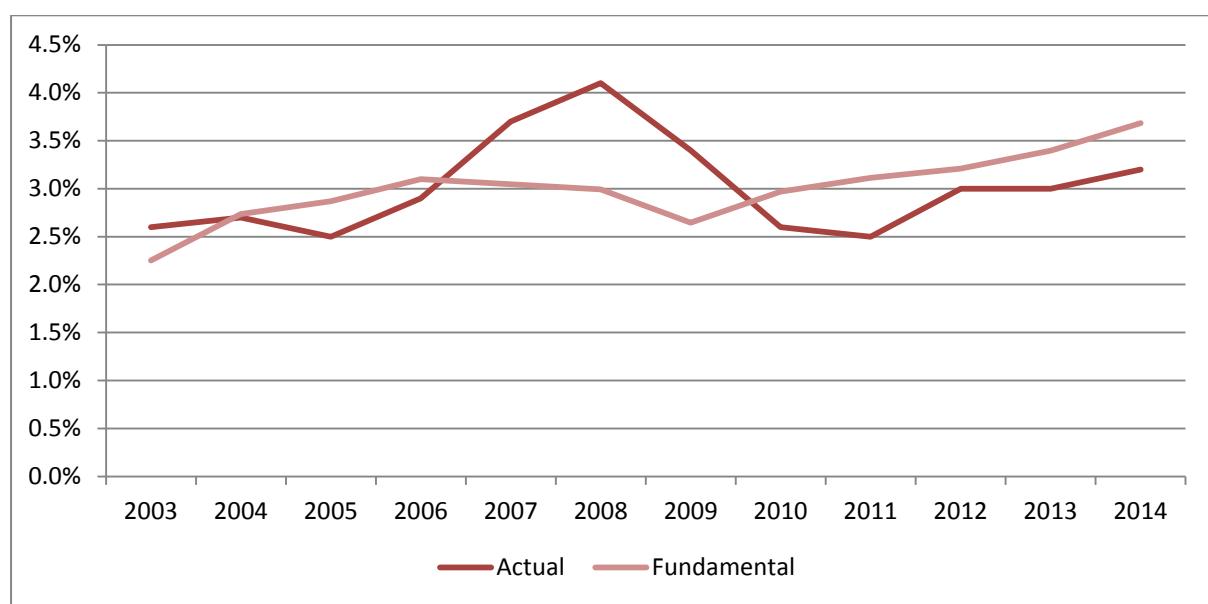
Source: Authors' own calculations.

FIGURE A.13 Actual vs Fundamental Investment Rate Italy

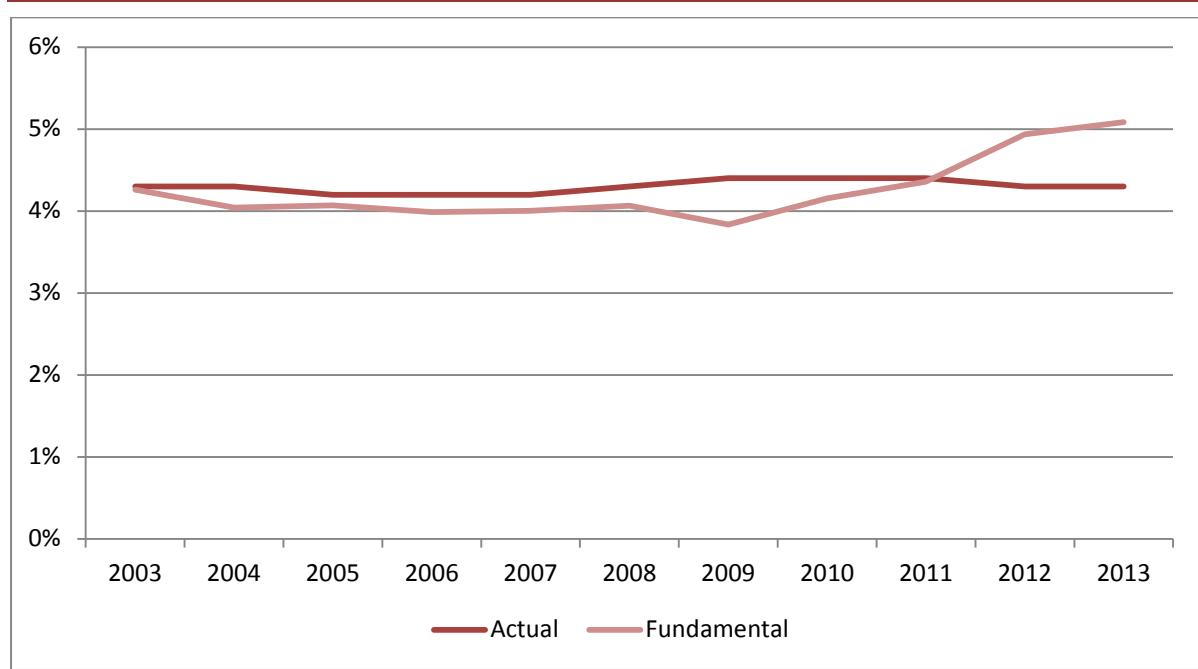


Source: Authors' own calculations.

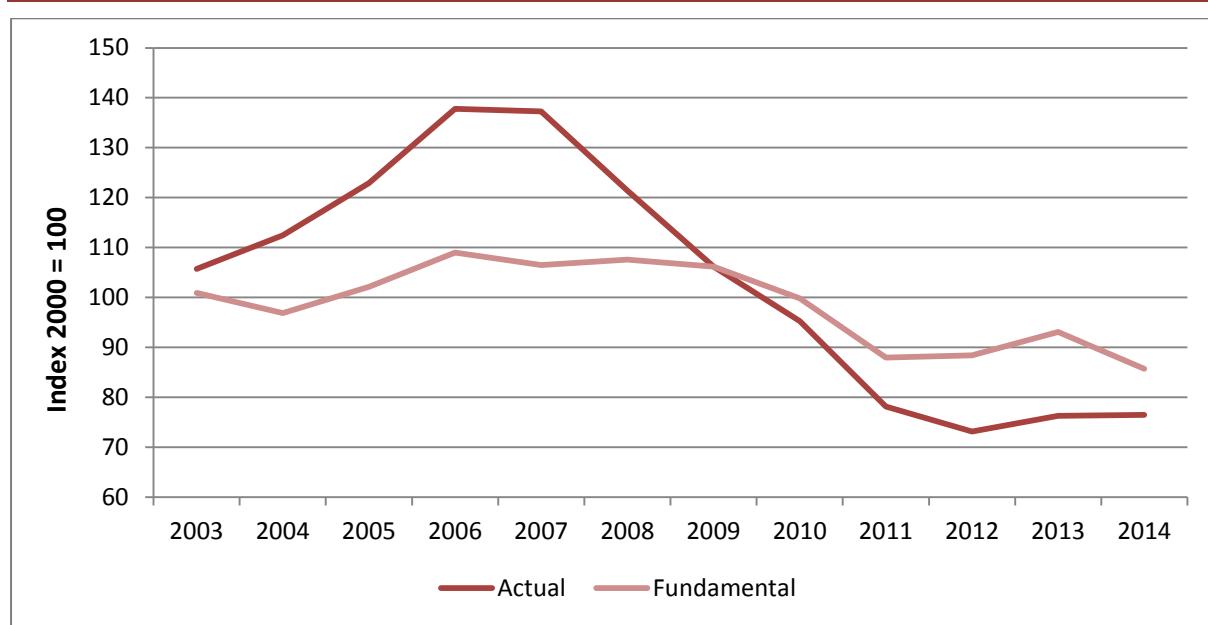
FIGURE A.14 Actual vs Fundamental Investment Rate Luxembourg



Source: Authors' own calculations.

FIGURE A.15 Actual vs Fundamental Investment Rate Austria

Source: Authors' own calculations.

FIGURE A.16 Actual vs. Fundamental House Prices Ireland

Source: Authors' own calculations.

TABLE A.1 Hausman Test Fixed effects vs. Random effects

Hausman Test		Statistic	P-value
Result		79.36	0.00

Note: Random effects model, H_1 : Fixed effects model.

TABLE A.2 Unit Root Test Results

Test Type	Harris-Tzavalis		Im, Pesaran, Shin	
Variable	Statistic	P-value	Statistic	P-value
<i>rinv</i>	0.963	0.148	-1.144	0.126
<i>rgdppc</i>	0.635	0.059	-0.511	0.305
<i>rhp</i>	0.946	0.996	-0.622	0.267
<i>ryoungpop</i>	1.009	0.596	1.192	0.883
<i>rrate</i>	0.654	0.095	-1.132	0.129

Note: H_0 : Panel contains unit root. H_1 : Panel is stationary.

TABLE A.3 Panel Co-integration Test Results

Kao Test	Statistic	P-value
Result	-5.344	0.000

Note: H_0 : No Cointegration . H_1 : Cointegration

Corporate Taxation and Foreign Direct Investment in EU Countries: Policy Implications for Ireland*

Ronald B. Davies^a, Iulia Siedschlag^b and Zuzanna Studnicka^c

1 Introduction

This research provides new empirical evidence on the impact of corporate taxation and other factors on the attractiveness of Ireland and other EU countries to foreign direct investment (FDI) over the period 2002-2013. In comparison to previous analyses which have considered individual countries as alternative locations,¹ we analyse groups of EU countries with similar characteristics as alternative locations for FDI. In this context, we examine the extent to which Ireland and the United Kingdom (UK) are perceived as similar alternatives with respect to factors that determine the location choice of foreign affiliates. This question is relevant in relation to a possible redirection of FDI in the case of a vote in the UK to leave the EU. In addition to identifying average effects for all FDI projects, we account for the heterogeneity of investors' behaviour by analysing intra-EU investments and investments from outside the EU. Furthermore, we identify and quantify similarities and differences with respect to the effects of corporate taxation and of other factors on the location choice of foreign affiliates in manufacturing and services.

This new empirical evidence suggests how changes in the corporate taxation in Ireland and the UK would potentially affect Ireland's attractiveness to foreign direct investment. While we focus on corporate tax policy, we also highlight the importance of other factors which multinationals consider for the location choice

* This research is part of the joint ESRI and the Department of Finance Research Programme on the Macro-Economy and Taxation. The views expressed in this paper are those of the authors and they should not be regarded as an official position of the Department of Finance. We thank Marius Brülhart, Martina Lawless and participants at research presentations at the Department of Finance and the Society for International Trade Theory (SITT) Conference at the University College Dublin for useful discussions.

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¹ This modelling approach implies that each location is perceived as perfectly independent from any other location option. Recent studies include among others Head and Mayer (2004), Devereux et al. (2007), Barrios et al. (2012), Lawless et al. (2014), Barrett et al. (2015), Davies and Killeen (2015).

of foreign affiliates including those which could be influenced by public policy such as production costs and investment in R&D.

The results of this analysis indicate that Ireland and the UK are perceived to be similar as alternative locations for FDI in particular by investors from outside the EU and in services. This result suggests that a possible redirection of FDI from the UK to Ireland would be more likely in services and by investors with headquarters outside the EU.

Consistent with international evidence, we find that on average, the attractiveness of countries to FDI is negatively linked to corporate tax rates. However, corporate investment decisions are based on a range of other factors which influence profitability. The results of this analysis indicate that location characteristics which increase the attractiveness of countries within the EU groups considered include market size, the possibility to access other EU markets from the host country, speaking the same language, being neighbours, and having low production costs. We uncover a non-linear effect of R&D intensity on the attractiveness of countries to FDI. Our results indicate that new FDI projects are likely to locate in countries with a low level of technological development where they benefit from local advantages such as low production costs. This result is consistent with the well-established evidence on the intensity of multinational firms in knowledge-based assets that give them an advantage over domestic firms in host countries and allow them to overcome barriers to entry in foreign markets.² The non-linear effect implies that, as the R&D intensity increases above a certain threshold,³ countries with higher levels of technological development are attractive to FDI. As documented by recent evidence, knowledge-sourcing is an increasingly important factor for the location choice of foreign affiliates by multinational firms.⁴

This analysis finds that the effect of corporate taxation on the attractiveness of countries to FDI varies depending on economic sectors. It appears that lower corporate tax rates increase the attractiveness of EU countries to FDI in services, while manufacturing FDI is more likely to locate in larger countries which tend to have higher corporate tax rates such as Germany and France.

This analysis also shows that given the groups of EU countries considered, investors from EU and non-EU countries value location characteristics differently.

² See for example Markusen (2002).

³ Our estimates suggest that the turning point for R&D intensity when all new FDI projects are considered is 1.8 per cent of GDP.

⁴ See for example von Zedtwitz and Gassmann (2002), and Iwasa and Odagiri (2004), and Siedschlag et al. (2013a).

While FDI by non-EU investors is more likely in countries with lower corporate tax rates, intra-EU investments are more likely to locate in countries with higher corporate taxes where they benefit from other local advantages. The results indicate that EU investors are seeking low cost locations in other EU countries, while investors from outside the EU are attracted by the possibility to get access to the European Single Market.

Policy analysis based on these research results indicate that the sensitivity of Ireland's attractiveness to FDI with respect to changes in its corporate tax rate is the highest among EU countries in the case of FDI projects by investors from outside the EU. Assuming all other factors would remain unchanged, an increase in Ireland's statutory corporate tax rate by one percentage point (from 12.5 per cent to 13.5 per cent) would be associated with a reduction in its probability of being chosen as a location for FDI projects from non-EU countries by 4.6 per cent.

All else being equal, a more competitive corporate tax rate in the UK would reduce the attractiveness of Ireland especially for FDI from non-EU countries. With everything else unchanged, a reduction of the UK's statutory corporate tax rate by one percentage point (from 20 per cent to 19 per cent) would reduce Ireland's attractiveness to new FDI projects from non-EU countries by 4.3 per cent.

Taken together, these research results indicate that a competitive corporate tax rate is a significant factor for attracting FDI to Ireland, especially from countries outside the EU. In the context of increased international tax competition, Ireland's attractiveness to FDI would benefit from policies aimed at maintaining cost competitiveness and enabling further R&D investment.

The empirical methodology and data used for this analysis are described in Section 2 and the empirical results are presented in Section 3. On the basis of the results of this analysis, Section 4 discusses policy implications for Ireland's attractiveness to FDI. Section 5 concludes.

2 Empirical Methodology and Data

Location choices by multinational firms have been typically analysed using a random utility maximisation econometric framework following McFadden (1974).⁵ In this modelling set-up, investors consider the set of location options

⁵ Recent reviews of this modelling framework include among others Schmidheiny and Brülhart (2011), Siedschlag et al. (2013a, 2013b), Lawless et al. (2014) and Davies and Killeen (2015).

and choose the location with the highest profitability among competing options. The profitability of each location option is a function of the location's characteristics.

2.1 Baseline Model Specification

To identify the attractiveness of EU countries to FDI, we use a nested logit model following McFadden (1984). Details of this empirical approach are given in Box 1.

Box 1. Modelling Location Choices by Multinational Firms: A Nested Logit Approach

The nested logit model (NLM) formalised by McFadden (1984) improves on the conditional logit model (CLM) by considering groups of similar locations and thus allowing more flexible substitution patterns across alternative locations.⁶ The partition of location options in groups of countries (nests) is based on similar unobserved characteristics that affect profitability. In this empirical set-up, corporate investors make their location decisions in two steps:

- (1) the choice between groups of similar locations (nests);
- (2) the location choice within nests.

The assumption in the NLM is that of independence between nests (unobserved locational characteristics are not correlated between nests) while non-negative correlation of unobserved locational characteristics within nests is allowed.

In this case, the location probability for option j located in nest k (P_j^k) is given by the product of the probability of nest k to be chosen among K nests (P_k) and the probability of location j to be chosen given that nest k has been chosen ($P_{j/k}$):

$$P_j^k = P_k * P_{j/k} \quad (1)$$

An important parameter in the nested logit modelling framework is a measure of the degree of independence of the unobserved profit among the location options within the nest: a dissimilarity parameter, λ_k . A higher value of λ_k indicates a greater independence and so less correlation among location options within the nest k . If the location options within the nest are perfectly independent (perfectly dissimilar), $\lambda_k = 1$. In this case a nested structure is not needed and the location probabilities could be estimated with the CLM. Low values of λ_k indicate high similarity among location options within the nest and a higher degree of substitution among them. $\lambda_k = 0$ indicates perfect dependence (similarity) among location options.

Values of λ_k between 0 and 1 indicate consistency of the nested structures with profit maximisation for all possible values of the explanatory variables.

$\lambda_k > 1$ indicates nested structures consistent with profit maximisation behaviour for some range of the explanatory variables but not for all values. $\lambda_k < 0$ indicates that the model is inconsistent with profit maximisation.⁷

⁶ The conditional logit model is based on the assumption of independence of irrelevant alternatives (IIA). This statistical property implies that changes in the location characteristics affect only the distribution of investments across all location options. Analyses of location choice of affiliates by multinational firms using nested logit models include among others Devereux and Griffith and (1998), Crozet et al. (2004) and Siedschlag et al. (2013a).

⁷ More details on testing nested structures are provided by Henscher et al. (2005) and Pollak and Wales (1991).

In contrast to the conditional logit modelling, in the nested logit modelling, the *expected* total number of investments depends on the regressors and estimated parameters and it differs from the *observed* total number of firms. A change in a region's locational attractiveness will affect the total number of firms summed across all alternative locations.⁸

The baseline model specification we estimate is as follows:

$$y_{ij} = \begin{cases} 1, & \text{if } \pi_{ij} > \pi_{ik}, \forall j \neq k \\ 0, & \text{otherwise} \end{cases} \quad (2)$$

The dependent variable y_{ij} is a binary variable equal to 1 if a new foreign affiliate i was established in country j over the period 2002-2013. π_{ij} is the expected profit for firm i in country j . Country j is chosen if π_{ij} is larger than in any other location option k . Since π_{ij} is not known ex-ante by the multinational firm, the probability that country j is chosen by firm i depends on the likelihood that its profit will be maximised conditional on location characteristics in country j .

The expected profit π_{ij} is a function of observed locational characteristics, X_j , and a random term of unobserved profit μ_{ij} :

$$\pi_{ij} = X_j \beta + \mu_{ij} \quad (3)$$

The variable of interest in this analysis is the statutory corporate tax rate at country level. Corporate taxes impact on the cost of capital which in turn influences investment decisions. Existing evidence on the effect of corporate taxation on the location choice of foreign affiliates indicates that higher taxes reduce the likelihood of foreign direct investment.⁹

In addition to corporate taxation, we analyse the attractiveness of Ireland and other EU countries to other factors which have been found to influence the location choice of foreign affiliates.¹⁰ These factors include:

- demand factors such as market size and market access;
- production costs, proxied by GDP per capita;

⁸ A more detailed discussion of the comparisons between the conditional and nested logit modelling frameworks is given by Schmidheiny and Brülhart (2011).

⁹ Previous analyses also examined the effect of the effective average tax rates (EATR) on the location choice of FDI. Given the policy focus of this analysis, our empirical identification is based on the variation across countries of the statutory corporate tax rate which is independent of firm decisions. de Mooij and Ederveen (2003, 2008) provide meta-analyses of international evidence. Recent studies include Barrios et al. (2012) and Lawless et al. (2014).

¹⁰ Recent reviews of this evidence include among others Fontagné and Mayer (2005), Siedschlag et al. (2013a, 2013b), and Lawless et al. (2014).

- technology level and innovation capacity, proxied by the private and public R&D expenditures as percentage of GDP;
- trade and investment costs, proxied by the distance between the home and host countries;
- cultural and geographical proximity, proxied by variables for sharing a common language and for sharing a common border, respectively.

Definitions of the variables used in this analysis are given in Table A1 in the Appendix.

Having tested alternative nested structures on the basis of countries' similarity based on shared history, as well as institutional characteristics, we consider the following four groups of EU countries as location nests which are consistent with the tested random profit maximisation principles:¹¹

- *United Kingdom and Ireland*;
- *Core and Northern EU Group*: Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, and Norway;¹²
- *Central and Eastern EU Group*: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia;
- *Southern EU Group*: Greece, Italy, Malta, Portugal, Spain.

2.2 Heterogeneous Effects

The above baseline model specification considers the behaviour of a representative location-seeking investor. However, previous analyses on the location choice of multinational activity in the EU (Siedschlag 2013a, 2013b) have found that the relevance and importance of location characteristics are perceived differently by investors based in the EU and investors from outside the EU, particularly from the US. To account for this heterogeneity of investment behaviour, we analyse and compare the location decisions of investors with headquarters in the EU and those of investors with headquarters outside the EU.

¹¹ As pointed out by Greene (2000), there is no well-defined procedure to identify nested structures. Multiple nested structures are possible and their validity could be tested. Following McFadden (1984), values of λ_k between 0 and 1, indicate consistency of the nested structure with random profit maximisation principles for all values of the explanatory variables.

¹² We consider Norway as a location option together with EU countries given its membership in the European Economic Area (EEA) which makes it part of the European Single Market. Iceland and Lichtenstein are also members of the EEA. These two countries are not included in the analysis due to limited available data. The results of this analysis are unlikely to be affected given the very small size of these two countries.

Further heterogeneity in the location decisions by multinational firms is likely to exist across sectors of economic activity (Siedschlag 2013a, 2013b; Lawless et al. 2014; Davies and Killeen 2015). We explore this heterogeneity by analysing separately the location decisions of new foreign affiliates in manufacturing and services.

2.3 Data

The data for this analysis include information at firm and country level from several sources. The firm level information is extracted from the Amadeus dataset provided by Bureau van Dijk. We analyse 18,100 foreign affiliates established in EU countries over the period 2002-2013. We consider newly established foreign affiliates which are directly owned by companies which report non-zero employment and own at least 50 per cent of the voting shares in the newly established enterprises.

The distribution of FDI projects by host countries is shown in Table 1 while Table 2 shows the distribution of FDI projects by country of origin. The top five FDI destinations (accounting for 55 per cent of all new FDI projects) are Germany, the UK, Romania, Italy, and the Netherlands. The top five investing countries are Switzerland, the Netherlands, the US, Germany and Spain (56 per cent of all new FDI projects).

The definitions and data sources of the country level variables are given in Table A1 in the Appendix.

TABLE 1 Number of New Foreign Affiliates by Country of Destination

Country	Number of new foreign affiliates	Share of new foreign affiliates
Germany	3,333	18.40
United Kingdom	2,434	13.44
Romania	1,546	8.54
Italy	1,355	7.48
Netherlands	1,264	6.98
France	969	5.35
Poland	956	5.28
Czech Republic	869	4.80
Austria	788	4.35
Slovakia	786	4.34
Spain	667	3.68
Portugal	462	2.55
Belgium	346	1.91
Ireland	321	1.77
Denmark	308	1.70
Finland	260	1.44
Norway	250	1.38
Hungary	234	1.29
Estonia	194	1.07
Croatia	191	1.05
Latvia	173	0.96
Luxembourg	134	0.74
Bulgaria	94	0.52
Slovenia	56	0.31
Greece	44	0.24
Malta	44	0.24
Lithuania	32	0.18
Total	18,110	100.00

Source: Amadeus dataset provided by Bureau van Dijk.

TABLE 2 Number of New Foreign Affiliates by Country of Origin

Origin	Number of new foreign affiliates	Share in total new FDI projects	Origin	Number of new foreign affiliates	Share in total new FDI projects
Switzerland	3,209	17.72	Cayman Islands	22	0.12
Netherlands	2,274	12.56	Croatia	20	0.11
United States	1,895	10.46	Malta	18	0.10
Germany	1,712	9.45	Romania	17	0.09
Spain	1,087	6.00	Virgin Islands, British	14	0.08
Sweden	995	5.49	Chile	9	0.05
Italy	932	5.15	Bosnia and Herzegovina	8	0.04
Belgium	707	3.90	Bangladesh	7	0.04
United Kingdom	614	3.39	Mexico	7	0.04
Japan	482	2.66	Russia	7	0.04
Austria	451	2.49	Argentina	6	0.03
France	423	2.34	Egypt	5	0.03
Denmark	381	2.10	Indonesia	5	0.03
Czech Republic	363	2.00	Moldova	5	0.03
Hungary	291	1.61	Taiwan	5	0.03
Finland	285	1.57	Venezuela	5	0.03
Slovak Republic	182	1.00	Andorra	4	0.02
Portugal	167	0.92	Sri Lanka	4	0.02
Ireland	165	0.91	Nigeria	4	0.02
Luxembourg	112	0.62	Gibraltar	3	0.02
Israel	93	0.51	Pakistan	3	0.02
Turkey	93	0.51	Saudi Arabia	3	0.02
Norway	90	0.50	Angola	2	0.01
Poland	86	0.47	Libya	2	0.01
Lithuania	75	0.41	Marshall Islands	2	0.01
China	72	0.40	Tunisia	2	0.01
Canada	66	0.36	Trinidad and Tobago	2	0.01
Greece	63	0.35	United Arab Emirates	1	0.01
Slovenia	55	0.30	Bahamas	1	0.01
Bermuda	48	0.27	Botswana	1	0.01
India	48	0.27	Belarus	1	0.01
Cyprus	46	0.25	Dominican Republic	1	0.01
Estonia	45	0.25	Georgia	1	0.01
Brazil	42	0.23	Ghana	1	0.01
Latvia	42	0.23	Liberia	1	0.01
Iceland	36	0.20	Macedonia	1	0.01
Hong Kong	35	0.19	Mauritius	1	0.01
South Africa	35	0.19	Malaysia	1	0.01
Australia	28	0.15	Peru	1	0.01
South Korea	28	0.15	Philippines	1	0.01
Bulgaria	27	0.15	San Marino	1	0.01
New Zealand	24	0.13	Suriname	1	0.01

Source: Amadeus dataset provided by Bureau van Dijk.

3 Empirical Results

3.1 All New FDI Projects

Table 3 shows the estimates from nested logit regressions of determinants of the location choice of new foreign affiliates in EU countries over the period 2002–2013. The first column reports the estimates for all investors while columns 2 and 3 show the results for EU investors and investors with headquarters outside the EU.

The results in column 1 indicate that lower corporate tax rates make EU countries more attractive as locations for FDI. Location characteristics that increase countries' attractiveness to FDI over and above the effect of corporate tax rates include: market size, market potential (the possibility to access the European Single Market from the host country), speaking the same language, and being neighbours. GDP per capita captures both production costs and skills. Location probabilities are negatively linked to GDP per capita, suggesting that on average, the attractiveness of low cost locations dominates the attractiveness of locations with high skills.

R&D expenditure intensity has a non-linear effect on the attractiveness of countries to FDI. While at low rates of R&D intensity the effect is negative, as the R&D intensity increases, this negative effect moderates, and once a threshold has been reached, the effect becomes positive. Our estimates indicate that this turning point for R&D intensity is 1.8 per cent of GDP.

The dissimilarity parameters (λ_k) indicate that Ireland and the United Kingdom are perceived as being more similar as location options compared with the other groups of EU countries considered as location nests. Countries within the Southern Europe group and Central and Eastern European countries are more similar as location options compared to the Core and Northern group of EU countries.

The statistical test for the independence of irrelevant alternatives (IIA) indicates that the location options inside the considered groups of countries are not independent. This implies that the nested logit estimates are consistent with the IIA.

TABLE 3 Determinants of the Location Choice for New Foreign Affiliates in EU Countries, 2002-2013

Explanatory variables	All FDI projects	EU investors	Non-EU investors
Corporate tax policy rate	-0.083** (0.039)	0.153*** (0.051)	-0.532*** (0.056)
Market size (GDP)	0.345*** (0.011)	0.362*** (0.013)	0.346*** (0.018)
EU Market potential	0.089*** (0.021)	-0.339*** (0.032)	0.830*** (0.034)
GDP per capita	-0.524*** (0.021)	-0.633*** (0.027)	-0.034 (0.053)
Trade costs- distance to home country	-0.451*** (0.015)	-0.653*** (0.019)	0.212*** (0.043)
Common language	0.386*** (0.022)	0.299*** (0.032)	0.516*** (0.039)
Common border	0.456*** (0.020)	0.475*** (0.025)	0.653*** (0.039)
R&D expenditure intensity	-0.369*** (0.048)	-0.344*** (0.064)	-0.693*** (0.092)
R&D expenditure intensity squared	0.103*** (0.012)	0.066*** (0.016)	0.224*** (0.022)
Dissimilarity parameters (λ_k)			
United Kingdom and Ireland EU Group	0.444*** (0.022)	0.564*** (0.034)	0.267*** (0.023)
Core and Northern EU Group	0.637*** (0.012)	0.731*** (0.016)	0.465*** (0.017)
Central and Eastern EU Group	0.543*** (0.017)	0.653*** (0.020)	0.522*** (0.038)
Southern EU Group	0.406*** (0.013)	0.458*** (0.018)	0.443*** (0.022)
Number of observations	436,846	274,341	162,505
Log likelihood	-47383	-30263	-16211
LR test for IIA ($\lambda_k = 1$)	$\chi^2(4) =$ 917.53***	$\chi^2(4) =$ 442.23***	$\chi^2(4) =$ 530.38***

Source: Authors' estimates.
Notes: Estimates obtained from a nested logit model. Standard errors are in parentheses. ***, **, *, denote p<0.01, p<0.05, p<0.1, respectively. The dependent variable is equal to 1 if a foreign affiliate was established over the period in the host country. Explanatory variables are lagged by one year with respect to the dependent variable. R&D expenditure intensity is in percentages. Trade costs, common language, common border are dummy variables. The rest of the explanatory variables are in logarithms. The country compositions of the EU groups are as follows: **Core and Northern**: Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Norway. **Central and Eastern**: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia. **Southern**: Greece, Italy, Malta, Portugal, Spain.

3.2 Intra-EU Investment versus Investment From Outside the EU

Table 3 also reports results from separate regressions on determinants of the location choice of new foreign affiliates in EU countries by companies with headquarters in the EU and outside the EU. The evidence suggests that EU and non-EU investors value countries' characteristics differently. FDI by EU investors is more likely to locate in countries with higher corporate tax rates where they can benefit from local advantages such as low production costs and market size. In contrast, investors from outside the EU are deterred by high corporate taxes. While low production costs increase the attractiveness of countries to intra-EU investment, they do not matter for investors with headquarters outside the EU. Other differences in investment behaviour are in relation to the effects of EU market access and trade costs. While in the case of investors with headquarters outside the EU, the location probability increases with access to the European Single Market, intra-EU investments are more likely in countries with small market potential. Also, FDI by non-EU investors is more likely in countries which are more distant, in which case trade costs would be higher.

Taken together, these results suggest that, in the presence of trade costs, countries with a higher EU market potential are particularly attractive to investors with headquarters outside the EU. The results also suggest that while intra-EU investments are efficiency-seeking, FDI by investors from outside the EU are market-seeking.

The dissimilarity parameters indicate that Ireland and the UK are seen as closer location alternatives by non-EU investors compared with EU investors. This result could be explained by the importance of foreign direct investment in both countries by US multinationals. For EU investors, the countries in the Southern EU group are seen as closer substitutes compared to other location options in the other EU groups.

3.3 Differences Across Sectors

The results shown in Table 4 indicate that foreign investors respond differently to corporate taxation in manufacturing and services. On average, FDI in manufacturing is more likely to locate in countries with higher corporate tax rates where they benefit from other local advantages such as low production costs and market size. This result is consistent with the fact that larger countries which are more attractive to investment in manufacturing, such as Germany and France, tend to have higher corporate tax rates. In contrast, the location probability for FDI in services is negatively linked to corporate tax rates.

While on average, higher market potential (access to the European Single Market) increases the attractiveness of countries to FDI in services, it does not matter for the location choice of FDI in manufacturing.

The dissimilarity parameters indicate that Ireland and the UK are perceived as being more similar as location alternatives for FDI in services in comparison to FDI in manufacturing.

Table 5 explores heterogeneous effects in investment decisions across both investors by country of origin and sectors. The results indicate higher statutory corporate tax rates are associated with a higher likelihood of new intra-EU investment in manufacturing, while they do not seem to matter for investors from outside the EU. Investments from non-EU investors in services are less likely in countries with high corporate taxes. The likelihood of investments in manufacturing from non-EU investors also declines with the statutory corporate tax rate.

Market size increases the likelihood of investment in all analysed cases. The different relevance and importance of access to EU markets appears again for EU and non-EU investors. While EU investors are likely to invest in countries with a smaller EU market potential, countries with a higher EU market potential increase substantially the attractiveness to investment by non-EU investors in both manufacturing and services.

TABLE 4 Determinants of the Location Choice for New Foreign Affiliates in EU Countries, Manufacturing and Services, 2002-2013

Explanatory variables	All Investors Manufacturing	Services
Corporate policy tax rate	0.275** (0.129)	-0.216*** (0.046)
Market size (GDP)	0.484*** (0.040)	0.340*** (0.012)
EU Market potential	0.120 (0.077)	0.161*** (0.023)
GDP per capita	-0.969*** (0.072)	-0.399*** (0.026)
Trade costs- distance to home country	-0.444*** (0.051)	-0.430*** (0.018)
Common language	0.468*** (0.076)	0.322*** (0.024)
Common border	0.468*** (0.064)	0.524*** (0.024)
R&D expenditure intensity	-0.755*** (0.176)	-0.273*** (0.055)
R&D expenditure intensity squared	0.234*** (0.043)	0.085*** (0.013)
Dissimilarity parameters (λ_k)		
United Kingdom and Ireland EU Group	0.755*** (0.111)	0.409*** (0.024)
Core and Northern EU group	0.613*** (0.039)	0.642*** (0.014)
Central and Eastern EU Group	0.769*** (0.056)	0.558*** (0.020)
Southern EU Group	0.387*** (0.040)	0.416*** (0.015)
Number of observations	47,193	338,284
log likelihood	-5104	-36579
LR test for IIA ($\lambda_k = 1$)	$\chi^2 (4) =$ 132.34***	$\chi^2 (4) =$ 704.78***

Source: Authors' estimates.

Notes: Estimates obtained from a nested logit model. Standard errors are in parentheses. ***, **, *, denote p<0.01, p<0.05, p<0.1, respectively. The dependent variable is equal to 1 if a foreign affiliate was established over the period in the host country. Explanatory variables are lagged by one year with respect to the dependent variable. R&D expenditure intensity is in percentages. Trade costs, common language, common border are dummy variables. The rest of the explanatory variables are in logarithms. The country compositions of the EU groups are as follows: *Core and Northern*: Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Norway. *Central and Eastern*: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia. *Southern*: Greece, Italy, Malta, Portugal, Spain.

TABLE 5 Determinants of the Location Choice for New Foreign Affiliates by EU and non-EU investors in Manufacturing and Services, 2002-2013

Explanatory variables	EU Investors		Non-EU Investors	
	Manufacturing	Services	Manufacturing	Services
Corporate tax policy rate	0.430*** (0.164)	0.048 (0.059)	0.035 (0.211)	-0.623*** (0.058)
Market size (GDP)	0.495*** (0.047)	0.351*** (0.015)	0.442*** (0.077)	0.348*** (0.019)
EU Market potential	-0.326*** (0.111)	-0.278*** (0.036)	0.832*** (0.112)	0.892*** (0.038)
GDP per capita	-1.086*** (0.091)	-0.516*** (0.032)	-0.601*** (0.125)	0.127** (0.063)
Trade costs- distance to home country	-0.634*** (0.059)	-0.633*** (0.022)	0.234 (0.157)	0.191*** (0.048)
Common language	0.337*** (0.106)	0.256*** (0.035)	0.699*** (0.155)	0.415*** (0.042)
Common border	0.536*** (0.078)	0.519*** (0.029)	0.354*** (0.130)	0.766*** (0.045)
R&D expenditure intensity	-0.621*** (0.222)	-0.207*** (0.074)	-1.078*** (0.350)	-0.638*** (0.103)
R&D expenditure intensity squared	0.177*** (0.055)	0.040** (0.018)	0.349*** (0.081)	0.210*** (0.024)
Dissimilarity parameters (λ_k)				
United Kingdom and Ireland EU Group	0.722*** (0.139)	0.541*** (0.038)	0.636*** (0.144)	0.246*** (0.024)
Core and Northern EU Group	0.652*** (0.046)	0.733*** (0.018)	0.488*** (0.072)	0.479*** (0.019)
Central and Eastern EU Group	0.848*** (0.066)	0.665*** (0.025)	0.646*** (0.128)	0.565*** (0.045)
Southern EU Group	0.444*** (0.053)	0.454*** (0.061)	0.320*** (0.058)	0.481*** (0.026)
Number of observations	30,144	208,884	17,049	129,400
log likelihood	-3270	-22982	-1736	-12929
LR test for IIA ($\lambda_k = 1$)	$\chi^2 (4) =$ 74.38***	$\chi^2 (4) =$ 335.54***	$\chi^2 (4) =$ 64.15***	$\chi^2 (4) =$ 408.80***

Source: Authors' estimates.

Notes: Estimates obtained from a nested logit model. Standard errors are in parentheses. ***, **, * denote p<0.01, p<0.05, p<0.1, respectively. The dependent variable is equal to 1 if a foreign affiliate was established over the period in the host country. Explanatory variables are lagged by one year with respect to the dependent variable. R&D expenditure intensity is in percentages. Trade costs, common language, common border are dummy variables. The rest of the explanatory variables are in logarithms. The country compositions of the EU groups are as follows: *Core and Northern*: Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Norway. *Central and Eastern*: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia. *Southern*: Greece, Italy, Malta, Portugal, Spain.

We uncover additional heterogeneous effects with respect to the importance of production as well as trade costs. Lower production costs proxied by the GDP per capita attract intra-EU investments in both sectors, while in the case of non-EU investors, this attractiveness factor appears only for investment in manufacturing. Higher levels of GDP per capita increase the attractiveness of EU countries to foreign investment by non-EU investors in services. This result might be related to higher demand for services in countries with a higher level of development.

The dissimilarity parameters indicate that the United Kingdom and Ireland are perceived to be more substitutable locations particularly by investors from non-EU countries and in services.

4 Policy Implications for Ireland

This section analyses policy implications for Ireland's attractiveness to FDI on the basis of the estimates discussed in Section 3.¹³

As shown in Table 6, the sensitivity of EU countries' attractiveness to FDI to changes in corporate tax rates is the highest for Southern EU countries. Ireland appears to be the 9th most sensitive among EU countries when all FDI projects are considered. Assuming all other factors would remain unchanged, a one percentage point increase in Ireland's statutory tax rate (from 12.5 per cent to 13.5 per cent) would be associated with a reduction of its chance to be chosen as a location for new FDI projects by 0.4 per cent.

The sensitivity of Ireland's attractiveness to changes in corporate tax rates appears to be the highest with respect to FDI from non-EU countries and for FDI in services. With everything else unchanged, an increase by one percentage point in Ireland's statutory corporate tax rate would reduce the location probability for investment from non-EU countries by 4.6 per cent, the highest among EU countries, and by 1.2 per cent in the case of FDI in services.

¹³ The calculation of the elasticities of location probabilities are based on Greene (2000) and Wen and Koppelman (2001). Details are given in Table A2 in the Appendix.

TABLE 6 Elasticities of Location Probabilities with respect to Countries' Own Corporate Tax Rate

Countries	All FDI projects	EU investors	Non-EU investors	Manufacturing	Services
Malta	-0.7222	1.1776	-4.2349	2.5046	-1.8304
Greece	-0.6439	1.0452	-3.7601	2.2163	-1.6223
Portugal	-0.6222	1.0178	-3.6748	2.1609	-1.5801
Spain	-0.5811	0.9637	-3.4696	2.0197	-1.4863
Italy	-0.4700	0.5876	-2.7894	1.6452	-1.2240
Slovenia	-0.4659	0.7160	-3.1061	1.0953	-1.1802
Estonia	-0.4643	0.7088	-3.0884	1.0860	-1.1720
Czech Republic	-0.4543	0.7068	-3.0532	1.0835	-1.1594
Ireland	-0.4447	0.6506	-4.5753	0.8971	-1.2386
Croatia	-0.4405	0.6774	-2.9432	1.0378	-1.1168
Luxembourg	-0.4391	0.7067	-3.8482	1.5175	-1.1327
Slovakia	-0.4316	0.6703	-2.8953	1.0264	-1.1025
Norway	-0.4264	0.6803	-3.7068	1.4645	-1.0924
Belgium	-0.4209	0.6973	-3.6524	1.4858	-1.0971
Denmark	-0.4177	0.6716	-3.6464	1.4419	-1.0747
Finland	-0.4126	0.6641	-3.5909	1.4175	-1.0627
Lithuania	-0.4102	0.6272	-2.7303	0.9616	-1.0362
Hungary	-0.4069	0.6305	-2.7291	0.9677	-1.0364
Austria	-0.4067	0.6550	-3.5218	1.4063	-1.0433
Netherlands	-0.4059	0.6643	-3.5197	1.4231	-1.0494
Latvia	-0.4042	0.6173	-2.6890	0.9469	-1.0205
Romania	-0.3944	0.5985	-2.6255	0.9126	-0.9945
France	-0.3855	0.6329	-3.2651	1.3238	-0.9886
Poland	-0.3821	0.5965	-2.5911	0.9159	-0.9819
Germany	-0.3577	0.6018	-2.9811	1.2081	-0.9237
Bulgaria	-0.3433	0.5274	-2.2986	0.8061	-0.8715
United Kingdom	-0.2776	0.5089	-2.0170	0.8687	-0.7475

Source: Authors' estimates.

Note: Elasticities of location probabilities are computed at the country-specific sample means.

Measures to make the UK's corporate tax rate more competitive have been already announced in the Summer Budget in July 2015. Thus, the corporation tax rate will be reduced to 19 per cent from 1 April 2017 and 18 per cent from 1 April 2020. Our results indicate that a reduction by one percentage point of the corporate tax rate in the UK (from 20 per cent to 19 per cent) would reduce Ireland's attractiveness to FDI on average by 0.3 per cent. In this scenario, Ireland's probability of being chosen as location for FDI projects would decline by 4.3 per cent in the case of investors from non-EU countries and by 0.9 per cent in the case of FDI in services.

Taken together, these research results indicate that a competitive corporate tax rate is an important factor for attracting FDI to Ireland, especially from countries outside the EU.

From a policy perspective, in the context of increased international tax competition, policies aimed at maintaining cost competitiveness and fostering further R&D investment would be beneficial for Ireland's attractiveness to FDI.

5 Summary and Conclusion

The results of this analysis indicate that, consistent with international evidence, on average, lower corporate tax rates increase the attractiveness of countries to FDI. However, other location characteristics matter too. Location characteristics that increase the attractiveness of EU countries to FDI over and above the effect of the corporate tax rate include market size, access to the European Single Market, speaking the same language, being neighbours, and having low production costs. We uncover a non-linear effect of R&D intensity on the FDI location choices. On the one hand, multinational firms tend to locate in countries with lower technological development where they benefit from low production costs or market size. However, countries with higher levels of technology development are also attractive to FDI, the attractiveness factor in this case being sourcing advanced research and technologies.

The results also indicate that the effect of corporate taxation on the attractiveness of countries to FDI varies depending on economic sectors. It appears that lower corporate tax rates increase the attractiveness of EU countries to FDI in services while FDI in manufacturing are more likely to locate in larger countries such as Germany and France which tend to have higher corporate tax rates.

This analysis also shows that given the groups of EU countries considered, EU and non-EU investors value location characteristics differently. While FDI by non-EU investors is more likely in countries with lower corporate tax rates, intra-EU investments are more likely to locate in EU countries with higher corporate taxes where they benefit from local advantages such as low production costs and market size. Our results indicate that EU investors are seeking low cost locations in other EU countries, while investors from outside the EU are attracted by the possibility of getting access to the European Single Market.

This analysis finds that Ireland and the UK are perceived to be similar as alternative locations for FDI in particular by investors from outside the EU and in services. This result suggests that a possible redirection of FDI from the UK to Ireland would be more likely in the service sector and by investors from outside the EU.

A higher corporate tax rate would reduce Ireland's attractiveness to FDI particularly by investors from outside the EU and in services. The sensitivity of Ireland's attractiveness to FDI by investors from outside the EU is the highest among EU countries. Our results indicate that, with all other factors unchanged, an increase in Ireland's statutory corporate tax rate by one percentage point (from 12.5 per cent to 13.5 per cent) would be associated with a reduction of its probability of being chosen as a location for FDI projects from countries outside the EU by 4.6 per cent.

A more competitive corporate tax rate in the UK would reduce the attractiveness of Ireland particularly for FDI from non-EU countries. With everything else unchanged, a reduction of the UK's corporate tax rate by one percentage point (from 20 per cent to 19 per cent) would reduce Ireland's attractiveness to new FDI projects from non-EU countries by 4.3 per cent.

Taken together, our research results indicate that a competitive tax rate is a significant factor for attracting FDI to Ireland especially by investors from outside the EU.

In the context of increased international tax competition, policies aimed at maintaining cost competitiveness and enabling further R&D investment would be particularly beneficial for continuing to attract FDI to Ireland.

References

- Barrett, A., A. Bergin, J. FitzGerald, D. Lambert, D. McCoy, E. Morgenroth, I. Siedschlag, Z. Studnicka (2015). ‘Scoping the Possible Economic Implications of Brexit on Ireland’, ESRI Research series No. 48.
- Barrios, S., H. Huizinga, L. Laeven, and G. Nicodeme (2012). ‘International taxation and multinational firm location decisions’, *Journal of Public Economics*, 96(11): 946-958.
- Crozet, M., T. Mayer, and J. L. Mucchielli (2004). ‘How do firms agglomerate? A study of FDI in France’, *Regional Science and Urban Economics*, 34(1): 27-54.
- Davies, R. B. and N. Killeen (2015). ‘Location decisions of non-bank financial foreign direct investment: Firm-level evidence from Europe’, UCD Working Paper No. 2015/26.
- de Mooij, R. and S. Ederveen (2003). ‘Taxation and foreign direct investment: A synthesis of empirical research’, *International Tax and Public Finance*, 10: 673-693.
- de Mooij, R. and S. Ederveen (2008). ‘Corporate tax elasticities: A reader’s guide to empirical findings’, *Oxford Review of Economic Policy*, 24(4): 680-697.
- Devereux, M. P. and R. Griffith (1998). ‘Taxes and the location of production: evidence from a panel of US multinationals’, *Journal of Public Economics* 68: 335-367.
- Devereux, M., R. Griffith, H. Simpson (2007). ‘Firm location decisions, regional grants and agglomeration externalities’, *Journal of Public Economics*, 91 (3-4): 413-435.
- Fontagné, L. and T. Mayer (2005). ‘Determinants of location choices by multinational firms: A review of the current state of knowledge’, *Applied Economic Quarterly* 51: 9-34.
- Greene, W.H. (2000). *Econometric Analysis*, 4th Edition, New Jersey, Prentice Hall International, Inc.
- Head, K. and T. Mayer (2004). ‘Market potential and the location of Japanese investment in the European Union’, *Review of Economics and Statistics*, 86(2): 959-972.
- Hensher D.A., J. M. Rose, W.H. Greene (2005). *Applied Choice Analysis*, Cambridge University Press.
- Iwasa, T., H. Odagiri (2004). ‘Overseas R&D, knowledge sourcing, and patenting: An empirical study of Japanese R&D investment in the US’, *Research Policy*, 33: 807-828.
- Lawless, M., D. McCoy, E. Morgenroth, and C. O’Toole (2014). *The Importance of Corporation Tax Policy in the Location Choice of Multinational Firms*. Dublin: Department of Finance.
- Markusen, J. (2002). *Multinational Firms and the Theory of International Trade*, MIT Press, Cambridge and London.
- McFadden, D. (1974). ‘Conditional Logit Analysis of Qualitative Choice Behaviour’, in P. Zarembka (ed.) *Frontiers in Econometrics*, 105-142, New York: Academic Press.
- McFadden, D. (1984). ‘Econometric analysis of qualitative response models’, in Griliches, Z., Intriligator, M. D. (eds.). *Handbook of Economics* vol. II, Elsevier Science Publishers BV.
- Pollak, R. A., T. J. Wales (1991). ‘The likelihood dominance criterion: A new approach to model selection’, *Journal of Econometrics*, 47(2-3): 227-242.

- Schmidheiny, K. and M. Brülhart (2011). ‘On the equivalence of location choice models: Conditional logit, nested logit and Poisson’, *Journal of Urban Economics*, 69: 214-222.
- Siedschlag, I., D. Smith, C. Turcu, and X. Zhang (2013a), ‘What determines the location choice of R&D activities by multinational firms?’, *Research Policy*, 42: 1420-1430.
- Siedschlag, I., X. Zhang, and D. Smith (2013b), ‘What determines the location choice of multinational firms in the information and communication technologies sector?’, *Economics of Innovation and New Technology*, 22(6): 581-600.
- Von Zedtwitz, M., O. Gassmann (2002). ‘Market versus technology drive in R&D internationalization: four different patterns of managing research and development’, *Research Policy* 31(4): 569-588.
- Wen, C., F. S. Koppelman (2001). ‘The generalized nested logit model’, *Transportation Research*, 35: 627-641.

Appendix

TABLE A1 Variables Definitions and Data Sources

Variable	Definition	Data source
Location choice	Binary variable equal to 1 if a foreign affiliate was established in host country, 0 otherwise	Amadeus dataset, Bureau van Dijk
Corporate policy tax rate	Statutory corporate tax rate	KPMG
GDP	GDP in 2005 prices	The World Bank, Economy & Growth Indicators
EU Market potential	The sum of GDP in the host country and the inverse distance-weighted GDP of all location options in the European Union other than the host country.	The World Bank, Economy & Growth Indicators, and CEPII
GDP per capita	GDP in 2005 prices over midyear population in host country	The World Bank, Economy & Growth Indicators
Distance	Distance in km between the host and home country capital cities	CEPII
Common language	Binary variable equal to 1 if home and host countries have a common official primary language, 0 otherwise	CEPII
Common border	Binary variable equal to 1 if home and host countries share a border, 0 otherwise	CEPII
R&D expenditure intensity	Public and private R&D expenditure as per cent of GDP	The World Bank, Science & Technology Indicators

TABLE A2 Direct and Cross-Elasticities of Location Probabilities in Nested Logit Models

Nested structure	Direct elasticity	Cross-elasticity
Location i in nest N	$\left[(1 - P_i) + \left(\frac{1 - \lambda_N}{\lambda_N} \right) (1 - P_{i/N}) \right] \beta X_i$	
Locations i and j in the same nest N		$- \left[P_i + \frac{\left(\frac{1 - \lambda_N}{\lambda_N} \right) P_N P_{i/N} P_{j/N}}{P_j} \right] \beta X_i$

Notes: The computation of direct and cross-elasticities of location probabilities with respect to location characteristics X are based on Greene (2000) and Wen and Koppelman (2001). λ_N is the estimated dissimilarity parameter for nest N. P_i is the location probability for country i. $P_{i/N}$ is the location probability for country i conditional on nest N being chosen. P_N is the location probability for nest N. β is the estimated parameter for location characteristic X .



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ISBN 978-0-7070-0404-4