QUARTERLY ECONOMIC COMMENTARY

Winter 2007

ALAN BARRETT
IDE KEARNEY
MARTIN O'BRIEN

The forecasts in this Commentary are based on data available by early-December 2007

Special Articles

Copies of this paper may be obtained from The Economic and Social Research Institute (Limited Company No. 18269). Registered Office: Whitaker Square, Sir John Rogerson's Quay, Dublin 2.
www.esri.ie

Price €75 per copy or €300 per year, (including Medium-Term Review, 2005-2012)

Alan Barrett is a Senior Research Officer, Ide Kearney is a Research Associate and both are Editors of the *Commentary*, Martin O'Brien is a Research Assistant at The Economic and Social Research Institute (ESRI). Yvonne McCarthy is at the Central Bank & Financial Services Authority of Ireland. Sean D. Barrett is at Economics Department, Trinity College, Dublin. Richard S.J. Tol is a Senior Research Officer at ESRI.
 Draft completed 14 December 2007.

Call For Papers

As part of the remit of the *Quarterly Economic Commentary*, articles on various aspects of the Irish economy and Irish economic policy are regularly published along with the forecasts and commentary. Authors are invited to submit papers for consideration to either of the *QEC*'s co-editors, Alan Barrett and Ide Kearney at: ESRI, Whitaker Square, Sir John Rogerson's Quay, Dublin 2 (e-mail Alan.Barrett@esri.ie or I.Kearney@planet.nl). The following guidelines should be followed:

All articles should be up-to-date and policy-oriented. The content should involve the application of economic theory, data analysis or the application of lessons from the international literature. Review articles are also welcome where lessons for policy are explicitly addressed. Articles should normally comprise 4-10,000 words, excluding tables. All articles will be anonymously refereed by members of the editorial board or by an external referee chosen by the editors. The editors may also, where appropriate, seek the comments of policy experts outside of the academic community.

The *QEC* aims for a quick turnaround from submission to acceptance, with decisions usually made within two months. All accepted papers are published electronically as well as being included in the printed version, thereby ensuring a wide circulation well beyond subscribers to the *QEC*.

Printed by Fodhla Printing, Baldoyle Industrial Estate, Dublin 13.

CONTENTS

SUMMARY TABLE

	2005	2006	2007	2008
OUTPUT (Real Annual Growth %)				
Private Consumer Expenditure	7.3	5.7	7.0	3.8
Public Net Current Expenditure	4.0	5.3	5.0	3.5
Investment	11.8	3.1	0.1	-3.7
Exports	5.2	4.4	5.7	5.0
Imports	7.7	4.4	5.0	4.4
Gross Domestic Product (GDP)	5.9	5.7	4.8	2.3
Gross National Product (GNP)	4.9	6.5	4.4	2.3
GNP per capita (constant prices)	2.7	3.7	1.8	0.9
PRICES (Annual Growth %)				
Harmonised Index of Consumer Prices (HICP)	2.1	2.7	2.9	2.8
Consumer Price Index (CPI)	2.5	4.0	4.9	3.3
Wage Growth	5.6	4.9	5.5	4.0
LABOUR MARKET				
Employment Levels (ILO basis (000s))	1,952	2,039	2,100	2,108
Unemployment Levels (ILO basis (000s))	89	93	102	130
Unemployment Rate (as % of Labour Force)	4.4	4.4	4.6	5.8
PUBLIC FINANCE				
Exchequer Balance (€m)	-500	2,264	-1,623	-4,833
General Government Balance (€m)	1,934	5,107	899	-1,813
General Government Balance (% of GDP)	1.2	2.9	0.5	-0.9
General Government Debt (% of GDP)	27.4	25.1	24.4	25.7
EXTERNAL TRADE				
Balance of Payments Current Account (€m)	-5,692.0	-7,271	-8,617.0	-8,784.0
Current Account (% of GNP)	-4.2	-4.9	-5.4	-5.2
EXCHANGE AND INTEREST RATES (end of year)				
US$/€ Exchange Rate	1.19	1.32	1.45	1.45
STG£/€ Exchange Rate	0.68	0.67	0.70	0.70
Main ECB Interest Rate	2.25	3.50	4.00	4.00

SUMMARY

Real growth in GNP is estimated to be 4.4 per cent in 2007. This means that 2007 has been another year of strong economic growth in Ireland. However, the growth will have been fuelled by a number of unsustainable components, including the effects of SSIAs and a highly stimulatory fiscal stance. Employment will register an impressive rate of growth in 2007, at almost 3 per cent.

While the full-year figures for 2007 are strong, it appears that a deceleration in the rate of growth began to take hold in the second part of the year. This is largely related to a contraction in house building. Given the weight of house building in total economic activity in Ireland, the contraction is placing a drag on growth and this will be prominent in the economic story for 2008.

We now expect real GNP to grow by 2.3 per cent in 2008, the slowest pace of real GNP growth since 1992. Investment is forecast to contract by almost 4 per cent in 2008 and so will partly cancel out growth in the other components of demand. The slow pace of economic growth will be reflected in the labour market where we expect employment to grow by less than 0.5 per cent. We expect unemployment to rise to 5.8 per cent.

The forecasts for both 2007 and 2008 have been prepared against a background of continued uncertainty in international financial markets. The international context also includes anticipated slowdowns in the UK, the US and the Euro Area, which are in turn partly related to the global credit crunch. We expect the rate of growth in exports to moderate in 2008 relative to 2007 (5 per cent versus 5.7 per cent) in response to these slowdowns.

We have adopted a technical assumption that the ECB will not change interest rates in 2008. Although inflationary pressures are present in the Euro Area, growth appears to be weakening and so it is unclear in which direction the ECB will take interest rates. Based on this assumption, we forecast that CPI inflation will be 3.3 per cent in 2008, while our forecast for HICP is 2.8 per cent. This represents a significant reduction in the difference between the two measures of inflation.

In the *General Assessment* we look at three issues. First, we discuss what we see as being unsustainable elements in Ireland's recent growth performance. With these elements now receding, there is a heightened need for competitiveness to be restored so that other sectors can grow. Second, we look behind the employment forecast for 2008 of a net increase of 8,000 jobs. This increase is made up of an increase of over 28,000 jobs in services and a fall of approximately 20,000 jobs in industry (including construction). Hence, the figure of 8,000 understates the full extent of employment dynamics. Finally, we reflect on the recent Budget. While broadly welcoming the measures included and the overall fiscal stance for 2008, we note again the highly stimulatory nature of fiscal policy in 2007 and its effects on the economy.

NATIONAL ACCOUNTS 2006

A: Expenditure on Gross National Product

	2005	2006 Forecast	Change in 2006				
			€m		%		
	€m	€m	Value	Volume	Value	Price	Volume
Private Consumer Expenditure	76,435	82,483	6,048	4,388	7.9	2.1	5.7
Public Net Current Expenditure	22,870	24,939	2,069	1,204	9.0	3.6	5.3
Gross Fixed Capital Formation	42,079	46,027	3,948	1,298	9.4	6.1	3.1
Exports of Goods and Services (X)	132,098	139,766	7,669	5,870	5.8	1.3	4.4
Physical Changes in Stocks	162	1,476	1,313	1,204			
Final Demand	**273,645**	**294,691**	**21,046**	**13,965**	**7.7**	**2.5**	**5.1**
less:							
Imports of Goods and Services (M)	112,279	120,997	8,718	4,899	7.8	3.3	4.4
less:							
Statistical Discrepancy	-132	-1,011	-878	-196			
GDP at Market Prices	**161,498**	**174,705**	**13,207**	**9,262**	**8.2**	**2.3**	**5.7**
less:							
Net Factor Payments (F)	-25,775	-25,575	200	-481	-0.8	-2.6	1.9
GNP at Market Prices	**135,723**	**149,130**	**13,407**	**8,781**	9.9	3.2	6.5

B: Gross National Product by Origin

	2005	2006 Forecast	Change in 2006	
	€m	€m	€m	%
Agriculture, Forestry, Fishing	3,397	3,195	-202	-5.9
Non-Agricultural: Wages, etc.	65,992	72,426	6,434	9.8
Other:	56,270	59,649	3,379	6.0
Adjustments: Stock Appreciation	-538	-329		
Statistical Discrepancy	-132	-1011		
Net Domestic Product	**124,989**	**133,931**	**8,942**	**7.2**
less:				
Net Factor Payments	-25,775	-25,575	200	-0.8
National Income	**99,214**	**108,356**	**9,142**	**9.2**
Depreciation	17,424	18,436	1,012	5.8
GNP at Factor Cost	116,638	126,792	10,154	8.7
Taxes less Subsidies	19,085	22,338	3,253	17.0
GNP at Market Prices	**135,723**	**149,130**	**13,407**	**9.9**

C: Balance of Payments on Current Account

	2005	2006 Forecast	Change in 2006
	€m	€m	€m
Exports (X) less Imports (M)	19,818	18,769	-1,049
Net Factor Payments (F)	-25,775	-25,575	200
Net Transfers	265	-465	-730
Balance on Current Account	**-5,692**	**-7,271**	**-1,579**
as % of GNP	-4.2	-4.9	-0.7

FORECAST NATIONAL ACCOUNTS 2007

A: Expenditure on Gross National Product

	2006 Forecast €m	2007 Forecast €m	Change in 2007 €m Value	Volume	% Value	Price	Volume
Private Consumer Expenditure	82,483	91,346	8,863	5,774	10.7	3.5	7.0
Public Net Current Expenditure	24,939	27,808	2,868	1,247	11.5	6.2	5.0
Gross Fixed Capital Formation	46,027	47,007	981	37	2.1	2.0	0.1
Exports of Goods and Services (X)	139,766	148,739	8,973	7,939	6.4	0.7	5.7
Physical Changes in Stocks	1,476	664	- 812	- 812			
Final Demand	**294,691**	**315,564**	**20,873**	**14,326**	**7.1**	**2.1**	**4.9**
less:							
Imports of Goods and Services (M)	120,997	129,687	8,690	5,994	7.2	2.1	5.0
less:							
Statistical Discrepancy	-1,011	-1,011	0	-34			
GDP at Market Prices	**174,705**	**186,888**	**12,183**	**8,366**	**7.0**	**2.1**	**4.8**
less:							
Net Factor Payments (F)	-25,575	-27,069	-1,494	-1,768	5.8	-1.0	6.9
GNP at Market Prices	**149,130**	**159,819**	**10,689**	**6,566**	**7.2**	**2.6**	**4.4**

B: Gross National Product by Origin

	2006 Forecast €m	2007 Forecast €m	Change in 2007 2006 €m	%
Agriculture, Forestry, Fishing	3,195	3,355	160	5.0
Non-Agricultural: Wages, etc.	72,426	78,923	6,497	9.0
Other:	59,649	62,924	3,275	5.5
Adjustments: Stock Appreciation	-329	-200		
Statistical Discrepancy	-1,011	-1,011		
Net Domestic Product	**133,931**	**143,992**	**10,061**	**7.5**
less:				
Net Factor Payments	-25,575	-27,069	-1,494	5.8
National Income	108,356	116,922	8,567	7.9
Depreciation	18,436	20,008	1,572	8.5
GNP at Factor Cost	126,792	136,930	10,138	8.0
Taxes less Subsidies	22,338	22,888	550	2.5
GNP at Market Prices	**149,130**	**159,819**	**10,689**	**7.2**

C: Balance of Payments on Current Account

	2006 Forecast €m	2007 Forecast €m	Change in 2007 €m
Exports (X) less Imports (M)	18,769	19,052	283
Net Factor Payments (F)	-25,575	-27,069	-1,494
Net Transfers	-465	-600	-135
Balance on Current Account	-7,271	-8,617	-1,346
as % of GNP	-4.9	-5.4	-0.5

FORECAST NATIONAL ACCOUNTS 2008

A: Expenditure on Gross National Product

	2007 Preliminary €m	2008 Forecast €m	Change in 2008 €m Value	€m Volume	% Value	% Price	% Volume
Private Consumer Expenditure	91,346	97,141	5,795	3,425	6.3	2.5	3.8
Public Net Current Expenditure	27,808	30,449	2,642	973	9.5	5.8	3.5
Gross Fixed Capital Formation	47,007	46,900	-107	-1,761	-0.2	3.7	-3.7
Exports of Goods and Services (X)	148,739	157,960	9,220	7,421	6.2	1.2	5.0
Physical Changes in Stocks	664	531	-133	0			
Final Demand	**315,564**	**332,981**	**17,416**	**10,101**	**5.5**	**2.2**	**3.2**
less:							
Imports of Goods and Services (M)	129,687	137,809	8,122	5,754	6.3	1.7	4.4
less:							
Statistical Discrepancy	-1,011	-1,011	0	-37			
GDP at Market Prices	186,888	196,183	9,295	4,383	**5.0**	**2.6**	**2.3**
less:							
Net Factor Payments (F)	-27,069	-28,335	-1,265	-710	4.7	2.0	2.6
GNP at Market Prices	**159,819**	**167,848**	**8,029**	**3,666**	**5.0**	**2.7**	**2.3**

B: Gross National Product by Origin

	2007 Preliminary €m	2008 Forecast €m	Change in 2008 €m	%
Agriculture, Forestry, Fishing	3,355	3,489	134	4.0
Non-Agricultural: Wages, etc.	78,923	82,434	3,511	4.4
Other:	62,924	66,251	3,327	5.3
Adjustments: Stock Appreciation	-200	-200		
Statistical Discrepancy	-1,011	-1,011		
Net Domestic Product	**143,992**	**150,964**	6,972	4.8
less:				
Net Factor Payments	-27,069	-28,335	-1,265	4.7
National Income	**116,922**	**122,629**	**5,706**	**4.9**
Depreciation	20,008	21,187	1,179	5.9
GNP at Factor Cost	**136,930**	**143,816**	**6,885**	**5.0**
Taxes less Subsidies	22,888	24,032	1,144	5.0
GNP at Market Prices	**159,819**	**167,848**	**8,029**	**5.0**

C: Balance of Payments on Current Account

	2007 €m	2008 Forecast €m	Change in 2008 €m
Exports (X) less Imports (M)	19,052	20,151	1,098
Net Factor Payments (F)	-27,069	-28,335	-1,265
Net Transfers	-600	-600	0
Balance on Current Account	**-8,617**	**-8,784**	**-167**
as % of GNP	-5.4	-5.2	0.2

THE INTERNATIONAL ECONOMY

The main developments in the international economy may be summarised as follows:

- The international context is still characterised by uncertainty as the fall-out from the US sub-prime mortgage crisis is likely to extend into 2008.
- Growth in the Euro Area is expected to moderate in 2007 and 2008 at 2.6 and 1.9 per cent respectively. Inflation is expected to increase in the short term as the labour market tightens, but less favourable credit conditions for individuals and businesses may have the same impact as a tightening of monetary policy. We assume no change in the ECB main refinancing rate.
- UK economic growth is forecast to slow significantly to 2 per cent in 2008 as a rapidly cooling housing market combined with less credit availability depresses consumer and business sentiment.
- Growth in the US economy in 2007 has slowed due to a rapid contraction in residential investment. In 2008 we expect a further contraction in the housing market and tighter credit conditions to impact negatively on consumption and investment leading to real GDP growth of 2 per cent.
- On exchange rates, we have assumed that the $/€ rate will be 1.45 at the end of this year and throughout next year and that the £/€ rate will be 0.7 over the same period.

Euro Area

Following strong growth in 2006 of 2.9 per cent, the Euro Area economy has continued to expand at a strong pace in 2007. Real GDP is expected to increase by 2.6 per cent in 2007, moderating to 1.9 per cent in 2008, with exports and investment being the main drivers of growth. Unemployment is expected to average 6.8 per cent in 2007, down from 7.7 per cent in 2006. Further tightening in the labour market is forecast to contribute to modest increases in wage demands in 2008. Consumer spending growth in 2007 has been less than expected as higher interest rates, less favourable credit conditions, and uncertainty due to the turbulence on financial markets has dampened activity. This is expected to ease during the course of 2008.

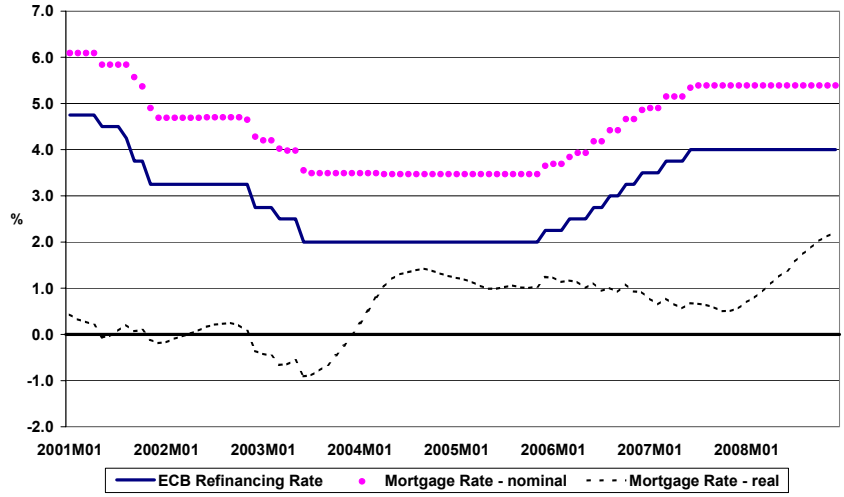
With the labour market tightening and prices for oil and food rising quite sharply in recent months, consumer price inflation has begun to pick up in the Euro Area. Inflation in the Euro Area is expected to average 2.1 per cent in 2007, rising to 2.5 per cent in 2008. This is above the European Central Bank (ECB) medium-term target of "close to but below 2 per cent". At the December meeting of the Governing Council, ECB President Jean Claude Trichet stressed that cutting interest rates was not currently being considered. Our forecasts are based on the assumption of no changes in the ECB main refinancing rate, currently at 4 per cent, during 2008.

Turning to developments in the main Euro Area economies, the outturn for German real GDP growth is expected to be strong in 2007 at 2.6 per cent. This is a moderation on the growth seen in 2006 of 3.1 per cent, but still reflects robust growth in external demand and investment. Unemployment has continued to fall in 2007 and is expected to average 5.7 per cent in 2008. Economic growth is expected to revert to trend in 2008 with real GDP increasing by 1.8 per cent. Private consumption is anticipated to be the main driver of growth as exports and business investment slows. The tightening of the labour market is expected to feed through to higher wage demands in 2007 and 2008, ultimately contributing to consumer prices rising above 2 per cent this year and next.

The French economy is likely to record moderate real GDP growth in 2007 of 1.9 per cent and 1.8 per cent in 2008. This follows growth of 2.2 per cent in 2006. Falling unemployment has been accompanied by relatively strong wage growth in 2007. In 2008 fiscal policy is expected to provide a stimulus to private consumption and to offset the likely pressure on real disposable incomes that will result from rising oil and food prices. Consumer prices are forecast to increase by 2.2 per cent in 2008.

In 2006 the Italian economy grew by 1.9 per cent in real terms, with export growth being a key factor. Growth is expected to be similar in 2007, at 1.8 per cent. Rising wage costs and consumer prices as the labour market tightens are expected to depress export activity in 2008. Combined with a fall in construction activity, real GDP growth is expected to be around its trend of 1.3 per cent in 2008.

Figure 1: Interest Rates (2001-present, forecast to end 2008)*



*Mortgage rate used is the Irish Representative Building Societies Mortgage Rate.
Source: Central Statistics Office.

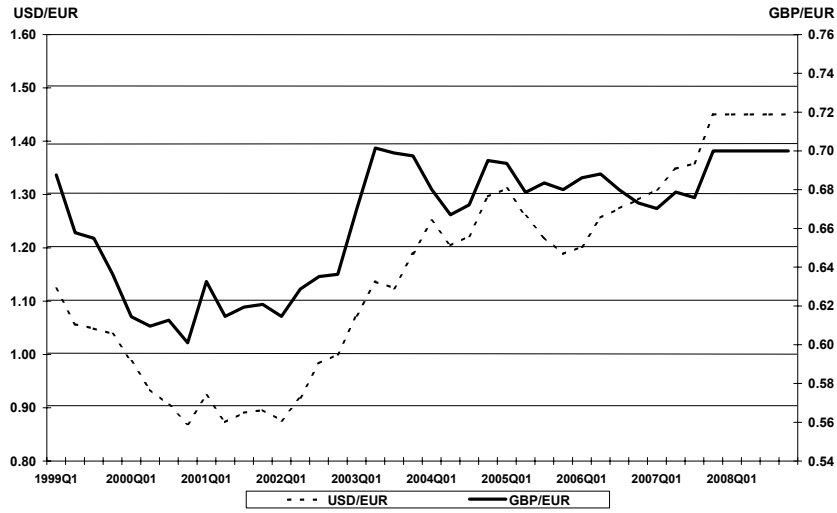
United Kingdom

The robust pace of real GDP growth in 2006 of 2.8 per cent continued into the first half of 2007. Despite the likelihood of moderating growth towards the end of this year, the economy is likely to expand by 3.1 per cent for 2007 as a whole. However, growth is forecast to slow in 2008 to just 2 per cent, as a rapidly cooling housing market is dampening consumer and business sentiment. Combined with tighter credit conditions as a result of the recent events in financial markets, this is expected to lead to slower investment and consumer spending growth. However, fiscal policy is expected to provide some stimulus to the economy in 2008 as the government deficit is forecast to rise to –3.4 per cent of GDP.

The labour market adjustment to the slower pace of economic expansion in 2008 is likely to come mostly through lower earnings growth as opposed to large increases in unemployment. Wage growth in 2008 is expected to be 2.6 per cent, well below the 5.2 per cent growth seen in 2006. This compounds the effect of tighter credit on private consumption and is anticipated to dampen domestic demand growth in 2008. It should also help to ensure that consumer price inflation meets the Bank of England's (BoE) target of approximately 2 per cent next year. In its latest Inflation Report (November 2007), the BoE noted the danger of high food and oil prices leading to inflation being above target at a time when overall economic growth slows significantly. However, this is only expected to be the case in the very short term, as commodity prices are expected to stabilise during 2008, so that it is likely that monetary policy will be further eased in the coming months. The BoE has signalled that a further cut of at least 25 basis points is likely in the opening months of 2008 following its recent decision to reduce the

main policy rate from 5.75 per cent to 5.5 per cent.

Figure 2: Exchange Rates (1999-present, forecast to end 2008)



Source: Central Bank & Financial Services Authority of Ireland (historic) and OECD Economic Outlook, December 2007 (forecast).

United States

Real GDP growth in the US is expected to slow in 2007 to 2.2 per cent from the 2.9 per cent growth rate in 2006. This slowdown is expected to continue in 2008 with GDP forecast to grow by just 2 per cent. The impetus for this slowdown was originally concentrated in the house-building sector with housing output now expected to decline by over 17 per cent in 2007 and a further 15 per cent in 2008. These developments in the US housing market have contributed to the ongoing turmoil on international financial markets. However, the consequences of this slowdown are likely to permeate more widely through the economy in 2008. Current indicators suggest US consumer spending has remained robust in 2007 but it is expected to slow significantly in 2008. Job creation in the private sector has eased significantly and unemployment has begun to increase. Wages are forecast to grow by 3.6 per cent next year, well below the 5 per cent growth expected for 2007. Meanwhile the unemployment rate in 2008 is anticipated to increase to 5 per cent.

Offsetting this slowdown in private consumption growth, strong non-residential investment growth and an improving net export performance due to the fall in the value of the dollar, should prevent the US economy moving into recession. Continued strong export growth and muted domestic demand contributes to the US current account deficit narrowing in 2008 to -5.4 per cent of GDP.

Table 1: Short-term International Outlook

	GDP Output Growth			Consumer Price Inflation*			Average Earnings Growth			Unemployment Rate %			Current Account Balance % of GDP		
Country	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**
UK	2.8	3.1	2.0	2.3	2.4	2.0	5.2	4.2	2.6	5.5	5.5	5.7	-3.1	-2.9	-3.1
Germany	3.1	2.6	1.8	1.8	2.2	2.3	1.7	2.9	2.9	8.1	6.4	5.7	4.9	6.0	6.0
France	2.2	1.9	1.8	1.9	1.5	2.2	3.8	4.2	3.7	8.8	8.0	7.5	-1.3	-1.3	-2.2
Italy	1.9	1.8	1.3	2.2	2.0	2.4	4.6	3.6	4.2	6.8	5.9	5.8	-2.6	-2.0	-2.1
Euro Area	2.9	2.6	1.9	2.2	2.1	2.5	1.8	2.4	2.8	7.7	6.8	6.4	0.0	0.2	-0.1
USA	2.9	2.2	2.0	3.2	2.8	2.7	4.0	5.0	3.6	4.6	4.6	5.0	-6.2	-5.6	-5.4
Japan	2.2	1.9	1.6	0.2	0.0	0.3	1.7	0.9	0.6	4.1	3.8	3.7	3.9	4.7	4.8
China	11.1	11.4	10.7	3.1	4.4	4.5							9.4	11.2	11.3
OECD	3.2	2.7	2.7	3.9	4.5	4.2	3.1	3.3	3.7	5.9	5.4	5.4	-1.8	-1.4	-1.4
Ireland	5.7	4.8	2.3	2.7	2.9	2.8	4.9	5.5	4.0	4.4	4.6	5.8	-4.2	-4.6	-4.5

Source: OECD Economic Outlook No. 82, December 2007 and own forecasts.
* HICP for Euro Area countries and the UK.

Despite higher oil prices and a weakening dollar, inflationary pressures over our forecast horizon are expected to remain subdued. Headline inflation in the US is currently running above 3 per cent, but is expected to average 2.8 per cent for 2007 as a whole and 2.7 per cent in 2008. Core inflation, which excludes energy and food, appears to be anchored at around 2 per cent. The Federal Reserve has cut its main policy rate by 1 per cent to 4.25 per cent in recent months to support growth in the US next year and prevent a spillover from the financial market turmoil to the real economy. This easing is unlikely to have a major stimulatory effect on inflation. However the outlook for growth in the US is subject to significant downside risks as the full extent of the impact on the real economy of the financial market turmoil and the on-going correction in the housing market is still uncertain.

Asia

The Japanese economy grew by 2.2 per cent in 2006 in real terms, with external demand being the key factor. Real GDP growth of 1.9 per cent is estimated for 2007 and growth of 1.6 per cent is expected in 2008. This moderation in growth is mainly due to a fall in residential construction and the continued faltering in personal consumption growth. Despite a continuing fall in unemployment, from an average of 4.1 per cent in 2006 to an anticipated 3.8 per cent in 2007, wage growth has remained relatively low. In the absence of significant rises in consumer prices, the steady increases in the cost of raw materials have squeezed corporate profitability. The trend of weak growth in domestic demand is expected to continue through most of 2008, and while the risk of deflation still exists consumer prices are expected to increase by 0.3 per cent in 2008.

China continues to grow very rapidly, with real GDP growth of 11.4 per cent expected in 2007, following 11.1 per cent growth in 2006. While external demand remains the fundamental driver of growth, domestic demand has begun to increase significantly in 2007. Investment in particular has risen, but despite the expanding capital stock the Chinese economy continues to grow above its potential, contributing to inflationary pressures. Inflation rose to an eleven-year high in November of 6.9 per cent. Much of this increase in inflation is attributed to food prices accelerating, as a result of rising animal feed costs and a shortage of pigs. However, non-food prices have also started to rise and wage pressures are becoming evident. Real GDP growth is expected to moderate to 10.7 per cent next year as these domestic price and wage pressures impact upon competitiveness. This is not expected to be enough to dampen excess demand significantly. Despite the People's Bank of China moving to a tighter monetary stance, inflation is expected to remain above its desired rate, contributing to speculative bubbles in various asset markets.

International Context for Ireland[1]

Uncertainty in the international financial markets continues to be a feature of the context in which our forecasts for Ireland were prepared. Although the original source of the financial turmoil is the problem of defaults in the US sub-prime mortgage market, the main problem now is one of uncertainty. As many of these sub-prime mortgages were sold on to other institutions in the form of complex financial instruments, it became unclear as to which institutions would ultimately hold the bad debts. Given this uncertainty, banks became unwilling to lend to each other and hence the credit crunch began in August 2007. The spread between official interest rates and market rates rose and central banks found it necessary to provide liquidity to the financial markets to assist in their on-going operation.

At the outset of the credit crunch, it might have been expected that the major problems in the US and broader OECD financial system would have impacted in Ireland in the form of a rise in retail interest rates. As Honohan (2006)[2] pointed out, the Irish financial system has borrowed heavily abroad to fund the very large rise in domestic credit that has underpinned the boom in building and construction. However, mortgage interest rates for existing customers have remained unchanged in Ireland over the second half of 2007 in the face of the rise in the international cost of funds for banks. This indicates that the mortgage customers of the Irish banking system have been reasonably insulated from the credit crunch. While the banks themselves may have absorbed some of the increases in their costs, the recent report on financial stability from the Central Bank[3] points to the on-going health of the Irish financial system.

One part of the reason for the stability of Ireland's financial system is the generally favourable outlook for the household sector. Although debt levels have risen dramatically since the beginning of the decade, much of the borrowed money has been used to purchase assets (i.e., houses). However, the net financial position of Irish households is strong. When combined with the recent easing in credit growth and high wage growth in recent years, the household sector can be viewed as a stable component in the overall context in which Ireland's banks operate.[4]

Looking beyond Ireland, the Euroframe-EFN[5] report of September argued that a short-run problem in international

[1] We are grateful to John Fitz Gerald for contributions to this section.
[2] Honohan, Patrick (2006), "To What Extent Has Finance Been a Driver of Ireland's Economic Success?", *Quarterly Economic Commentary*, Winter.
[3] Central Bank of Ireland (2007), *Financial Stability Report*, Dublin: Central Bank
[4] See also Central Bank (2007).
[5] Euroframe-EFN (2007), *Economic Assessment of the Euro Area: Forecasts and Policy Analysis*, available through www.euroframe.org

financial markets would have a limited impact on output in the Euro Area. On that basis, Euroframe-EFN did not factor the credit crunch into its analysis. One caveat that was added in the September report was the acknowledgement that a full-blown banking crisis in Europe or the US would indeed have significant macroeconomic impacts. We have followed Euroframe-EFN in basing our forecasts on the more benign view of the current difficulties and as such have proceeded on the expectation that the impact in Ireland will remain limited.

Growth prospects for many of Ireland's trading partners have been revised downwards for 2008, with significant downside risks to the forecasts. However, the current spike in commodity prices is beginning to feed through to consumer prices in most economies. Combining the outlook for growth and inflation, the possibility remains that over the short term there will be a period of high inflation and below potential economic growth.

While this scenario is clearly of concern, it should be noted that the global economy entered this current phase on the back of a long period of expansion, with low unemployment and high levels of corporate profitability. In addition, the reaction of monetary authorities to date has been to assist in the maintenance of liquidity in financial markets, including combined efforts across central banks. In the case of both the US Federal Reserve and the Bank of England, decisions have also been taken to cut interest rates. These actions serve to counteract the effects of the credit crunch.

THE DOMESTIC ECONOMY

General

The slowdown in the house-building sector continues to place a drag on economic growth. Following a record level of completions in 2006 of 88,000, we now estimate that completions will be in the mid-70,000s this year and in the mid-50,000s in 2008. These levels of house completions imply a contraction in housing investment of over 12 per cent in 2007 and over 20 per cent in 2008. Given the current weight of housing in total investment, we now estimate that investment will be static in 2007 relative to 2006 and that 2008 will see a decline in investment of almost 4 per cent.

Given the strong pace of consumption growth that is being experienced this year, we expect to see consumption growth of 7 per cent for 2007. With Government spending also growing strongly in 2007 and exports showing a recovery relative to 2006, growth for 2007 is now expected to be 4.4 per cent in GNP volume terms (4.8 per cent in GDP).

For 2008, a number of factors will combine to reduce growth significantly. First, as discussed above, the contraction in house-building will be very substantial. Second, with the SSIA effect no longer present, consumption growth will be lower. Third, current government spending will grow at a slower pace, following *Budget 2008*. As a result of these factors, we expect to see growth slowing to 2.3 per cent in 2008, for both GDP and GNP. This low rate of growth will be reflected in the labour market where we expect net employment growth to be well below 1 per cent.

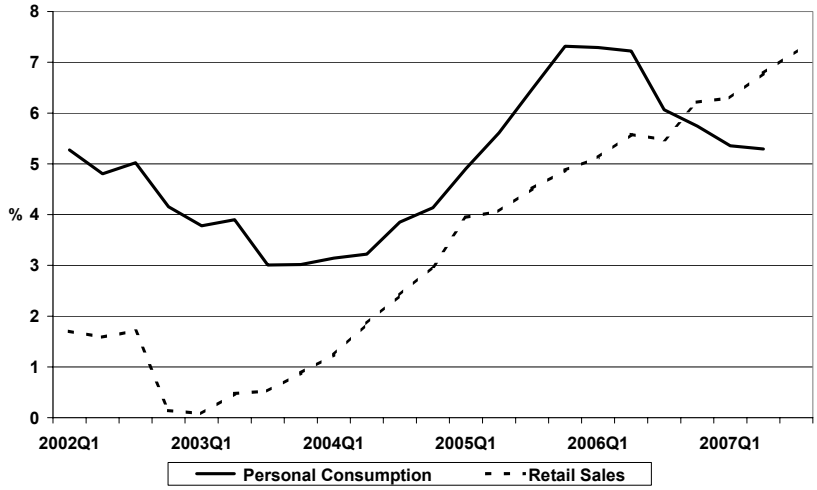
Consumption

Consumption continued to grow strongly in 2007, although not at the pace expected earlier in the year. In the Spring *Commentary*, we were forecasting consumption growth of 7.8 per cent for 2007, a significant jump from the 2006 growth rate of 5.7 per cent. The 2007 forecast had been (and continues to be) based partly on an anticipated SSIA effect but also on strong wage and employment growth.

According to the *Quarterly National Accounts* (*QNA*), consumption had grown by 5.3 per cent in the year ending 2007 Q2. As shown in Figure 3, this implies that growth in consumption

has been declining in each quarter since 2005 Q4. The Retail Sales Index shows a different story in terms of trends, again as shown in Figure 3. According to it, retail sales remain on an upward trajectory and grew by 7.3 per cent in the year ended September 2007. Excluding the motor trade, the index grew by 7 per cent over this period so car purchases are not distorting the overall picture.

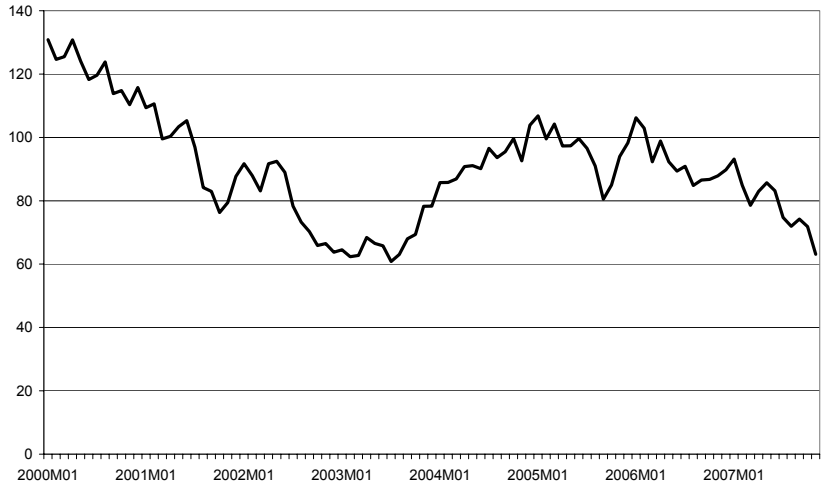
Figure 3: Growth in Consumption and Retail Sales



Source: Quarterly National Accounts and *Retail Sales Index,* CSO.

Our estimate for 2007 has now been revised down to 7 per cent. One reason for the slower growth in consumption in 2007 compared with earlier expectations is likely to have been the fall in consumer sentiment during the course of 2007 as shown in Figure 4. Looking at the three month moving average, the index has fallen steadily over the course of the year from a high of 90.3 in January to a reading of 69.7 in November. The fall has been such that the index is now close to its lowest reading since its inception in 1996. As the fall in sentiment is related to the general slowing in the economy, it is unlikely to rebound in 2008. When combined with lower employment growth in 2008, we arrive at a forecast for consumption growth in 2008 of 3.8 per cent in volume terms. This represents a marginal reduction from our forecast of 4 per cent in the Autumn *Commentary*.

Figure 4: IIB/ESRI Consumer Sentiment Index, 2000-2007



Investment

Following a year of modest investment growth in 2006, at 3.1 per cent, investment growth appears to have accelerated to 7 per cent in the year ended 2007 Q2, as reported in the *QNA*. However, this overall figure hides very different trends within the category.

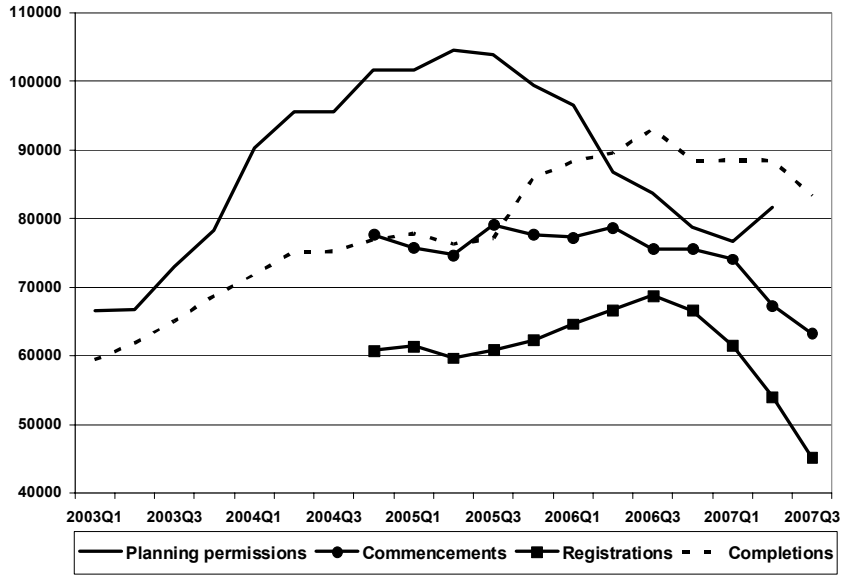
Housing investment continues to show signs of contraction. The number of completions in the twelve months to 2007 Q3 was just below 83,500, which is around 5,000 below both the number of completions in 2006 and in the twelve months ended 2007 Q2. Commencements data also show signs of contraction. In the year ended 2007 Q3, there were 63,262 commencements, around 15,000 below the commencement's peak of 2006 Q2. Finally, figures for registrations show the same trend, with a figure of just over 45,000 for the year ended 2007 Q3 (see Figure 5). This is almost 10,000 fewer than for the corresponding figure for the previous quarter. Based on these figures, we now expect house completions to number in the mid-70,000s in 2007 and the mid-50,000s in 2008, both of which are further downward adjustments relative to the previous *Commentary*. Such levels of output imply a contraction in housing investment volumes of 12.7 per cent in 2007 and 20.4 per cent in 2008.[6]

[6] From Figure 5, it will be noticed that planning permissions have actually turned upward in the most recent data. While this points to an upturn in activity at some point in the future, we do not think that this will happen before the end of 2008.

Table 2: Gross Fixed Capital Formation

	2005 €m	% Change in 2006 Volume	% Change in 2006 Value	2006 €m	% Change in 2007 Volume	% Change in 2007 Value	2007 €m	% Change in 2008 Volume	% Change in 2008 Value	2008 €m
Housing	20,975	3.5	10.7	23,221	-12.7	-14.1	19,945	-20.4	-19.2	16,123
Other Building	11,201	9.5	18.0	13,216	12.0	20.4	15,913	10.0	16.6	18,554
Building and Construction	32,176	5.6	13.2	36,438	-3.8	-1.6	35,857	-7.6	-3.3	34,677
Machinery and Equipment	9,903	-5.1	-3.2	9,589	14.0	16.3	11,150	8.0	9.6	12,223
Total	**42,079**	**3.1**	**9.4**	**46,027**	**0.1**	**2.1**	**47,007**	**-3.7**	**-0.2**	**46,900**

Figure 5: Housing Statistics



Source: Department of the Environment, Heritage and Local Government.

On house prices, the *permanent tsb/ESRI* house price index continues to show declines. The October release reported a month-on-month decline of 1.3 per cent and also that prices as recorded were almost 5 per cent below those reported in the December 2006 release. Given the on-going picture of house price declines, we have maintained our forecast for house prices in December 2007 to be 15 per cent below their December 2006 values. Such a forecast might appear overly pessimistic based on the October house price release but it should be noted that the October release refers to prices agreed about two months earlier (i.e. in August 2007). Our view is that prices will have fallen since August although these will not have been picked up in the *permanent tsb/ESRI* index yet. Given that an adjustment of this magnitude would eliminate the over-valuation of houses (as suggested by our modelling of the housing market), we expect house prices to stabilise during 2008.

Apart from housing, we have seen other elements of building and construction doing well in 2007 and expect this to continue into 2008. The spending of SSIAs on home improvements in 2007 has added to activity in this area and the National Development Plan continues to add significantly to investment spending. While the SSIA effect is likely to diminish in 2008, the NDP will continue to inject a large volume of spending. Overall, we expect non-housing building and construction to grow by 12 per cent in 2007 and 10 per cent in 2008. However, given the weight of house building in overall building and construction, we expect overall declines in this sector in both 2007 and 2008, with the decline being particularly severe in 2008.

On machinery and equipment, we estimate that investment will grow by 14 per cent in volume terms in 2007 and by 8 per cent in 2008. As discussed in the previous *Commentary*, machinery and equipment investment flows in Ireland can be heavily influenced by the purchases of aircraft. For this reason, there is a considerable degree of uncertainty about these forecasts and especially in the case of 2008. Both of the major airlines with bases in Ireland have announced expansion plans but the precise timing is uncertain.

Overall, we estimate that the outturn for investment will be static in 2007 in volume terms and that it will contract by 3.7 per cent in 2008.

Government Spending and the Public Finances

Budget 2008 and the release of the Exchequer returns have dominated developments in the public finances in recent weeks. Looking firstly at the Exchequer returns, figures on revenue inflows have shown a rapid slowdown in the latter part of the year whereby it is now estimated that the total tax take for 2007 will be €1.75 billion below that forecast by the Department of Finance at *Budget 2007*. This shortfall on the forecast level is far lower than that in our own forecasts (€3.3 billion) and in Box 1 we discuss our tax forecasts in some detail.

The biggest shortfall in absolute terms was for stamp duties. They are likely to be €730 million below the *Budget 2007* forecast and so 14 per cent below their 2006 level. This is clearly related to the slowdown in the housing market, both in terms of volumes of transactions and in terms of price. VAT and corporation tax also showed large absolute shortfalls relative to the *Budget 2007* forecasts (minus €325 million and minus €300 million respectively). The VAT figures may be related in part to the housing slowdown and also to a lower SSIA effect than was anticipated at the start of the year. In contrast, income taxes are likely to come in on target, thereby reflecting the continued strength of the labour market. The income tax take in 2007 was also boosted by the inflow of exit tax receipts from SSIA funds.

With voted current spending rising by 12.3 per cent in 2007 (marginally below the *Budget 2007* forecast), it now appears that the outturn for the General Government surplus will amount to 0.5 per cent of GDP in 2007. Given that the surplus in 2006 was 2.9 per cent of GDP, 2007 has seen a significant turnaround in the public finances and consequently fiscal policy has been highly stimulatory. The impact of fiscal policy in 2007 can be seen in part in the role played by public sector employment in the strong labour market performance mentioned above. Of the 67,600 net jobs created in the year ended 2007 Q3, 22,000 were in health, education and public administration. We return to this point in the *General Assessment* below when we discuss what we see as unsustainable elements in the growth outturn for 2007.

Table 3: Public Finances

	2006	% Change	2007	% Change	2008
Current Revenue	46,145	4.0	47,999	3.4	49,627
Current Expenditure	37,077	10.4	40,938	9.5	44,827
of which: Voted	32,915	12.3	36,948	9.3	40,390
Current Surplus	9,068	-22.1	7,061	-32.0	4,800
Capital Receipts	1,871	-24.8	1,407	3.5	1,456
Capital Expenditure	8,675	16.3	10,091	9.9	11,089
of which: Voted	6,476	18.9	7,700	11.2	8,562
Capital Borrowing	-6,804	27.6	-8,684	10.9	-9,633
Exchequer Balance	2,264.3		-1,623.1		-4,832.8
as % of GNP	1.5		-1.0		-2.9
General Government Balance	5,107.3		899.2		-1,812.7
as % of GDP	2.9		0.5		-0.9
Gross Debt as % of GDP	25.1		24.4		25.7
Net Debt as % of GDP*	12.7		10.3		9.7

*Net of pensions fund and Social Insurance Fund.

The slowdown in tax revenues in 2007 and the anticipated slowdown in economic activity in 2008 set the context for *Budget 2008*. Looking firstly at the expenditure side, the Tánaiste sought to reduce the rate of growth in voted current expenditure relative to 2007 and budgeted for an increase of 8.2 per cent.[7] Approximately 5 percentage points of this increase will be taken up by the increased cost of providing existing services. The scope for additional services provision within this envelope is somewhat limited, especially when compared with the situation in 2006 and 2007. Given this, it will be a major challenge to contain spending to the extent set out. On the capital side, voted expenditure is set to rise by 11.2 per cent. The higher increase on the capital side relative to the current side shows the importance being attached to the on-going roll-out of the NDP.

Based on our forecasts for economic growth in 2008, we estimate that current revenues will grow by 3.4 per cent. Factoring in the growth rates in other elements of the public finances leads us to forecast a General Government deficit of 0.9 per cent of GDP in 2008. This is very similar to the forecast by the Department of Finance, in spite of the fact that our forecast for economic growth next year is lower. Our higher underlying tax elasticity means that the slightly lower growth rate translates into a similar estimate for tax revenues (see Box 1).

[7] In Table 3 this is 9.3 per cent because Budget 2008 includes local government funding for non-national roads in the 2008 figure but not in the 2007 figure.

Box 1: Forecasting Tax Revenues

The *QEC* developed a detailed set of tax forecasting rules during the course of 2006 and 2007. These broadly consist of a series of elasticities linked to endogenous macroeconomic variables within the *QEC* forecasting framework. The elements of the approach are as follows:

a. Corporation tax is driven by non-agricultural profits. For 2007 we make a downward adjustment to our forecast due to once-off effects of changes in payment schedules.
b. Income tax is driven by non-agricultural incomes. We first adjust the income tax numbers to remove the effect of Special Investigations revenues and SSIA contributions, both of which are included by the Revenue Commissioners in the income tax category.
c. Customs are driven by the value of merchandise imports.
d. Excise taxes are driven by the volume personal consumption.
e. VAT is driven by the value of personal consumption.
f. Stamp duties are sub-divided and linked to separate drivers:
    i. Residential stamp duty is driven by the value of investment in housing (an indicator of activity in the property market).
    ii. Non-residential stamp duty is driven by the value of investment in other building and construction excluding roads.
    iii. Non-property stamp duties are driven by the value of personal consumption.
g. Capital Gains Tax and Capital Acquisitions Tax forecasts are driven by the value of personal consumption.

The table below looks at our 2006 and 2007 tax forecasting performance. The first column is based on initial forecasts for 2006 in the *QEC* of Winter 2005. These were the official Budget day forecasts. The second column shows the outcome for 2006. The third column shows our initial forecasts for 2007 based on our own tax forecasting elasticities. The fourth column shows the estimated outturn announced in *Budget 2008*.

Initial *QEC* forecasts underestimated 2006 tax revenues by €3.9 billion, equivalent to 8.5 per cent of the outturn and overestimated 2007 tax revenues by €3.3 billion, equivalent to 7 per cent of the estimated outturn. These represent relatively large divergences. However, if we turn to individual tax forecasts we can see that the bulk of this error is due to poor forecasting of capital taxes.[8] For 2006, our forecast for capital taxes was over 30 per cent below the actual outturn and for 2007 it was over 30 per cent above the actual outturn. These forecasts are directly related to developments in the housing market. Excluding capital taxes our forecasts were 4.4 per

[8] Stamps, capital gains tax, capital acquisitions tax.

cent below outturn in 2006, improving to a smaller 3.1 per cent overestimate in 2007 using our own forecasting model.

The *QEC* forecasts tax heads individually, but we also use an average tax-to-GDP elasticity estimate as a top-down check on the overall forecast. While over the medium term total tax revenue tends to have a one-to-one relationship with nominal GDP, (average elasticity of 1.1 over the period 1976-2006), this can fluctuate dramatically in individual years. For example in 2006 this elasticity was equal to 2.0, falling to an estimated 0.5 for 2007. Excluding capital taxes the equivalent figures are 1.4 and 0.8 respectively. Clearly 2006 was an exceptionally buoyant year for tax revenues while 2007 has underperformed, in terms of revenues, relative to estimated growth. For 2008 our forecasts imply a relatively modest growth in tax revenues, with an overall elasticity of 0.8. Excluding capital taxes, this elasticity is equivalent to 1.0.

	2006		2007		2008	
Source	***QEC* Winter 2005 Forecast**	**Outturn**	***QEC* Winter 2006 Forecast**	**Budget 2008 estimate**	**Budget 2008 Forecast**	***QEC* Winter 2007 Forecast**
Forecast Error Relative to Outturn:	€m	%	€m	%		
Exchequer Balance	-5,191		2,646			
Tax Revenue	-3,889	-8.5%	3,319	7.0		
Capital Taxes	-2,189	-30.5%	2,075	30.9		
Taxes excl capital	-1,700	-4.4%	1,243	3.1		
Income Tax	-580	-4.7%	-379	-2.8		
Corporation Tax	-653	-9.8%	659	10.4		
Excise	-99	-1.8%	344	5.9		
VAT	-353	-2.6%	615	4.2		
Growth rates						
Total Tax Revenue	6.1	16.0	11.2	3.9	3.3	3.7
Excl capital taxes	6.8	11.8	9.1	5.8	4.5	4.8
Nominal GDP growth	7.7	8.2	9.3	7.6	5.5	5.3
Elasticity w.r.t. GDP						
Total tax revenues	0.8	2.0	1.2	0.5	0.6	0.7
Taxes excl capital	0.9	1.4	1.0	0.8	0.8	0.9

Exports

All recent indicators suggest that the pace of growth in the volume of exports has been increasing throughout 2007. Following growth of 4.4 per cent in 2006, data from the most recent *Quarterly National Accounts* indicate that exports grew by 5.8 per cent annually in 2007 Q2 in volume terms and 6.2 per cent in value terms. While this growth is dominated by the continued strong expansion of services exports, merchandise exports have also

Table 4: Exports of Goods and Services

	2005 €m	% Change in 2006 Volume	% Change in 2006 Value	2006 €m	% Change in 2007 Volume	% Change in 2007 Value	2007 €m	% Change in 2008 Volume	% Change in 2008 Value	2008 €m
Merchandise	82,686	0.8	0.8	83,355	2.5	1.5	84,605	2.5	2.0	86,297
Tourism	3,863	8.0	10.2	4,258	6.3	10.0	4,684	5.9	8.5	5,082
Other Services	44,356	10.7	14.5	50,793	10.9	14.0	57,904	8.7	12.0	64,853
Exports of Goods and Services	130,905	4.4	5.7	138,406	5.7	6.3	147,193	5.0	6.1	156,232
FISIM Adjustment	1,193			1,360			1,546			1,728
Adjusted Exports	132,098	4.4	5.8	139,766	5.7	6.4	148,739	5.0	6.2	157,960

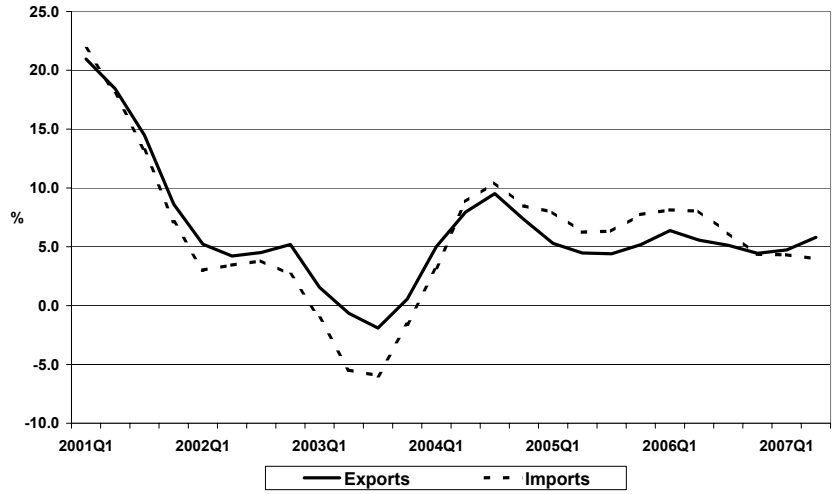
shown signs of recovery following a disappointing performance in 2006. According to the *Balance of Payments*, which only provides data in current prices, annual growth in non-tourism services exports was 14.1 per cent for the year ended 2007 Q2, with tourism exports growing at 10.1 per cent. The growth in the value of merchandise exports was significantly lower at 1.4 per cent for the same period.

Towards the end of 2006 there was a significant deterioration in the performance of merchandise exports which was largely concentrated in the final quarter of the year. This poor performance in Q4 meant that in 2006 volume growth in merchandise exports was just 0.8 per cent. However, as discussed in previous *Commentaries,* this slowdown appears to have been temporary in nature. Data from the latest *External Trade* statistics estimate that volume growth in merchandise exports rose by 5.5 per cent in the year ended 2007 Q2, with export prices falling by 2.6 per cent over the same period. Export prices have been falling since mid-2006 and there is no evidence so far of this trend reversing as the *Wholesale Price Index* for manufacturing, a good indicator of merchandise export prices, has continued to fall through 2007. We expect this trend of falling merchandise export prices to continue throughout the forecast period. Consequently, our forecasts for growth in the value of merchandise exports in 2007 and 2008, at 1.5 per cent and 2 per cent respectively, are below our forecasts for volume growth of 2.5 per cent in both years. Our forecast for volume growth has been revised downwards from our Autumn *Commentary*. This reflects the projected slowdown in growth of our major trading partners, in particular the US, and the strengthening of the Euro.

As discussed in previous *Commentaries*, the share of services exports in total exports has increased significantly in recent years. While services accounted for 22 per cent of the total value of exports in 2000, this had risen to 40 per cent in 2006 and is expected to rise further to 45 per cent in 2008 according to our forecasts. Unsurprisingly, overall export growth has been dominated by the growth in services exports, which increased by 14.2 per cent in value and 10.5 per cent in volume terms in 2006. This growth was concentrated in insurance, financial and other business services which together accounted for 73.8 per cent of the total growth in the value of services exports last year. Data for the year ending 2007 Q2 show that services exports grew by 13.7 per cent in value terms and 10.5 per cent in volume terms. Looking forward, we expect the pattern of more services intensive growth to continue, with growth in the value of non-tourism services exports of 14 per cent and 12 per cent in 2007 and 2008 respectively. The equivalent forecasts for volume growth are 10.9 per cent and 8.7 per cent. Meanwhile, tourism services exports are expected to grow robustly this year and next at 10 per cent and 8.5 per cent in value terms.

Our expectation for the outturn 2007 is for 5.7 per cent growth in the volume of exports of goods and services, with growth expected to moderate in 2008 to 5 per cent. The 2008 forecast has been revised downwards since our Autumn *Commentary*. As noted above, this is because the international outlook is less favourable and remains somewhat uncertain and also because of exchange rate movements.

Figure 6: Volume Growth Rates (Annual Average)



Source: Quarterly National Accounts, CSO.

Imports

The volume of imports of goods and services grew by 4.4 per cent in 2006, while the total value of imports rose by 7.8 per cent. The most recent data for 2007 suggest lower growth rates in imports this year. The *QNA* estimate volume growth of 4.1 per cent and value growth at 6 per cent in the year ending 2007 Q2 (see Figure 6). According to the latest *Balance of Payments* data, there has been a marked slowdown in the pace of growth in the value of services imports in recent quarters. This is particularly the case for non-tourism services, which grew by just 5 per cent in the year ending 2007 Q2. Meanwhile, the value of tourism imports grew by 11.6 per cent and merchandise imports grew by 6.4 per cent over the same period.

Merchandise import volume growth was estimated at 1.6 per cent in 2006 according to the CSO. In the year ended 2007 Q2 that growth had accelerated to 4.6 per cent. The value of merchandise imports from a number of economies has increased in recent months, particularly from some of the New Member States. For the period January to August 2007 the value of merchandise imports from Poland, for example, increased by 71 per cent compared to the same period in 2006.

Table 5: Imports of Goods and Services

	2005 €m	% Change in 2006 Volume	% Change in 2006 Value	2006 €m	% Change in 2007 Volume	% Change in 2007 Value	2007 €m	% Change in 2008 Volume	% Change in 2008 Value	2008 €m
Merchandise	54,467	1.6	6.4	57,967	4.9	7.0	62,025	4.9	6.5	66,056
Tourism	4,898	8.5	11.2	5,446	8.8	11.0	6,045	3.9	6.5	6,438
Other Services	52,623	6.8	8.4	57,025	4.6	7.0	61,017	4.0	6.0	64,678
Imports of Goods and Services	111,988	4.4	7.5	120,438	5.0	7.2	129,087	4.4	6.3	137,172
FISIM Adjustment	291			559			601			637
Adjusted Imports	112,279	4.4	7.8	120,997	5.0	7.2	129,687	4.4	6.3	137,809

The growth in the volume of services imports in 2006 is estimated at 7 per cent by the CSO. In 2007 Q2 that growth had slowed significantly to 3.7 per cent on an annual average basis. An analysis of the *Balance of Payments* data, which provides a more detailed breakdown in current prices, suggest that the slowdown in services imports relates to a moderation in the growth of insurance and transport services.

For 2007 our estimate suggests growth in the volume of goods and services imports of 5 per cent. While this is higher than the growth recorded in 2006, it is a significant downward revision on our forecast 5.8 per cent growth rate in the Autumn *Commentary*. Based on current indicators we estimate a significant acceleration in the pace of growth of merchandise imports to 4.9 per cent. The anticipated increase in merchandise import growth this year is driven in part by the current solid performance of the industrial sector (excluding construction) and the large increase in machinery and equipment investment, mostly aircraft. Nevertheless, our overall estimate of import growth for 2007 has been revised downwards because of the current slow pace of growth in non-tourism services imports.

For 2008 volume growth in imports of goods and services is forecast to slow to 4.4 per cent, a significant downward revision from our Autumn forecast. This moderation is driven by the forecast slowdown in the growth of personal consumption next year, which is particularly reflected in services imports. Growth in non-tourism services imports is anticipated to fall to 4.0 per cent (6.0 per cent value) while tourism import growth declines rapidly to just 3.9 per cent (6.5 per cent value).

Our forecasts for growth in the value of goods and services imports are 7.2 per cent and 6.3 per cent for 2007 and 2008 respectively.

Balance of Payments

Our forecasts for merchandise imports and exports for 2007 and 2008 imply a further narrowing of the merchandise trade balance this year and next. Both volume and price developments contribute to this trend. Our expectation of further falls in merchandise export prices leads to a continuing deterioration in the terms of trade over the forecast period. Offsetting this is the narrowing of the services trade deficit, where services export growth continues to outstrip imports growth. The strong performance from services is expected to compensate entirely for the contraction in the merchandise trade balance in 2007 and 2008, leading to the first increase in the trade balance since 2002. We now expect the trade balance to stabilise at approximately 11.3 per cent of GNP this year and next.

Table 6: Balance of Payments*

	2005 €m	Change %	2006 €m	Change %	2007 €m	Change %	2008 €m
Merchandise Trade Balance	28,219	-10.0	25,388	-11.1	22,581	-10.4	20,241
Service Trade Balance	- 9,302	-20.2	-7,420	-39.7	-4,474	-73.6	-1,181
Trade Balance in Goods and Services on BOP basis	18,917	-5.0	17,968	0.8	18,107	5.3	19,060
% of GNP	13.9		12.0		11.3		11.4
Total Debit Flows	68,287	24.0	84,651	26.7	107,269	16.2	124,618
Total Credit Flows	43,417	37.9	59,870	35.5	81,146	20.0	97,375
Net Factor Flows	-24,870	-0.4	-24,781	5.4	-26,124	4.3	-27,244
Net Current Transfers	265	-275.5	-465	29.0	-600	0.0	-600
Balance on Current Account	-5,688		-7,278		-8,617		- 8,784
Capital Transfers	264	-15.5	223	34.5	300	0.0	300
Effective Current Balance	-5,424		-7,055		-8,317		-8,484
% of GNP	-4.0		-4.7		-5.2		-5.1

*This table includes adjustments to *Balance of Payments* basis.

In relation to net factor flows, the latest *Balance of Payments* data estimate that the net factor income deficit widened by 9.4 per cent in the year ended 2007 Q2. This followed a small contraction of the deficit in 2006 of -0.4 per cent. Credit flows increased by 33.3 per cent in the year ended 2007 Q2, with much of this growth being accounted for by portfolio and other investment income. There was an increase in debit flows of 25.7 per cent in the year ended 2007 Q2. A fall in repatriated profit flows of 35.9 per cent (approximately €9.6 billion) over the period was more than offset by an increase of 37.4 per cent in portfolio and other investment flows (approximately €16.1 billion).

Given the scale and volatility of these net factor flows, forecasting their future course is quite difficult. For 2007 and 2008 we have increased our forecast growth in net factor income to 5.4 per cent and 4.3 per cent respectively. Combined with our forecasts for the trade balance, this implies an effective current account balance equivalent to –5.2 per cent of GNP in 2007, narrowing slightly to –5.1 per cent of GNP in 2008 (Table 6).

Measures of Growth

The anticipation of lower rates of GNP and GDP growth relative to recent years has been covered above. The last time a rate of growth below 3 per cent was experienced was in 2002, when GNP grew by 2.9 per cent (although in the same year, GDP growth was 6.4 per cent). Looking at other measures of growth, GNP adjusted for the terms of trade is expected to grow by 1.7 per cent in 2008. This lower figure relative to GNP growth reflects our expectation of a deterioration in the terms of trade in 2008. This is part of a

longer-run trend as seen in the table. Growth in GNP per capita is expected to be just under 1 per cent in 2008 and arises from our expectation that the population will grow by about 1.5 per cent in 2008.

Table 7: Measures of Growth

Growth Indicators	2004	2005	2006	2007	2008
GNP	3.7	4.9	6.5	4.4	2.3
GNP adjusted for Terms of Trade	2.9	3.8	4.5	3.0	1.7
GNDI	2.9	3.7	4.0	2.9	1.7
National Resources	3.0	3.6	4.0	3.0	1.7
GNP per capita (constant prices)	2.0	2.7	3.7	1.8	0.9
Consumption per capita (constant prices)	2.5	5.1	3.0	4.4	2.3
Personal disposable income per capita	3.4	6.7	3.6	6.6	5.2
Investment in Housing/GNP	13.5	15.5	15.6	12.5	9.6
Investment/GNP	28.0	31.0	30.9	29.4	27.9

Sectoral Output

Following the good performance of **industry** in 2006, with growth (excluding construction) of 5.3 per cent, it appears that 2007 will again be a year of relatively good growth. The most recent *Quarterly National Accounts* showed industry growing by 6 per cent in the year ended 2007 Q2. With construction now growing more slowly than other industry, this figure conceals an even better performance in the non-construction component where growth up to 2007 Q2 was 7.2 per cent. Construction itself grew by 3 per cent in the year to 2007 Q2.

This positive performance is also seen in the *Index of Industrial Production*. The index for all industries grew by 5.6 per cent for the year up to September 2007. Within this, manufacturing grew by 5.9 per cent over the same period.

For 2007, we estimate that industrial production (excluding construction) will grow by 4.5 per cent in volume terms. However, due to unfavourable price movements, we expect the growth rate in value terms to be lower, at 3.5 per cent. This view of prices is partly informed by observed movements in the wholesale price index, which posted a reading of -1.3 per cent on an annual basis for the year ended September 2007. For 2008, we expect industry (again excluding construction) to grow by 3 per cent in volume terms and by 2 per cent in value terms. This slowdown between 2007 and 2008 is related in part to a slowing in exports (as discussed in the section on Exports above) in the face of slower global growth in 2008 and the weaker dollar.

Services continue to exhibit the strongest rates of growth across the sectors of the economy. Across all services, growth was 6.8 per

cent in 2006 with the highest rate of growth being shown in the "other services" category (7.8 per cent). The indications for 2007 continue to be positive. According to the *QNA*, services grew by 7.1 per cent in volume terms in the year ended 2007 Q2. The breakdown in growth rates within the sector is as follows: distribution, transport and communications: +6.4 per cent; public administration and defence: +1.8 per cent; other services +7.8 per cent. These growth rates in output are mirrored in the employment numbers where the highest numbers of additional jobs are in the areas of finance and business services. We should note, however, that employment is also growing in publicly-provided services, i.e. health and education. Hence, the overall growth in services is partly related to the large increase in Government spending in 2007.

For 2007, we estimate that services in total will grow by 6.2 per cent in volume terms and by 10.7 per cent in value terms. These aggregate figures are dominated by our estimate of growth in "other services", which we estimate will grow by 7.2 per cent in volume terms and by 12.5 per cent in value terms.

For 2008, growth in services is expected to moderate but, nonetheless, growth will be strong and higher than in other sectors again. Overall growth in volume terms is forecast to be 3.6 per cent, with the growth rate for "other services" forecast to be 4.3 per cent. The corresponding value growth rates are 7.2 per cent and 8.5 per cent respectively.

For **agriculture,** declines in output over the last year have been counterbalanced by large increases in output prices. The *QNA* record a decline in the volume of output of 7.5 per cent in the year ended 2007 Q2. However, the index of output prices in September 2007 was 16.6 per cent higher than in September of 2006. The largest increase in output prices was for cereals (67.7 per cent), followed by milk (44.9 per cent). These trends are related to international movements in food prices, discussed under consumer prices.

For 2007, we expect that the trend towards lower output volumes but higher output in value terms will have continued. For 2008, we expect a modest pick-up in volume, with growth of 1 per cent forecast. Positive price developments should see this translate into a value increase of 4 per cent.

Table 8: GDP by Sector

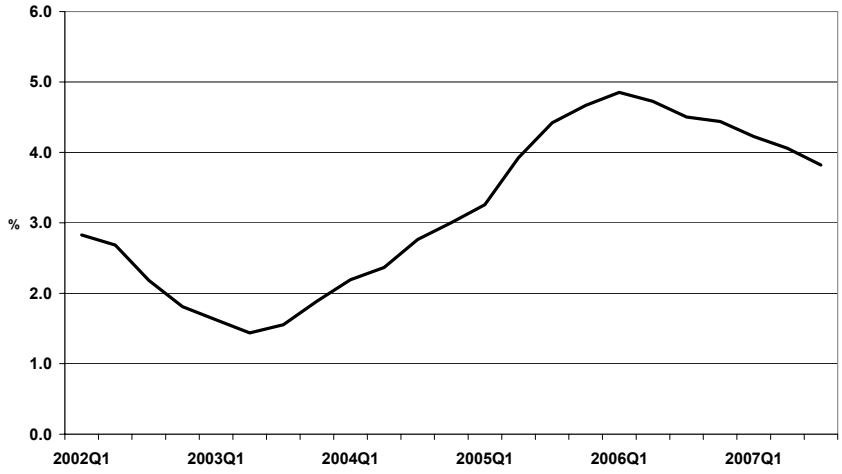
	2005 €m	Change Volume	Change Value	2006 €m	Change Volume	Change Value	2007 €m	Change Volume	Change Value	2008 €m
Agriculture	4,097	-6.8	-4.4	3,918	-1.0	5.0	4,113	1.0	4.0	4,277
Industry:	50,465	4.6	5.1	53,043	2.3	2.0	54,129	0.3	0.5	54,423
Other Industry	36,961	4.3	2.6	37,906	4.5	3.5	39,233	3.0	2.0	40,018
Building & Construction	13,504	5.3	12.1	15,137	-3.8	-1.6	14,896	-7.6	-3.3	14,406
Services:	87,983	6.8	9.6	96,417	6.2	10.7	106,769	3.6	7.2	114,461
Public Administration & Defence	5,127	3.0	7.0	5,485	2.5	7.0	5,869	1.0	4.5	6,133
Distribution, Transport and Communications	21,759	4.6	6.1	23,075	4.0	6.6	24,592	2.0	3.8	25,521
Other Services (including rent)	61,098	7.8	11.1	67,857	7.2	12.5	76,308	4.3	8.5	82,807
GDP at Factor Cost – output basis	142,545	5.6	7.6	153,378	4.6	7.6	165,011	2.4	4.9	173,161

Employment

According to the latest *Quarterly National Household Survey*, employment grew by 3.8 per cent in the year ended 2007 Q3 (+67,600 jobs). Relative to Q3 of 2006, employment in 2007 Q3 was 3.3 per cent higher. As was the case with the figures in the previous QNHS, these figures suggest that while employment growth remains strong, the rate of growth is softening. The point is illustrated in Figure 7. Annual employment growth peaked in 2006 Q1 when the growth rate reached 4.9 per cent. Since then, there has been a slow but steady decline in the growth rate.

Although the annual rate of growth in employment in construction, at 7.6 per cent, is higher than the average growth rate, a better sense of the unfolding story in construction is provided by quarter-on-quarter comparisons. Employment in this sector was just 1.7 per cent higher in 2007 Q3 relative to 2006 Q3. As recently as 2007 Q1, employment in construction was 11.2 per cent higher than in the corresponding quarter of the previous year. Hence, the rapid slowdown in construction is clearly evident. Furthermore, the monthly index of construction (firms of five or more) has fallen in each month since April 2007.

Figure 7: Annual Employment Growth 2002 Q1 to 2007 Q3



Source: Quarterly National Household Survey, CSO.

With construction no longer being the main source of job growth, financial and other business services now show the highest number of additional jobs. Between 2006 Q3 and 2007 Q3, employment grew by 28,700 in this sector. The sector with the next highest level of employment growth in absolute numbers was retail and wholesale, adding 11,800 jobs between 2006 Q3 and 2007 Q3.

One interesting feature of the job growth in the most recent period is the fact that over half of the extra jobs created between 2006 Q3 and 2007 Q3 were part-time. By contrast, in the year ended 2006 Q3, only 7 per cent of the extra jobs created were part-

time. We should note that most of the extra part-time jobs were in the category of "not under-employed", thereby suggesting that people were choosing to work part-time as opposed to facing a constraint in the labour market. Hence, the part-time intensity of the employment growth does not necessarily point to a weakening in the labour market.

Of the 67,600 extra jobs created in the year to 2007 Q3, 48,400 were filled by immigrants. This represents almost 72 per cent of the additional jobs and suggests that immigrants are filling an increasing proportion of new jobs. In Q2, 53 per cent of the new jobs created in the previous year were filled by non-nationals. This trend suggests that the reduction in employment growth has not been met yet with a similar decline in the growth rate of the immigrant inflow. Were this to persist, there would be implications in terms of competition for jobs with possible consequences in terms of wages level and unemployment rates.[9]

Looking ahead to 2008, we expect the deceleration in employment growth to continue to such a degree that employment will only grow by 8,000 or 0.4 per cent. This is obviously a notably low figure when compared to recent years but arises largely from the contraction in house building, which is a highly labour-intensive sector. Employment in services is forecast to rise by 28,000 but the drag which results from house building will all but erase these gains in an aggregate sense. As a result of the low growth in employment, the rate of unemployment is forecast to rise to 5.8 per cent. Net inward migration is forecast to be 25,000, a significant fall relative to the 2007 estimate of 71,000.

TABLE 9: Employment and Unemployment

	Annual Averages 000s			
	2005	**2006**	**2007**	**2008**
Agriculture	115	117	115	115
Industry	539	560	569	550
Services	1,298	1,362	1,416	1,444
Total at Work	1,952	2,039	2,100	2,108
Unemployed	89	93	102	130
Labour Force	2,041	2,132	2,202	2,238
Unemployment Rate %	4.4	4.4	4.6	5.8
Net Migration	53.4	69.9	70.6	25.0
of which: Inward Migration	70.0	86.9	87.6	42.0
Change in Participation Rate*	1.7	1.0	0.9	0.3

* *Note:* Participation rate measured as share of population aged 15-64 years.

[9] Comparing the period January – October 2007 with the equivalent period in 2006, there has been a 5.3 per cent drop in the number of PPS number allocations to immigrants from the NMS, from 121,669 to 116,084. PPS numbers are a very inexact indicator of migration trends but this figure does point to a moderation in the inward flow.

Incomes

In Table 10, we report trends in wages up to 2007 Q2. On an economy-wide basis, wage growth continues to be strong with growth of 5.1 per cent in the year ended 2007 Q2. The highest rate of growth is in financial and other business services and this is consistent with the employment data that shows this to be a particularly buoyant sector. The low rate of growth in hotels and restaurants may be related to the inflow of immigrants into that sector. According to the *QNHS*, of the 9,400 extra jobs in that sector in the year to 2007 Q3, 9,200 were filled by immigrants.

Table 10: Growth in Average Hourly Earnings 1999-2006

	Hourly Earnings 2007 Q2	Annualised Growth 2007 Q2	Annual Growth							
	Euro	%	1999	2000	2001	2002	2003	2004	2005	2006**
						%				
Economy*	18.61	5.1	5.6	7.6	9.8	6.0	4.9	5.8	5.1	4.7
Industry	15.68	4.7	5.3	6.1	10.4	7.9	5.4	4.7	2.9	4.1
Construction	18.34	4.2	7.7	12.5	11.4	10.4	5.2	4.4	7.2	2.1
Distribution	18.10	5.7	6.3	12.0	10.0	6.8	5.7	4.4	4.4	6.3
Hotels and Restaurants	11.15	2.0	7.6	6.5	5.5	3.6	7.1	8.0	6.1	3.2
Transport, Storage and Communications	20.44	7.4	3.5	5.6	8.4	1.0	5.3	5.7	4.2	6.5
Non-Market Public Services	26.45	5.8	5.4	5.7	9.6	3.7	3.8	9.5	7.1	6.0
Other Market Services	18.88	4.9	6.8	8.4	7.7	2.7	5.6	4.1	3.7	4.5
Financial and Other Business	22.56	7.6	3.6	6.1	11.5	4.2	1.8	6.1	5.6	7.4

* Excludes agriculture and health sector earnings.

** Annual growth to 2006 defined as the annual growth in the four quarter moving average ended in Q4.

On the basis of trends so far in 2007, we estimate that wages will grow by 5.5 per cent this year. When combined with our estimate of employment growth, we arrive at an estimate for growth in non-agricultural wages of 9 per cent. With transfers having grown strongly this year, partly as a result of the social welfare package in *Budget 2007*, gross personal incomes should rise by 9.6 per cent this year. Given the strong growth in consumption in 2007, even if the growth rate was slightly lower than expected, the savings rate should fall to 5.7 per cent in 2007, down from 7 per cent in 2006.

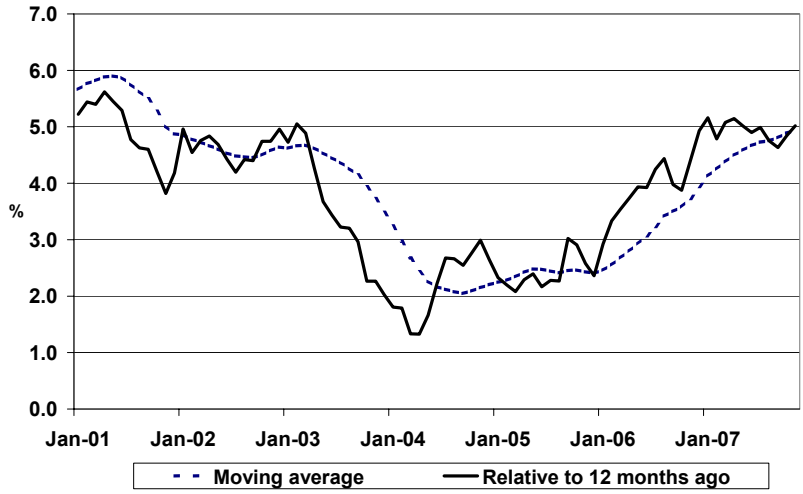
For 2008, we expect the rate of growth in wages to moderate somewhat in the context of slower employment growth and rising unemployment. Our forecast is for wages to grow by 4 per cent. Given our expectation that employment growth will be very low next year, we expect non-agricultural wages to grow by only 4.4 per cent. As the social welfare package in *Budget 2008* is more modest that than in *Budget 2007*, current transfers will grow by a lower rate 7 per cent compared with 15.4 per cent in 2007. Although incomes

will grow more slowly in 2008 relative to 2007, so too will consumption. Hence, we expect the saving rate to increase slightly to 6 per cent in 2008.

Consumer Prices

Inflation, as measured by the Consumer Price Index (CPI), was estimated at 5 per cent year-on-year in November. This was a slight increase on the 4.8 per cent registered in October but consistent with the trend of price increases approaching 5 per cent seen through most of 2007. This trend is reflected in the twelve-month moving average inflation rate shown in Figure 8, which has been rising consistently since the beginning of 2006. The average inflation rate for the twelve months to November was 4.9 per cent.

Figure 8: CPI Inflation Rate



Source: Consumer Price Index, CSO.

Despite no further interest rate increases since June of this year the impact of previous ECB decisions to increase its main refinancing rate, from 2 per cent at the end of 2005 to its current level of 4 per cent, still dominates the development of consumer prices. Given its treatment in calculating the CPI, the mortgage interest component accounted for 36.7 per cent of the total rate of inflation reported in November. The impact of mortgage interest rates on consumer price inflation has, however, fallen significantly in recent months. Our forecasts are based upon the technical assumption of no changes in the ECB main refinancing rate over our forecast horizon to the end of 2008. This implies the influence of the mortgage interest rate component on overall inflation, as measured by the CPI, should continue to fall. Meanwhile, rents continue to increase at a robust pace, registering an 11.1 per cent increase in November compared with the same month in 2006.

Table 11: Personal Disposable Income

	2005 €m	Change %	Change €m	2006 €m	Change %	Change €m	2007 €m	Change %	Change €m	2008 €m
Agriculture, etc.	3,397	-5.9	-202	3,195	5.0	160	3,355	4.0	134	3,489
Non-Agricultural Wages	65,992	9.8	6,434	72,426	9.0	6,497	78,923	4.4	3,511	82,434
Other Non-Agricultural Income	15,409	6.3	974	16,383	6.9	1,135	17,517	13.0	2,271	19,788
Total Income Received	84,798	8.5	7,207	92,004	8.5	7,791	99,795	5.9	5,916	105,711
Current Transfers	18,126	-0.5	-94	18,031	15.4	2,776	20,807	7.0	1,461	22,268
Gross Personal Income	102,923	6.9	7,112	110,035	9.6	10,568	120,603	6.1	7,377	127,980
Direct Personal Taxes	19,561	9.2	1,809	21,371	10.9	2,321	23,691	4.0	942	24,634
Personal Disposable Income	83,362	6.4	5,303	88,665	9.3	8,247	96,912	6.6	6,435	103,346
Consumption	76,435	7.9	6,048	82,483	10.7	8,863	91,346	6.3	5,795	97,141
Personal Savings	6,926			6,181			5,565			6,205
Savings Ratio	8.3			7.0			5.7			6.0
Average Personal Tax Rate	19.0			19.4			19.6			19.2

Apart from interest rates, much of the recent increases in consumer prices are driven by other external forces. Supply constraints internationally for a number of commodities, alongside increasing demand from emerging market economies, have contributed to overall consumer price inflation in Ireland in recent months. This is particularly the case for certain foodstuffs. The food component of the CPI increased by 6 per cent year-on-year in November, significantly above the 2.6 per cent average rate of increase in food prices for the first eleven months of 2007. The increases have been particularly high for cereals, bread and dairy products. The pace of increase in food prices is likely to remain quite elevated over the coming months, but our forecasts assume a return to trend growth in food prices towards the end of 2008.

The recent spike in the price of oil is also reflected in the current inflation rate, with petrol prices increasing by 15.8 per cent year-on-year in November alongside a significant rise in the cost of home heating oil. Most commentators expect the price of oil to stabilise in the opening months of 2008. The strengthening of the Euro against the US dollar has helped, and should continue to help contain the feed through of increased oil prices on the overall CPI.

The main domestic drivers of consumer price inflation are found in the services sector of the economy. Inflation for services averaged 8.4 per cent in the twelve months to October 2007 while inflation for goods averaged 0.9 per cent.

Ireland remains above the Euro Area average in terms of consumer price inflation. Using the EU Harmonised Index of Consumer Prices (HICP),[10] Ireland's year-on-year rate of inflation in November was 3.5 per cent. This measure of inflation has averaged 2.9 per cent for the twelve months up to and including November 2007, which is significantly higher than the equivalent measure for the Euro Area as a whole of 2 per cent.

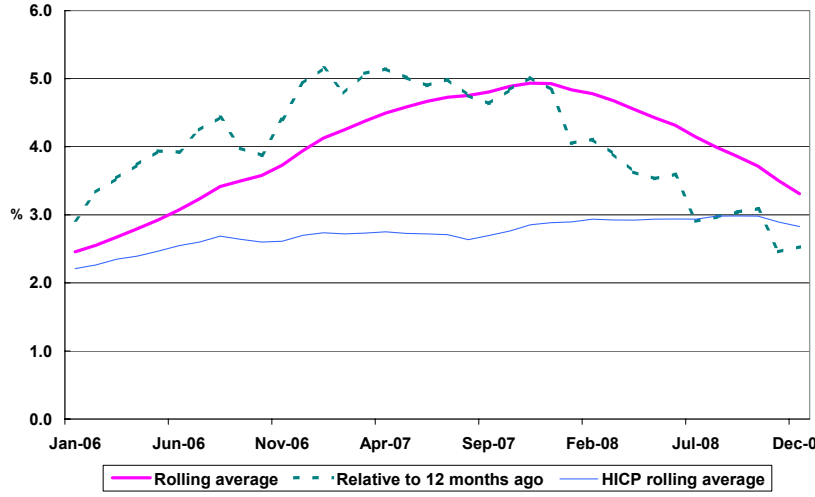
Table 12: Inflation Measures (%)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
HICP (Ireland)	5.3	4.0	4.7	4.0	2.3	2.2	2.7	2.9	2.8
CPI	5.6	4.9	4.6	3.5	2.2	2.4	3.9	4.9	3.3
Mortgage Interest	12.5	24.7	-7.6	-8.3	5.4	12.3	31.4	40.1	7.0
HICP (Euro Area)	2.1	2.3	2.2	2.1	2.1	2.2	2.2	2.1	2.5

[10] The HICP excludes mortgage interest, building materials, concrete blocks, union subscriptions, motor car insurance, dwellings insurance, motor car tax and motorcycle tax.

Looking forward we expect Ireland to remain above the Euro Area average in terms of consumer price inflation. For 2007 and 2008 we expect HICP inflation to average 2.9 and 2.8 per cent respectively. Our forecasts for CPI inflation hinge upon the technical assumption of no changes in the ECB main refinancing rate over our forecast horizon. This implies the gap between the CPI and HICP measures narrows next year. CPI inflation is expected to average 4.9 per cent in 2007 and 3.3 per cent in 2008. The current forecast for 2008 is slightly below that in the previous *Commentary* due to the change in our assumption on interest rates, which had previously been based on an expected 25 basis points increase in December 2007. We now expect the pace of growth in consumer prices to peak at the end of this year and moderate through 2008, as shown in Figure 9.

Figure 9: Inflation Profile 2006-2008 (Forecasts 2007M10 onwards)



Source: Consumer Price Index, Harmonised Index of Consumer Prices, CSO and own forecasts.

General Assessment

We address three issues in this assessment. First, we outline what we see as unsustainable aspects of the recent growth performance. Second, we look at labour market dynamics in the context of low employment growth. Third, we reflect on the recent Budget.

The Unsustainable Nature of the Recent Growth Experience

If our forecast for GNP growth in 2008 of 2.3 per cent is realised, Ireland will experience its slowest pace of economic growth since 1992. As discussed in the text, the slow pace of growth in 2008 is heavily influenced by the contraction in house building. The level of housing output that we expect to see in 2008 will imply a decrease in volume of over 20 per cent. Given the current weight of house building in Ireland's total output, such a contraction places a very significant drag on growth.

As we have argued in a number of *Commentaries*, this contraction in house building can be viewed as a return to a more sustainable rate of housing output. In this way, the adjustment is not entirely negative for the economy and should result in labour resources being released from this sector that can be re-deployed elsewhere in the economy.

While much has been written about the housing sector and its contraction, it should be noted that the scale of housing output was not the only unsustainable element of the recent growth experience. As discussed above in the section on the public finances, 2007 saw a large fiscal stimulus with very rapid growth in expenditure. Combined with very sluggish growth in tax revenues this year – not anticipated at the time of *Budget 2007* – the change in the General Government surplus from 2.9 per cent of GDP in 2006 to 0.5 per cent in 2007 points to a large injection of demand into the economy on the part of the Government. The effect of this can be seen in the profile of employment growth. Of the 67,600 jobs created between 2006 Q3 and 2007 Q3, almost a third (22,000) was in health, education and public administration. The rate of growth is current public spending is being significantly curtailed in 2008 because the rate of increase seen in 2007 was unsustainable.

The final element of the 2007 growth experience that will not be present in 2008 is the SSIA effect. While consumption may not have grown as rapidly as expected at the outset of 2007, our

estimate of 7 per cent growth is still a large increase that will not be repeated in 2008.

With the ending of the housing boom, SSIA-led consumption growth and the large fiscal stimulus of 2007, it is clear that other sectors will now have to perform well if the growth rate is to recover in 2009. The addition of almost 30,000 jobs in "financial and other business services" in the year ended 2007 Q3 shows that there is growth potential elsewhere in the economy, even if some concerns now exist for the global employment prospects of the financial sector in the short term, given the turmoil in financial markets.

The key to an improved performance is, as always, competitiveness. In this context, moderation in wage growth in 2008 would be particularly welcome. High rates of wage inflation in recent years have led to Ireland's share of world export markets falling. A reversal of this trend is imperative in the context that we have just set out.

Employment Dynamics

Given the very different outlooks for the house building sector and for other industries and services, our forecast for overall employment growth in 2008 also hides a much more mixed picture. As can be seen from Table 8 above, we expect total employment to grow by just 8,000 in 2008. However, we expect employment in services to grow by 28,000. As employment in industry, including construction, is expected to fall by approximately 20,000 it is clear that gross employment changes will vastly exceed the net change. Even these figures understate the full extent of the changing structure of employment because employment shifts within industry will also occur.

Our employment forecasts are based on a somewhat optimistic view of the potential for labour to flow across sectors. Without detailed knowledge of the skills of those losing jobs in one sector and the skills needed in expanding sectors, it is difficult to model the labour re-allocation process. However, it is worth pointing out that if labour cannot readily flow between sectors, our forecast for unemployment next year might be overly optimistic. To use a slightly old-fashioned term, "structural unemployment" might emerge, whereby the number of vacancies matches the number of unemployed workers but where skill mismatches prevent job matches. In this context, the importance of training policies comes to the fore because there is a need to supplement the skills of those becoming unemployed so that they can move to other sectors.

The Budget

Although *Budget 2008* was the most high profile public finance "event" in recent weeks, the Exchequer returns were in some ways more noteworthy from an economic perspective. The slowdown in revenue flows meant that the general government surplus was substantially lower than had been expected. By extension, this meant that fiscal policy was more stimulatory in 2007 than had been planned in *Budget 2007*. As discussed above, this will have impacted on the growth rate in 2007 but will not be an on-going stimulus, given the need to curtail growth in current public spending.

Budget 2008 itself contained a number of positive elements. The curtailing of the rate of growth in current spending is to be welcomed, as are the planned lower rates of growth indicated for 2009 and 2010. Meeting these targets will represent a serious challenge for government. The continued growth in capital expenditure to fund the NDP is also welcome. The decision to borrow close to 1 per cent of GDP is sensible given the situation that the economy faces in 2008 and the general health of the public finances. The decision to index tax bands and allowances was also to be welcomed because it is preferable that decisions to increase tax revenue should be explicit and should not come about through fiscal drag.

SPECIAL ARTICLES*

The Earnings of Immigrants in Ireland: Results from the 2005 EU Survey of Income and Living Conditions

by
Alan Barrett** and Yvonne McCarthy***
***The Economic and Social Research Institute, Dublin*
**** Central Bank and Financial Services Authority of Ireland*

Hub Airport Slots, Market Exit and Irish Regional Economic Development

by
Sean D. Barrett
Department of Economics, Trinity College, Dublin

Building for the Future? Interpreting an "Irish" Current Account Deficit

by
Martin O'Brien
The Economic and Social Research Institute, Dublin

Irish Climate Policy for 2012: An Assessment

by
Richard S.J. Tol
The Economic and Social Research Institute, Dublin

*Articles are published in the *Quarterly Economic Commentary* in order to foster high-quality debate on various aspects of the Irish economy and Irish economic policy. All articles, whether authored by ESRI staff members or others, are refereed to ensure that they contain a level of analysis that satisfies accepted academic standards. For most articles, the comments of policy experts from outside of the academic community are also sought. While the ESRI aims to ensure that the refereeing process is both fair and rigorous, it does not accept responsibility for any views expressed in the published articles.

THE EARNINGS OF IMMIGRANTS IN IRELAND: RESULTS FROM THE 2005 EU SURVEY OF INCOME AND LIVING CONDITIONS

Alan Barrett[*] and Yvonne McCarthy[**]

Abstract

This paper has three objectives. First, a review of the developing body of work on the economics of immigration in Ireland is provided. Second, the analysis undertaken by Barrett and McCarthy (2007) of earnings of immigrants in Ireland is updated. Third, the earnings of immigrant women are assessed to see if they experience a "double disadvantage". Among other findings, the review of the emerging literature points to immigrants faring less well in the Irish labour market relative to native employees. As regards the analysis conducted in this paper, we find that immigrants were earning 15 per cent less than comparable Irish employees in 2005. For immigrants from non-English speaking countries, the wage disadvantage was 20 per cent. The corresponding figure for immigrants from the EU's New Member States was 32 per cent. A double disadvantage is found for immigrant women. By this we mean that the analysis shows (a) women

[*]Corresponding author; mailing address – The Economic and Social Research Institute, Whitaker Square, Dublin 2, Ireland. Tel. + 353 1 863 2112. E-mail: Alan.Barrett@esri.ie.

[**]Central Bank and Financial Services Authority of Ireland, formerly of The Economic and Social Research Institute.

(immigrants plus natives) earn 12 per cent less than comparable men (again, immigrants plus natives) and (b) female immigrants earn 14 per cent less than comparable native female employees. This double disadvantage is concentrated among female immigrants with third level degrees.

1. Introduction

In recent years, immigration has become one of the most important economic and social issues facing Ireland. Over a remarkably short time-span, Ireland went from being a country with relatively few immigrants to one with an immigrant share of population similar to the EU average. The presence of this immigrant population has given rise to a wide range of research questions, relating to issues such as the experiences of immigrants in Ireland and their impacts.

In this paper, we address a number of themes. First, we review the literature that has emerged in recent years on the economics of immigration into Ireland. A number of papers have been written since the mid-1990s but no overview has been provided yet. Our second task in the paper is to provide an addition to this emerging body of research through an analysis of the earnings of immigrants in Ireland relative to natives. Earnings are obviously an indicator of labour market success so it is important that we know how the earnings of immigrants compare to those of natives. Significant differences in wages between natives and immigrants can point to efficiency losses for the economy if those lower wages reflect a sub-optimal use of immigrant human capital. Wage differences can also have unfavourable distributional implications.

We conduct our analysis using data from the 2005 wave of the European Union Survey of Income and Living Conditions (EU-SILC). In undertaking this analysis, we have two objectives. First, we want to update the findings in Barrett and McCarthy (2007) in which data from the 2004 wave of the EU-SILC were used. We also want to develop the analysis in Barrett and McCarthy and in particular to consider the earnings of immigrants by gender.

The Barrett and McCarthy paper contains the only analysis of immigrants' earnings in Ireland that is based on a representative sample. For this reason, the addition of a second observation of immigrant earnings has merit. However, we also see this update as having merit because the sample on which Barrett and McCarthy based their analysis contained less than 200 immigrants. The sample used here is also limited in terms of the number of immigrants included but by re-examining the pattern of immigrants' earnings relative to natives we can assess if the findings of Barrett and McCarthy are largely robust.

The paper is structured as follows. In Section 2, we provide the overview of research on the economic dimensions of immigration in Ireland. In Section 3, we describe the data on which the analysis

is based, we present some descriptive statistics and then we present the results from the regression analysis. In Section 4, we offer some conclusions.[1]

2. Research on the Economics of Immigration in Ireland

Although immigration into Ireland is a recent phenomenon, the research community in Ireland has been able to draw on a vast literature on the topic from other countries in setting research questions. Here, we provide a brief note on each question, with some examples of relevant papers. Our focus is purely on the economic dimensions.

1. *What determines the size of migration flows?* A typical approach under this line of research is to consider the relative economic positions of two countries or regions (such as incomes per head) and to relate this to population flows. One recent example is Bauer and Zimmermann (1999) who sought to forecast possible population movements following the expansion of the EU in May 2004.

2. *What are the characteristics of migrants, for example, in terms of human capital?* There are many examples of papers looking at this issue, with one of the best known being Borjas (1987). Borjas showed how immigrants in the US differed in their human capital across countries of origin. In particular, he showed how the shift towards a greater concentration of Latin American immigrants in the inflow after the mid-1960s, and away from Europeans who had higher levels of education, led to a less educated immigrant population in the US.

3. *What are the experiences of migrants in their host countries? For example, how do they perform in the labour market?* Chiswick (1978) was one of the earliest and most influential papers on this topic. He appeared to show that immigrants earned less on average than comparable natives when they arrived in the US but that their earnings converged on those of natives over time, as they acquired "location-specific human capital". Much work has followed this line and has looked at dimensions of the immigrant experience other than earnings such as occupational attainment (Chiswick *et al.* 2005) and welfare participation (Hansen and Lofstrom, 2003).

4. *What are the economic impacts of migrants on variables such as GNP, earnings and the public finances?* The measurement of impacts is a more controversial area than those just mentioned. Some studies have used variations in immigrant concentrations across geographic areas to assess impacts and have found the impact to be minor. However, Borjas *et al.* (1997) suggest that this approach may be flawed and that a model-based simulation approach is needed. The results from the Borjas *et al.,* approach tend to show immigration having a

[1] In an Appendix, we compare the results here with those from Barrett and McCarthy (2007) who used EU-SILC data from 2004.

relatively minor impact on average incomes but with more significant distributional implications.

We will now look at the recent Irish research under each heading. A number of papers addressed the question of migration flows between Ireland and the UK (Geary and McCarthy, 1976; Honohan, 1984 and 1992). The approach was to relate changes in relative incomes and relative unemployment rates between Ireland and the UK to population flows between the two economies. These papers clearly belong to a time when such flows were the dominant component in Ireland's migratory experience. Since the beginning of the era of large-scale inward migration, only one paper has looked at the determinants of more recent flows. Duffy *et al.* (2005) consider how inward migration has tended to contribute to increasing the price of houses and how this increase, in turn, reduces the attractiveness of migrating to Ireland. The authors conclude that this house price/migration link reduces potential migration and so lessens the potential for migration to dampen wage pressures in Ireland.

Starting with Barrett and Trace (1998), a number of papers have looked at the characteristics of immigrants (Barrett *et al.,* 2006; Minns, 2005). Barrett and Trace showed that immigrants in the mid-1990s were a highly educated group, with levels of education that significantly exceeded those of the native population. One of the hypotheses explaining this observation was that the immigrants of the 1990s were "early movers" and may have had access to more information on Ireland. This gave rise to an expectation that the level of education among immigrants would fall as inward migration continued and increased.

The later analyses of immigrant characteristics continued to show immigrants as being a highly educated group, based on both the *Quarterly National Household Surveys* (Barrett *et al.*, 2006) and the *Census 2002* (Minns, 2005). It was also shown that immigrants had higher rates of labour force participation and higher employment rates. Barrett and Duffy (2008 forthcoming) show that the level of education among immigrants was lower among the more recent arrivals. Even so, the most recently arrived cohort (as of 2005) still had higher levels of education than the native population. Another paper on this issue of characteristics is Duffy (2007). He looks at the housing tenure of immigrants and finds that they are less likely to be owner-occupiers.

On the issue of how migrants are performing in the Irish labour market, the evidence suggests that they do less well than the native population. Ruhs (2005) provided the first study on earnings but his data was limited to work permit holders and so omitted the many EU nationals who were living in Ireland at the time of his analysis. Barrett and McCarthy (2007) is the first, and only, analysis of earnings that is based on a nationally representative dataset. They

show that immigrants earn 18 per cent less, on average, relative to native workers, controlling for factors such as education and length of labour market experience. For immigrants from non-English speaking countries, this wage gap is 31 per cent. Barrett and McCarthy also show that the wage gap is biggest for the more highly educated immigrants, relative to comparable native employees.

The issue of labour market performance is also addressed in Barrett *et al.* (2006) and Barrett and Duffy (2008 forthcoming). As these papers use the CSO's *Quarterly National Household Survey*, the sample sizes are larger than that used by Barrett and McCarthy. However, as the *QNHS* does not include information on earnings, the analyses in these papers use occupational attainment rather than wages as a measure of labour market outcomes. Both papers show how immigrants are less likely to be in higher-level occupations, controlling for factors such as age and education, and label this as an "occupational gap". Barrett and Duffy (2008 forthcoming) also show how this "occupational gap" is largest for immigrants from the EU's New Member States and how the gap does not seem to decline for this group as they spend longer in Ireland. Based on this finding, Barrett and Duffy conclude that there is an absence of evidence of increased labour market integration of immigrants over time.

The question of economic impacts has been addressed in Barrett *et al.* (2002), Barrett *et al.* (2006), Barrell *et al.* (2007) and Bergin and Kearney (2007). All four papers follow the simulation approach to measuring immigration impacts, as promoted by Borjas *et al.* (1997). Given the high-skilled nature of the immigrant inflow into Ireland, Barrett *et al.* (2002) and Bergin and Kearney (2007) see immigration dampening wage pressures at the high-paid end of the labour market and thereby allowing increased demand for such labour to translate into increased high-skilled employment and output. Barrett *et al.* (2002) link this process to an observation that earnings inequality grew at a slower pace in Ireland after 1997. Barrett *et al.* (2006) take account of the fact that immigrants, although highly educated, experience an occupational gap (defined above). As a result, immigration may have contributed to a dampening of wage pressures at the lower end of the distribution, as immigrants competed with lower-skilled native employees. Barrell *et al.* (2007) model immigration into Ireland in the broader context of population movements within the EU, following enlargement in 2004, and estimate what the on-going impact might be out to 2015. Ireland is shown to be the largest gainer from EU movements

(in proportionate GDP increases). As part of the same exercise, the accession states are shown to experience losses in GDP.[2]

In summary, the main lessons from the economics literature on immigration in Ireland are as follows. Immigration into Ireland has been notable for the high level of education among the immigrant inflow and also the high levels of labour force participation and employment. In spite of the high levels of education, immigrants in Ireland from non-English-speaking countries have been shown to experience labour market disadvantages relative to natives in terms of occupational attainment and wages. The impact of immigration has been shown to be positive for GNP but negative for average wage growth. Given the greater controversy that surrounds the measurement of impacts, it is important to note that findings with respect to impacts could be less pronounced, although of the same sign, if different methods were used.

3. Data, Descriptives and Regression Results

Although our literature review has covered a broad range of topics, we now focus on one of the issues, namely, the analysis of immigrant earnings in Ireland. The data on which the analysis below is based come from the EU Survey on Income and Living Conditions (EU-SILC) for 2005. A full description of the sampling methodology can be found in Central Statistics Office (2006) but here we will set out the broad features of the survey. The EU-SILC is a voluntary survey of private households and is carried out under EU legislation. To date, it has been used mainly to provide information on the rates of poverty and deprivation in Ireland (CSO, 2006). The survey seeks to provide a nationally representative sample of households. It does so by first creating a sample of 2,600 small areas and then selecting a random sample of households within each block. About 130 households were surveyed each week during the twelve months of 2005, resulting in a sample of 6,085 households and 15,539 individuals.

For each individual, the survey contains information on variables such as age, education, labour force status and earnings. Crucially for our purposes, the place of birth and citizenship of each respondent is provided and we use these to identify the immigrants in the sample. If an individual reports themselves as having been born in Ireland and as being an Irish citizen, we code them as being a native. If an individual reports that they were born outside of Ireland and that they are not Irish citizens, we code them as being

[2] As noted above, another topic that has been addressed in the international literature is the fiscal impact of immigration – see, for example, Auerbach and Oreopoulos (2000). No studies have looked at this in the Irish context. However, the findings of higher labour force participation rates for immigrants (Barrett *et al.,* 2006) and lower rates of welfare programme participation (Barrett and McCarthy, 2007) point to a more positive fiscal impact of immigration in Ireland relative to elsewhere.

immigrants. In addition, we take their reported citizenship to describe where they are from.[3] It should be borne in mind that the immigrants we observe in the sample will have entered Ireland through a number of routes. For citizens of the EU, there are no restrictions on movement to Ireland and on working there. Other admission routes include work permits and family re-unification measures.

One weakness of the data that should be noted is that we have no information on the length of time that immigrants have been in Ireland. For this reason, we are not able to look at wage growth over time and to address the issue of whether any immigrant wage gap falls as immigrants acquire location-specific human capital. There is a longitudinal component in the data in that 44 per cent of households that were interviewed in 2005 were also interviewed in the 2004 wave of the EU-SILC. Unfortunately, only 31 per cent of immigrants were interviewed in both 2004 and 2005. This leaves too small a sample for any dynamic analysis to be conducted. Even if the sample were larger, one year would probably represent too short a time span over which to capture wage convergence.

We now turn to the descriptive statistics. In Table 1, we show the age distribution of immigrants in the sample and also that of the native population.[4] The familiar picture emerges of immigrants being relatively younger than the native population, with almost 50 per cent aged between 20 and 44 years. In Table 2 we show the labour force status of the immigrant and native populations and, again, some features emerge that have been seen in some of the papers discussed above. Immigrants have higher employment and participation rates relative to the native population and also a higher unemployment rate.

[3] One group that we exclude from the analysis are people who are Irish citizens but who were not born here.

[4] We should note that immigrants make up 5 per cent of the sample. This is an undercount as *Census 2006* showed 10 per cent of the population to be non-national. A similar degree of under-representation of non-nationals in the 2004 EU-SILC was found by Barrett and McCarthy 2007. They used the *Quarterly National Household Survey for 2004*, with its much larger sample size, to assess whether the under-representation of non-nationals was systematic along any observable dimension. No major bias was detected and so the same should hold for the 2005 data.

Table 1: Age Distribution of the Native and Immigrant Populations (%)

Age Group (Years)	EU-SILC Irish	EU-SILC Immigrant
0 -14	21.4	16.1
15-19	7.8	5.6
20-24	5.8	8.2
25-34	7.7	21.6
35-44	12.9	19.4
45-54	13.8	11.3
55-59	6.0	4.3
60-64	5.6	4.4
65+	19.0	9.0
Total	100.0	100.0
Mean	39.4	35.6
N	**14,199**	**687**

Table 2: Work Status Distribution of the Native and Immigrant Populations (%)

	EU-SILC Irish	EU-SILC Immigrant
Full-time Employment	36.5	45.7
Part-time Employment	11.1	8.6
Unemployed but Seeking Work	2.5	4.0
Unemployed but Not Currently Seeking Work	1.2	2.0
Not Economically Active	48.7	39.7
Total	100.0	100.0
Participation Rate	49.0	56.8
Unemployment Rate	4.9	6.8
N	**1,0912**	**564**

In Table 3, we focus on labour force participants and present the distribution of educational qualifications for natives and immigrants. The high level of educational attainment of Ireland's immigrants is shown again, with over 40 per cent having third level degrees or better.

Table 3: Distribution of Educational Attainment for the Native and Immigrant Labour Force (%)

	EU-SILC Irish	EU-SILC Immigrant
Less than Leaving Certificate	35.7	16.4
Leaving Certificate and Non-Degree	45.8	40.1
Third Level Degree and Above	18.4	43.5
Total	100.0	100.0
N	**5,458**	**299**

We now move on to consider the earnings of immigrants relative to natives. We use hourly wages as our measure because our main interest is in how the human capital of immigrants is valued in the labour market rather than in the total resources they command

through employment. On average, the data show that native workers earn €20 per hour whereas immigrants earn €18. This implies an unadjusted wage differential of around 10 per cent. However, given the higher education levels of immigrants it is clear that the adjusted differential might be higher so we turn to regression analysis to investigate this point.

In Table 4, we present a series of regression results. The model in each case is the standard Mincer wage equation, where the dependent variable is the log of hourly wages and the independent variables capture earnings-related characteristics such as education, length of labour market experience and gender. We also include dummy variables indicating immigrants generally and different groups of immigrants. We will briefly discuss the coefficients on the other variables before looking more closely at the coefficients on the immigrant dummy variables.

The coefficient of the gender variable suggests that men earn 12 per cent more than women, a result that is in line with other studies of the gender wage differential in Ireland. The "years worked" variable can be interpreted as saying that earnings rise by 4 per cent for each additional year worked. The two variables relating to education are dummy variables indicating (a) those with Leaving Certificates or equivalent and (b) those with third level degrees. The omitted category is "less than Leaving Certificate" and the coefficients should be interpreted as the earnings of each group relative to those in the omitted category. Hence, we find that people with Leaving Certificates earn 30 per cent more than those without this qualification while people with third level qualifications earn 82 per cent more.

Turning to the immigrant dummy variables, the coefficient on "immigrant" in Model 1 indicates that immigrants, on average, earn 15 per cent less than natives controlling for gender, education and experience. While this is an interesting finding, Barrett and McCarthy (2007) show that the aggregate figure might hide differences across different immigrant groups. For this reason, we follow Barrett and McCarthy and re-estimate Model 1 looking within the group.

In Model 2, we create two immigrant dummy variables – one indicating immigrants from English speaking countries and the other indicating immigrants from non-English-speaking countries. The coefficients on each can be interpreted as showing the earnings gap between the two groups and natives. In the case of immigrants from English-speaking countries, the point-estimate shows immigrants earning less than natives. However, as the estimate is not statistically significantly different from zero, we are not finding evidence of a difference between the earnings of these immigrants and natives.

In the case of immigrants from non-English speaking countries, the point estimate is statistically significant and indicates that this group earns 20 per cent less than comparable natives. In Model 3, we look within the immigrants from non-English speaking countries and uncover some further differences.[5] For immigrants from the EU-13 (i.e., the EU-15, prior to May 2004, less Ireland and the UK), we do not find an earnings difference relative to natives that is statistically different from zero. However, for immigrants from the EU-10 (i.e., the 2004 New Member States) and for immigrants from non-English speaking countries outside of the EU, the earnings gap relative to natives is in the region of 30 per cent.

Table 4: Wage Regressions (Dependent Variable: Log of Hourly Earnings)

	Model 1		Model 2		Model 3	
	Coef.	S. E	Coef.	S. E	Coef.	S. E
Constant	1.88	0.03	1.88	0.03	1.88	0.03
Immigrant	-0.15	0.04				
Immigrant: English Speaking Country			-0.09	0.06		
Immigrant: Non-English Speaking Country			-0.20	0.05		
Immigrant: Non-English Speaking EU-10					-0.32	0.09
Immigrant: Non-English Speaking EU-13					0.06	0.09
Immigrant: Non-English Speaking Outside EU-25					-0.29	0.08
Gender	0.12	0.02	0.12	0.02	0.12	0.02
Years Worked	0.04	0.00	0.04	0.00	0.04	0.00
(Years Worked)^2 x 1,000	-0.5	0.06	-0.5	0.06	-0.5	0.06
Leaving Certificate**	0.30	0.02	0.30	0.02	0.30	0.02
Third Level**	0.82	0.03	0.82	0.03	0.82	0.03
N	**3,493**		**3,493**		**3,411**	
	Total Immigrants = 201		English Speaking = 82 Non-English Speaking = 119		EU-10 = 38 EU-13 = 35 Non-EU25 = 46	
	Adj. R^2 = 0.29		Adj. R^2 = 0.29		Adj. R^2 = 0.29	

Note: ** Omitted category is Primary Education or Less than Leaving Certificate.

Part of the explanation often given for lower immigrant earnings is lower returns on education and labour market experience acquired in the home- as opposed to the host- country (see for example, Friedberg, 2000). Our data do not include information on where these forms of human capital were acquired. However, we attempt to provide some insight on this point by following Barrett and McCarthy and re-estimating Models 1 and 2 from Table 4 but

[5]As there appears to be no statistical difference between native employees and immigrants from English speaking countries, we drop them from the analysis.

this time including interactions between the immigrants dummy variables and the education and labour market experience variables. If it is the case that immigrants acquired their human capital outside of Ireland, then immigrants may experience lower returns to education and experience relative to Irish employees when working in Ireland. This would be captured by negative and significant coefficients on the respective interaction terms.

In Model 1 of Table 5, we look at all immigrants and include a third level education/immigrant interaction. We use a two-way classification of education at this point (third level versus lower) because of small cell sizes. The first point to note is that, relative to Model 1 of Table 4, the coefficient on the immigrant dummy variable is no longer statistically significant. The education/ immigrant coefficient is, however, significant thereby suggesting that much of the immigrant wage disadvantage is concentrated among third level graduates. In Model 2 of Table 5, we add the experience/immigrant interaction but little of substance changes in the move from Models 1 and 2.

In Model 3 of Table 5, we focus on the immigrants from non-English-speaking countries. As with Model 1, the introduction of the education/immigrant interaction produces a statistically significant coefficient on the interaction itself and a loss in significance for the immigrant dummy variable. So again, we appear to be finding that the immigrant wage disadvantage is concentrated among third level graduates. As with Model 2 of Table 2, the addition of the experience/immigrant interaction has little substantive impact. The coefficient on the immigrant dummy variable does change but remains statistically insignificant as we move from Model 3 to 4.

Table 5: Wage Regressions with Education and Experience Interactions Included (Dependent Variable: Log of Hourly Earnings)

	Model 1		Model 2		Model 3		Model 4	
	Coef.	S. E	Coef.	S. E	Coef.	S. E	Coef.	S. E
Constant	2.09	0.03	2.08	0.03	2.09	0.03	2.08	0.03
Immigrant	-0.07	0.06	0.05	0.08				
Immigrant: Non-English Speaking Country					-0.03	0.08	0.12	0.09
Gender	0.12	0.02	0.12	0.02	0.12	0.02	0.12	0.02
Years Worked	0.04	0.00	0.04	0.00	0.04	0.00	0.04	0.00
(Years Worked)^2 x 1,000	-0.7	0.06	-0.7	0.06	-0.7	0.06	-0.7	0.06
Third Level**	0.63	0.02	0.63	0.02	0.63	0.02	0.63	0.02
Immigrant*Third Level	-0.15	0.08	-0.17	0.08	-0.27	0.10	-0.25	0.10
Immigrant* Years Worked			-0.01	0.00			-0.02	0.00
N	**3,493**		**3,493**		**3,411**		**3,411**	
	Adj. R^2 = 0.26		Adj. R^2 = 0.26		Adj. R^2 = 0.25		Adj. R^2 = 0.26	

Note: ** Omitted category is less than third level degree.

At this point, we look to extend the analysis in two directions. The first of these extensions is to control for occupations in the

wage regressions. As noted in Section 2, Barrett *et al.* (2006) and Barrett and Duffy (2008 forthcoming) have shown that immigrants tend to be in lower level occupations given their education levels, relative to natives. For this reason, it could be the case that the earnings disadvantage of immigrants is partly due to the occupational gap, with immigrants earning the same as natives within occupational categories.[6] We can test for this by adding occupations to the regressions and by seeing whether the sign and significance of the immigrant dummy variables is altered. The results are presented in Tables 6 and 7.

If we compare the coefficients on the immigrant dummy variables in Table 6 with those in Table 4, we can see that the

Table 6: Wage Regressions with Occupations Included (Dependent Variable: Log of Hourly Earnings)

	Model 1		Model 2		Model 3	
	Coef.	S. E	Coef.	S. E	Coef.	S. E
Constant	2.00	0.04	2.00	0.04	1.99	0.05
Immigrant	-0.14	0.04				
Immigrant: English Speaking Country			-0.11	0.06		
Immigrant: Non-English Speaking Country			-0.16	0.05		
Immigrant: Non-English Speaking EU-10					-0.25	0.09
Immigrant: Non-English Speaking EU-13					0.07	0.09
Immigrant: Non-English Speaking Outside EU-25					-0.22	0.08
Gender	0.12	0.02	0.12	0.02	0.12	0.02
Years Worked	0.04	0.00	0.04	0.00	0.04	0.00
(Years Worked)^2 x 1,000	-0.5	0.06	-0.5	0.06	-0.5	0.06
Leaving Certificate**	0.20	0.02	0.20	0.02	0.21	0.02
Third Level**	0.53	0.03	0.53	0.03	0.53	0.03
Managers and Administrators***	0.17	0.04	0.17	0.04	0.17	0.04
Professional***	0.33	0.04	0.32	0.04	0.33	0.04
Associate Professional and Technical***	0.15	0.05	0.14	0.05	0.14	0.05
Clerical and Secretarial***	-0.02	0.04	-0.02	0.04	-0.02	0.04
Personal and Protective Service***	-0.09	0.04	-0.09	0.04	-0.09	0.04
Sales***	-0.19	0.05	-0.19	0.05	-0.18	0.05
Plant and Machinery Operatives***	-0.10	0.04	-0.10	0.04	-0.09	0.05
Other (includes not stated) ***	-0.12	0.04	-0.12	0.04	-0.11	0.04
N	**3,491**		**3,491**		**3,409**	
	Total Immigrants = 201		English Speaking = 82		EU-10 = 38 EU-13 = 35	
			Non-English Speaking = 119		Non-EU25 = 46	
	Adj. R^2 = 0.34		Adj. R^2 = 0.34		Adj. R^2 = 0.34	

*Note:*** Omitted category is Primary Education or Less than Leaving Certificate.
*** Omitted category is Craft and Related.

[6] If this was found to be the case, the important research question arises as to why immigrants are in lower-level occupations, given their human capital, and the policy issue is how this might be overcome.

inclusion of controls for occupation produces little change and certainly no changes that are statistically significant. Looking, for example, at Model 2 in both tables, the earnings disadvantage for immigrants from non-English speaking countries falls from 20 per cent to 16 per cent but a test for a difference between the coefficients shows that they are statistically the same. Given that the cell sizes are now getting very small as we cut the data more finely, it could be that the failure to find an impact from the inclusion of occupations is related to the limitations of the data as opposed to the actual absence of such an effect. For this reason, we can only say that we are not finding an effect; we cannot conclude that lower immigrant wages are unrelated to some form of occupational segregation.

In Table 7, we add the occupation controls to the regressions with the education/immigrant interactions. If we compare the immigrant dummy coefficients with those in Table 5 (Models 3 and 4), we again see a fall in the point estimates. For example, the coefficient on the immigrant/third level interaction term in Model 3 falls from minus 27 per cent to (in Table 5) to minus 19 per cent in Table 7. However, these point estimates are not statistically different and so the results can only be described as suggestive and not conclusive.

Table 7: Wage Regressions with Occupations and Education/Experience Interactions Included (Dependent Variable: Log of Hourly Earnings)

	Model 1		Model 2		Model 3		Model 4	
	Coef.	S. E	Coef.	S. E	Coef.	S. E	Coef.	S. E
Constant	2.14	0.04	2.13	0.04	2.14	0.04	2.13	0.04
Immigrant	-0.08	0.05	0.03	0.08				
Immigrant: Non-English Speaking Country					-0.03	0.07	0.10	0.09
Gender	0.13	0.02	0.13	0.02	0.13	0.02	0.13	0.02
Years Worked	0.04	0.00	0.04	0.00	0.04	0.00	0.04	0.00
(Years Worked)^2 x 1,000	-0.5	0.06	-0.5	0.06	-0.5	0.06	-0.5	0.06
Third Level*	0.37	0.03	0.37	0.03	0.37	0.03	0.38	0.03
Immigrant* in Third Level	-0.09	0.08	-0.10	0.08	-0.19	0.10	-0.17	0.10
Immigrant* Years Worked			-0.01	0.00			-0.01	0.01
Managers and Administrators**	0.21	0.04	0.20	0.04	0.21	0.04	0.21	0.04
Professional **	0.37	0.04	0.37	0.04	0.37	0.04	0.37	0.04
Associate Professional and Technical**	0.18	0.05	0.18	0.05	0.18	0.05	0.18	0.05
Clerical and Secretarial**	0.01	0.04	0.01	0.04	0.02	0.04	0.01	0.04
Personal and Protective Service**	-0.09	0.04	-0.10	0.04	-0.09	0.04	-0.10	0.04
Sales**	-0.20	0.05	-0.20	0.05	-0.19	0.05	-0.20	0.05
Plant and Machinery Operatives**	-0.13	0.05	-0.14	0.05	-0.12	0.05	-0.13	0.05
Other (includes not stated) **	-0.17	0.04	-0.17	0.04	-0.16	0.04	-0.16	0.04
N	**3,491**		**3,491**		**3,409**		**3,409**	
	Adj. R^2 = 0.32		Adj. R^2 = 0.32		Adj. R^2 = 0.32		Adj. R^2 = 0.32	

Note: * Omitted category is less than third level degree.
** Omitted category is Craft and Related.

Our next extension moves the analysis beyond the earlier work of Barrett and McCarthy and concerns the analysis of immigrant earnings by gender. It is well known that a gender pay gap exists in Ireland, whereby women earn less than men and we have shown above that immigrants earn less than natives. It is of interest to see if immigrant women suffer a "double disadvantage", in the sense of experiencing both the gender and immigrant pay gaps. It could be the case that our general findings for immigrants above are disguising even worse outcomes for immigrant men relative to natives and more favourable outcomes for female immigrants (or vice versa). It could also be the case that immigrant women suffer a disadvantage beyond those of being female and immigrant, if the combined characteristics of female and immigrant lead to a wage disadvantage that is over and above the "double disadvantage" just outlined. This issue has been addressed for Canada (Beach and Worswisck, 1993) and for the US (Duleep and Dowhan, 2002) but not for Ireland.

In order to see why a double disadvantage (or worse) might apply, it is useful to think in terms of the family migration model proposed by Mincer (1978). It is often the case that the migration decisions of women are closely linked with those of male partners. Although the family's migration may be income maximising, this could arise if the income gain to the male partner exceeds an income loss for the female partner. Hence, female immigrants may find themselves in unfavourable labour market situations and this could be reflected in the double disadvantage phenomenon.[7]

In exploring this issue, we divided the sample into male and female sub-samples. We then selected employees and re-ran the regressions in Table 4 above. Splitting the sample in this way and focusing on employees leads to small cell sizes and our female-focused analysis is based on 95 immigrants, 65 of whom are from non-English speaking countries. In spite of the small sample, we do find results that are statistically significant.[8]

Within the female group, a finding of a negative and significant coefficient on the immigrant dummy would point to the existence of a double disadvantage. In Table 8, we see that this is indeed the case. Immigrant women earn 14 per cent less than native women. As women earn about 12 per cent less than men (according to Table 4), the double disadvantage is clear. While our findings here imply that immigrant women suffer in wage terms from being both female

[7] Another possible explanation for a double disadvantage would be the existence of discrimination on the grounds of both gender and immigrant status. Similarly, occupational segregation along both gender and migrant dimensions could be present.

[8] It should be noted that we are only looking at the earnings of employees here. As we are not trying to control for selection effects, we are not saying anything about the potential earnings of immigrants who are unemployed or non-participants.

and immigrants, we are not finding evidence of an additional wage disadvantage from the combined impact of these two factors. If there was a specific immigrant/female interaction effect, the immigrant coefficient in the female regression would be significantly different from the corresponding coefficient in the male regression but this is not the case.

From Table 8, we can also see that the pattern of relative outcomes between immigrants and natives shows similarities across the genders, with no significant earnings penalty for immigrants from English speaking countries or from the EU-13. The earnings disadvantages are concentrated among the immigrants from the EU-10 and those from outside of the EU. The point estimates suggest some difference across the genders with respect to the relative size of the wage disadvantages between these two national groupings, with immigrants from the EU-10 having the largest wage disadvantage among women but immigrants from outside of the EU having the largest disadvantage among men. Within each gender group, the coefficients on the EU-10 and non-EU immigrant dummy variables are not statistically different from each other so nothing definitive can be read into that pattern.

We found earlier that for immigrants as a group, the earnings disadvantage was particularly evident for immigrants with third level qualifications. Table 8 suggests that this effect is actually much more a feature of the female immigrant experience relative to that of male immigrants. For women, the immigrant/education interaction term is negative and significant but this is not the case for men. It is also substantial in quantitative terms for women, at minus 38 per cent. This suggests that there exist particular difficulties for immigrant women in having qualifications either recognised and/or rewarded.

Table 8: Coefficients for Male and Female Immigrants

	Males		Females	
	Coef.	***S. E***	**Coef.**	***S. E***
Full sample				
All immigrants	-0.15	0.04	-0.14	0.05
Breaking the full sample of immigrants into those from English-speaking and non-English speaking countries				
English speaking countries	-0.12	0.08	-0.03	0.09
Non-English speaking countries	-0.19	0.08	-0.20	0.07
Further sub-dividing the sample of immigrants from non-English speaking countries				
EU-10	-0.24	0.11	-0.42	0.14
EU-13	0.23	0.14	-0.08	0.12
Outside of EU	-0.43	0.14	-0.18	0.10
Results for immigrants from non-English speaking countries when the education/immigrant interaction is added				
Immigrant	-0.09	0.10	0.04	0.11
Immigrant *Third level	-0.17	0.15	-0.38	0.14

This finding is interesting in itself but it is particularly interesting in the context of an identical finding from Canada. Beach and Worswick (1993) ran similar Mincer-type wage equations on Canadian data, comparing native-born and foreign-born women. As they point out "… the double-negative effect on earnings does not appear to hold across the board for all immigrant women, but is quite marked for highly-educated women" (p. 38). They estimate that a foreign-born woman with a post-graduate degree earns between 9 and 7 per cent less than a comparable Canadian-born woman and suggest that this finding is related to either problems surrounding the recognition of foreign credentials or discrimination against immigrant women in accessing higher-level jobs.

4. Conclusions

One first purpose in this paper was to review the literature on the economics of immigration in Ireland. The review showed how immigrants have been found to experience labour market disadvantage relative to natives both in terms of occupational attainment and earnings. Based on the international literature, this is unsurprising, as immigrants typically fare less well than natives, especially in the earlier period of their migratory experience, before they have acquired "location-specific human capital". The one piece of work that has looked at immigrants by year of arrival is Barrett and Duffy (2008 forthcoming) but they do not find evidence of integration. Other findings from the emerging literature of the economics of immigration in Ireland include positive impacts on GNP, partly achieved through a dampening in wage pressures. The earlier papers saw this dampening effect at the upper end of the labour market, as a result of high-skilled immigration. However, a more recent study has taken account of the lower occupational attainment of immigrants and has suggested that the wage impact of immigrants may have been more broadly spread.

While a collection of papers is being built up on immigrants' characteristics, experiences and impacts, the volume of papers is still small. For this reason, another purpose of the paper was to update the only previous analysis of the earnings of immigrants in Ireland that was based on a nationally representative sample, using data from 2005. In broad terms, the findings confirm those of the earlier paper. Using average hourly earnings as our measure of labour market outcomes, immigrants were found to earn 15 per cent less on average than natives. Although the corresponding figure from the 2004 data was higher at 18 per cent (Barrett and McCarthy, 2007), the estimates are statistically identical. As with the earlier analysis, the earnings disadvantage applies only to immigrants from non-English speaking countries, with immigrants from the accession countries of the EU earning over 30 per cent less than comparable native employees.

A third objective in the paper was to develop the analysis beyond that undertaken by Barrett and McCarthy. The analysis

along gender lines showed immigrant men and immigrant women experiencing similar degrees and similar patterns of wage disadvantage relative to native men and native women respectively. Given the earnings disadvantage of native women relative to native men, this implies a double disadvantage for immigrant women. However, we did not find an additional wage disadvantage for immigrant women over this double disadvantage that could have resulted from the interaction of gender and immigrant characteristics.

Our analysis has confirmed many of the results from Barrett and McCarthy (2007). However, given discrepancies between some of the results here and those from the 2004 analysis (see the Appendix below), there is an on-going need to add to the stock of observations on the immigrant wage gap in Ireland, preferably using different datasets with significantly higher numbers of immigrants. Hopefully, further analysis will help us to define more clearly the precise nature of the immigrant wage disadvantage and to establish, for example, if the finding here that the wage disadvantage is concentrated among the better educated immigrants is correct. It would also be helpful to know whether the immigrant wage disadvantage reduces for immigrants who spend longer in Ireland.

APPENDIX

In Table A1, we present the results from the 2004 data (from Barrett and McCarthy, 2007) and from the 2005 data. As noted above, 31 per cent of the immigrants in the 2005 sample also appeared in the 2004 sample so there is some overlap. However, as the sample is almost 70 per cent new, we are using a substantially different sample and so are providing a substantially new observation of immigrant earnings.

In general, the pattern of results is similar so our analysis broadly confirms the results of Barrett and McCarthy (2007). The overall immigrant wage disadvantage was estimated to be 18 per cent based on the 2004 data; based on the 2005 data, it is estimated to be 15 per cent although there is no statistical difference between these estimates. In the 2005 data, we again find that the earnings disadvantage relates to immigrants from non-English speaking countries and, in particular, to immigrants from the EU's New Member States. While the point estimates from the 2004 data were higher, the 2005 estimates are statistically the same.

There are two differences between the 2004 and 2005 results. First, in 2004 immigrants from the EU-13 were found to have a wage disadvantage relative to natives but this is not the case in the 2005 data. The 2005 finding is more in line with Barrett and Duffy's (2007) findings on occupational attainment and so, on that basis at least, is more believable. We do not have an explanation for why the 2004 and 2005 samples lead to different results for this group but it should be recalled that the results here are based on 35 individuals while the 2004 result was based on 27. Such small cell sizes were one of our motivations for undertaking this updated analysis and the discrepancy here shows that this component of the 2004 analysis was not robust. Hence, further analyses will be needed as newer, larger-scale datasets become available with larger samples of immigrants.

The second difference between the 2004 and 2005 results concerns the immigrant/education interaction term and its impact on the immigrant dummy variable. Looking specifically at immigrants from non-English speaking countries, the addition of the (non-significant) third-level/immigrant interaction in the 2004 case left the immigrant dummy itself statistically different from zero.

However, in the 2005 case, the interaction term is significantly different from zero and its inclusion led to the immigrant dummy becoming insignificant.[9] This means that the 2005 data was showing more evidence of the wage penalty for immigrants from non-English speaking countries being concentrated among third level graduates. As Table 8 reveals, this effect seems to be particularly concentrated among female immigrants. The comments just made about small cell sizes and the robustness of the 2004 analysis apply here also.

Table A1: Comparing the Coefficients of the Immigrant Dummy Variables from the 2004 and 2005 Datasets

	2004		2005	
	Coef.	**S. E**	**Coef.**	**S. E**
Full sample				
All immigrants	-0.18	0.04	-0.15	0.04
Breaking the full sample of immigrants into those from English-speaking and non-English speaking countries				
English speaking countries	-0.03	0.06	-0.09	0.06
Non-English speaking countries	-0.31	0.06	-0.20	0.05
Further sub-dividing the sample of immigrants from non-English speaking countries				
EU-10	-0.45	0.12	-0.32	0.09
EU-13	-0.27	0.11	0.06	0.09
Outside of EU	-0.27	0.08	-0.29	0.08
Results for immigrants from non-English speaking countries when the education/immigrant interaction is added				
Immigrant	-0.26	0.08	-0.03	0.08
Immigrant *Third level	-0.13	0.12	-0.27	0.12

[9] The 2004 and 2005 immigrant coefficients in the second last row of Table A1 are statistically different, although the final rows are not.

REFERENCES

AUERBACH, A. and P. OREOPOULOS, 2000. "The Fiscal Effects of U.S. Immigration: A Generational Accounting Perspective" in J. Poterba (eds.), *Tax Policy and the Economy,* Vol. 14 pp. 123-156.

BARRELL, R., J. FITZ GERALD and R. RILEY, 2007. "EU Enlargement and Migration: Assessing the Macroeconomic Impacts, National Institute for Economic and Social Research Discussion Paper No. 292 (London).

BARRETT, A. and D. DUFFY, (forthcoming 2008). "Are Ireland's Immigrants Integrating into its Labour Market?", *International Migration Review* Vol. 42, No. 3.

BARRETT, A. and Y. McCARTHY, 2007. "Immigrants in a Booming Economy: Analysing their Earnings and Welfare Dependence", *Labour*, Vol. 21, No. 4, pp. 789-808.

BARRETT, A. and F. TRACE, 1998. "Who is Coming Back? The Educational Profile of Returning Migrants in the 1990s", *Irish Banking Review,* Summer, pp. 38-52.

BARRETT, A., A. BERGIN and D. DUFFY, 2006. "The Labour Market Characteristics and Labour Market Impacts of Immigrants in Ireland", *The Economic and Social Review* , Vol. 37, pp. 1-26.

BARRETT, A., J. FITZ GERALD and B. NOLAN, 2002. "Earning Inequality, Returns to Education and Immigration into Ireland", *Labour Economics,* Vol. 9, No. 5, pp. 665-680.

BAUER, T. and K. F. ZIMMERMANN, 1999. *Assessment of the Possible Migration Pressure and Its Labour Market Impact Following EU Enlargement to Central and Eastern Europe*, IZA Study for the UK Department Education and Employment.

BEACH, C. M. and C. WORSWICK, 1993. "Is there a Double-Negative Effect on the Earnings of Immigrant Women?", *Canadian Public Policy,* Vol. 19, No. 1, pp. 36-53.

BERGIN, A. and I. KEARNEY, 2007. "Human Capital Accumulation in an Open Labour Market: Ireland in the 1990s", *Economic Modelling* , Vol. 24, No. 6, pp. 839-858.

BORJAS, G., 1987. "Self-selection and the Earnings of Immigrants", *American Economic Review* , Vol. 77, No. 4, pp. 531-553.

BORJAS, G., R. FREEMAN and L. KATZ, 1997. "How Much Do Immigration and Trade Affect Labour Market Outcomes?", *Brookings Papers on Economic Activity*, Vol. 1, pp. 1-67.

CENTRAL STATISTICS OFFICE, 2006. *EU Survey of Income and Living Conditions*, Dublin: CSO.

CHISWICK, B. R., 1978. "The Effect of Americanisation on the Earnings of Immigrant Men", *Journal of Political Economy*, Vol. 86, No. 5, pp. 897-921.

CHISWICK, B. R., Y. LIANG LEE and P. MILLER, 2005. "Longitudinal Analysis of Immigrant Occupational Mobility: A Test of the Immigrant Integration Hypothesis", *International Migration Review* , Vol. 39, pp. 332-353.

DUFFY, D., 2007. "The Housing Tenure of Immigrants in Ireland. Some Preliminary Analysis", Working Paper No. 188, Dublin: The Economic and Social Research Institute.

DUFFY, D., J. FITZ GERALD and I. KEARNEY, 2005. "Rising House Prices in an Open Labour Market", *The Economic and Social Review,* Vol. 36, No. 3, pp. 251-272.

DULEEP, H. O. and D. J. DOWHAN, 2002. "Revisiting the Family Investment Model with Longitudinal Data: The Earnings Growth of Immigrant and U.S.-Born Women", IZA Discussion Paper No. 568.

FRIEDBERG, R. M., 2000. "You Can't Take it with You: Immigrant Assimilation and the Portability of Human Capital", *Journal of Labor Economics* , Vol. 18, No. 2, pp. 221-251.

GEARY, P. T. and C. McCARTHY, 1976. "Wage and Price Determination in a Labour Exporting Economy: the Case of Ireland", *European Economic Review,* Vol. 8, pp. 219-233.

HANSEN, J. and M. LOFSTROM, 2003. "Immigrant Assimilation and Welfare Participation: Do Immigrants Assimilate into or out of Welfare?", *Journal of Human Resources*, Vol. 38, No. 1, pp. 74-98.

HONOHAN, P., 1984. "The Evolution of Unemployment in Ireland 1962-83" in T. Baker, T. Callan, S. Scott, and D. Madden (eds.), *Quarterly Economic Commentary* (May), Dublin: The Economic and Social Research Institute.

HONOHAN, P., 1992. "The Link between Irish and UK Unemployment" in T. Baker, S. Scott, S. and S. Cantillon (eds.), *Quarterly Economic Commentary* (Spring), Dublin: The Economic and Social Research Institute.

MINCER, J. 1978. "Family Migration Decision", *Journal of Political Economy* , Vol. 86, No. 5 pp. 749-773.

MINNS, C., 2005. "How Skilled Are Irish Immigrants? Evidence and Implications", paper delivered to the Statistical and Social Inquiry Society of Ireland, 24 February.

RUHS, M., 2005. *Managing the Immigration and Employment of non-EU Nationals in Ireland*, Paper No. 19, Dublin: The Policy Institute, Trinity College Dublin.

HUB AIRPORT SLOTS, MARKET EXIT AND IRISH REGIONAL ECONOMIC DEVELOPMENT

Sean D. Barrett[*]

1. Introduction

From January 14 2008 slots previously used on the Shannon-Heathrow air service by Aer Lingus will be transferred to the Belfast-Heathrow route. The case for the transfer is that it will increase the profitability of the airline. The case against the transfer is that it will undermine the economy of the Atlantic coast region of Ireland and that the government should intervene to prevent market exit by Aer Lingus from the Heathrow-Shannon route. This paper examines the economic issues involved in slot allocation in a deregulated aviation market with freedom of market entry and exit. Section 2 deals with airport slots and property rights. Sections 3 and 4 deal with the impacts of airline and airport competition on traffic distribution in the London area and in the Atlantic region of Ireland respectively. Section 5 examines eight market alternatives to the Shannon-Heathrow service. Section 6 examines arguments for government intervention to secure Shannon-Heathrow services on the grounds of business promotion, tourism promotion, regional development and the use of a national airline as an instrument of economic policy. Section 7 deals with the prospect of further Heathrow slot transfers. Section 8 contains a summary and conclusions.

[*] Author's contact address sbarrett@tcd.ie. The author would like to thank, with the usual disclaimer, an anonymous referee and editors for their helpful comments.

2. Airport Slots and Property Rights

Airport slots or units of capacity at capacity-constrained airports are allocated to airlines in order of seniority that is according to an airline's grandfather rights at the airport. The de facto vesting of slot property rights at airports in airlines rather than in airport management or in an independent regulator is based on the historic allocation of functions at airports. Airport management were responsible for the construction and maintenance of infrastructure and, encouraged by the duty free system, developed significant retailing at airports.

The management of the allocation of the capacity of airports became a function of the airlines with precedence in order of seniority. The property rights of grandfather airlines at slot constrained airports contrast with normal markets in which the customers purchase goods and services from producers rather than from other customers. However, the property rights of grandfather airlines are by now embedded and are likely to remain so. Doganis (2006) states that "…attempts to open up the system of slot allocation by abandoning the grandfather rules are unlikely to be any more successful in generating real competition than they have been in the past. Nevertheless, the European Commission, in a controversial staff working document released in September 2004, put forward a number of proposals including secondary slot trading, slot auctions, and progressive returns of grandfathered slots. It is difficult to see how far these proposals will go but the problem remains. How to ensure greater competition when slots are in short supply will be a key issue for regulators and a key challenge for airlines wishing to expand at hubs other than their own."

Since deregulation in Europe new entrant airlines have concentrated on developing routes at the many underused airports in the region. They thus avoid slot purchase at hubs, the high costs of legacy airports from the era of noncompeting airlines and the congestion costs of slot constrained hubs (Barrett, 2002). The new entrant airlines have also redefined the airport product to meet the requirements of low cost airlines operating point-to-point services rather than interlining at hubs. They do not require expensive terminals, business class lounges, or airbridges (Barrett 2004). Passengers responded favourably to less congested small airports with benefits such as lower fares, less walking and waiting times, fewer lost bags, cheaper car parks, better punctuality and less time spent in aircraft stacking over congested airports. Less congested new airports facilitated quicker turnaround times of 25 minutes compared to as much as 75 minutes at congested hubs. Aircraft serving uncongested airports fly more trips per day per aircraft than at hubs.

Airlines holding slots at hub airports find the price of slots rising due to increased demand while supply is constrained usually due to

environmental and planning objections to expansion proposals. Davy (2006a) noted sales of Heathrow slots at €15 million per pair in 2006 and estimated the value of slots held by Aer Lingus at Heathrow to be €306 million for the twenty-one pairs of slots it held there. In addition, British Midland allocates seven Heathrow slots to its Dublin route. The Republic of Ireland slots at Heathrow thus have a combined value of some €400 million. The price of a slot depends on the time of day to which it applies and the number of airlines seeking to acquire slots. The price of Heathrow slots is likely to rise in 2008 as airlines seek to open new routes in response to the market opportunities arising from the EU/USA open skies agreement.

Airport slot prices indicate the opportunity cost facing an airline in deciding to either sell, retain, or reallocate slots at a slot constrained airport. The Heathrow experience has been that the slots have been transferred from short-haul to long haul routes both by sale between airlines, and by management decision for transfers within airlines. There have been no purchases of Heathrow slots by low cost airlines. The two largest low cost airlines serving the United Kingdom, Ryanair and easyJet, had a combined total of 65 million passengers in 2006. This is double the number carried by British Airways which has the most slots at Heathrow but neither Ryanair or easyJet has sought to purchase Heathrow slots. Charter airlines, the traditional low cost sector before deregulation, carry the same number of passengers as British Airways but have not purchased Heathrow slots. Ryanair, easyJet, or charter airlines could acquire either the Aer Lingus or the same number of slots from other incumbents' slots at Heathrow for €304 million according to the Davy estimate of slot prices. In addition to this outlay there would be extra costs in landing charges, delays and longer turnaround times at Heathrow. The investment and output policies of the low cost airlines have avoided the Heathrow investment choices and concentrated on other airports. A Ryanair statement in November 2007 criticised easyJet as "…just another high fares airline" and claiming that "…all easyJet have left to do is to start levying fuel surcharges and move to Heathrow."

3. The Impact of Airline and Airport Deregulation on the Ireland-London Market

In a deregulated aviation market, such as Ireland-United Kingdom since 1986, the ability of slot constrained airports such as Heathrow to command a premium fare per passenger on short-haul routes has been reduced by the growth of both airline and airport competition and significant changes in the unbundled deregulated aviation product.

Before deregulation route development outside slot constrained airports typically required the airline developing the new route to give up capacity at hub airports in order to remain within overall market sharing arrangements between the designated national airlines of each state. The deregulated market on the other hand

allowed the development of new routes by new entrant airlines serving new airports.

The pre-deregulation unrestricted return fare between Shannon and Heathrow in 1985 of Ir£240 (€305), is equal to €575 at 2007 prices. Yield revenue per passenger per route by airline is not published and is a closely guarded commercial secret by airlines. However, yield data per passenger over the entire networks of airlines are published. Goodbody estimate that the 2007 one-way fare per short haul passenger on Aer Lingus was €72.80 and on Ryanair it was €46.50. The current Aer Lingus network yield per passenger is 26 per cent of the pre-deregulation unrestricted fare on Shannon-Heathrow while the Ryanair fare is 16 per cent. This indicates the impact of deregulation on price in European aviation. The airport charges per passenger are €15 on Aer Lingus and €8.1 on Ryanair in 2007. The average Aer Lingus airport charge is 85 per cent more than the average Ryanair airport charge indicating a significant degree of passenger savings from competition between airports.

The deregulated market unbundled the traditional airline product for both airlines and airports. No frills service replaced full service airlines between Ireland and the United Kingdom with the exception of the City jet service from Dublin to London City which has only a 1 per cent market share of the Ireland/United Kingdom market of over 12 million passengers. CityJet's business model in 1997 emphasised food, champagne, leather seats and passenger comfort on their London City-Paris service in conjunction with Air France. "They were happy with our performance on the Paris/London City service, which was now, next to Concorde, producing the highest passenger revenue per kilometre yield in the entire Air France global network. It was all business class and passengers were paying Stg£330 per return journey for their fifty-five minute experience" (Byrne, 2004).

Passengers on routes between Ireland and the United Kingdom overwhelmingly chose the lowcost airline model. British Airways exited the Ireland market rather than adapt the low-cost model and transferred its Heathrow slots to other routes. Both Aer Lingus and British Midland adopted the no frills model. The Aer Lingus Initial Public Offering Prospectus (2006) described the airline as "low-cost low-fares" operating a single economy class service on its short-haul network " and a "two-class service on its long haul network." The product was low-cost single fares with seat reservation. Food service is sold separately rather than bundled in high fares. The prospectus in part 3 examined sixteen risk factors relating to the airline industry and twenty-five relating to Aer Lingus but a scenario that the previous first class, business class or premium class would again command a premium fare in a deregulated market was not included. Weldon (2002) notes the commitment of Aer Lingus "…to making over three million cheap seats available in the Irish

market in 2002 at prices up to 60 per cent lower than in the previous year."

The 99 per cent share of low-cost airlines between Ireland and the United Kingdom, with only 1 per cent for CityJet's full service model, considerably exceeds the low cost share of 30.8 per cent for 18 European countries in February 2006 for intra-Europe traffic (Davy, 2006b). The opening of competition between Dublin and London in 1986 makes the Ireland-United Kingdom market the most mature deregulated market in Europe. It is also the market with the highest preference for low-cost airlines and airports. Table 1 shows the numbers of Shannon passengers that have availed of the new airport choices in the London area since deregulation and that the Heathrow monopoly on Shannon-London in 1995 fell to a 38 per cent market share in 2006. Passenger numbers between Shannon and London increased by 521,000 between 1996 and 2006 but fell by 12,000 between Shannon and Heathrow, a decline of 4 per cent in a market which grew by 156 per cent.

Table 1: Shannon-London Air Passenger Numbers (000s)

Route	2006	2005	2000	1995	1990
Heathrow	323	338	304	335	311
Stansted	290	305	234	-	-
Gatwick	160	154	123	-	-
Luton	83	65	-	-	27
Total	856	862	661	335	338
Heathrow share %	38	39	46	100	92

Source: Civil Aviation Authority, International Air Passenger Traffic Series.

In addition to lower fares and increased numbers of flights airport competition in the London area brings benefits such as reduced surface journey access times to local airports. The perceived isolation of the new entrant airports was reduced by the development of car hire services and cheaper car parks, and improved public transport links. In addition, the more widely dispersed pattern of distribution of economic activity in the modern economy makes Stansted, Gatwick and Luton the preferred choice of London airports for 533,000 Shannon passengers or 62 per cent of that market.

The Shannon-London case of airport competition includes competition at both ends of the route. Heathrow was the sole airport served in the London area before deregulation with only Shannon and Cork providing the service in the entire Irish Atlantic coast region. Section 4 examines the impact of deregulation on aviation in the Irish Atlantic region.

4. The Impact of Deregulation on Airlines and Airports in the Irish Atlantic Region

Since deregulation alternatives to Heathrow are available at Stansted, Gatwick, and Luton as shown in Section 3 above. In the Irish Atlantic region five new entrant airports since deregulation compete with Cork and Shannon, the dominant airports before deregulation. These are at Derry, Knock, Galway, Kerry, and Waterford, each with direct services to London. In addition two other new entrant airports, at Donegal and Sligo offer service to London over Dublin.

Table 2 shows the growth in air travel between the Atlantic region and London. This market has increased from 995,000 in 1990 to 2.682 million in 2006. The growth in the market since deregulation is dominated by new entrant airlines and airports. Of the increase of 1.687 million passengers 94 per cent is accounted for by three major developments.

(i) The new Irish airports at Derry, Knock, Galway, Kerry and Waterford added 554,000 London passengers.
(ii) Services from Cork to London airports other than Heathrow added 526,000 passengers.
(iii) Services from Shannon to London airports other than Heathrow added 506,000 passengers.

Table 2: Atlantic Region (Ireland) Air Travel to London, 1990-2006

	2006	2005	1990
Shannon- Heathrow	323	338	311
Shannon-Other London	533	524	27
Cork-Heathrow	426	434	337
Cork-Other London	614	616	88
Knock-London	356	282	88
Derry-London	153	106	n.a.
Kerry-London	149	148	48
Galway-London	65	60	56
Waterford-London	63	55	40
Total	**2,682**	**2,563**	**995**
Shannon-Heathrow share %	12.0	13.2	31.1
Shannon-Other London share %	19.9	20.4	2.7
Cork share %	38.8	41.0	42.7
Knock share %	13.3	11.0	8.8
Derry share %	5.7	4.1	n.a.
Kerry share%	5.6	5.8	4.8
Galway share %	2.4	2.3	5.6
Waterford share %	2.3	2.1	4.0
New Airports share % *	29.3	25.3	23.2

* Combined share of Knock, Derry, Kerry, Galway and Waterford.
Source: Civil Aviation Authority, International Air Passenger Traffic Series. City of Derry Airport.

By contrast only 12,000 or 0.7 per cent of the increase in passengers was on the Shannon-Heathrow route. The share of Shannon-Heathrow in the Atlantic Region traffic to London fell from 31.1 per cent in 1990 to 12.0 per cent in 2006. Table 3 shows the decline of the Shannon-Heathrow route in the total aviation

market between the Republic of Ireland and the United Kingdom from 7 per cent in 1990 to 2.6 per cent in 2006.

Table 3: Passenger Numbers on Shannon-Heathrow and Ireland-United Kingdom Routes, 1990-2006 (000s)

	2006	1990
Shannon-Heathrow	323	311
Ireland-United Kingdom	12,356	4,429
Shannon-Heathrow Share %	2.6	7.0

Civil Aviation Authority, op. cit

Table 4 shows the routes served from airports in the Atlantic region in summer 2007. The routes served directly from Shannon and Cork have increased to 47 and 40 respectively since Aer Lingus chose Cork and Ryanair chose Shannon as bases The new regional airports have developed 61 routes giving a total of 148 routes from the Atlantic region's nine airports in the summer of 2007. This compares with 150 routes at Dublin Airport. Each direct route offers a lower cost quicker journey than the previous routing of passengers through a hub such as Heathrow. This development of some 300 air routes gives more direct access to final destinations than a system based on feeder routes to hubs such as Heathrow. Passengers using the new local airports in Ireland save time and other journey costs to Dublin, Cork and Shannon which were the only international airports prior to deregulation. Airline deregulation in Ireland thus replicates the success of the precedent set by US airline deregulation some eight years previously. "The consumer benefits have taken the form not only of huge monetary savings but also more convenient access to a greater number of origins and destinations." (Kahn, 2005.)

Table 4: Number of Routes Served from Irish Atlantic Region Airports, Summer 2007

Shannon	47
Cork	40
Knock	18
Galway	16
Derry	12
Kerry	6
Waterford	5
Donegal	2
Sligo	2
Total	148

Source: Airport websites.

5. Market Alternatives Following Shannon-Heathrow Market Exit

The Aer Lingus decision to leave the Shannon-Heathrow route opens up a market of 323,000 extra passengers for other airlines and other airports in the region. The market adjustment is relatively easy since the share of Shannon-Heathrow in total traffic from the Atlantic region has fallen to 12 per cent in 2006, as shown in Table 2.

The market alternatives include:-

(a) Increased services by Ryanair on its London services from Shannon. These were announced within days of the Aer Lingus withdrawal announcement "…in order to ensure Shannon Airport's capacity and traffic does not fall as a result of the Aer Lingus closure". The increased services announced by Ryanair are a fourth daily service to Stansted, a second daily service to Gatwick and a daily service to Luton. The seven daily departures on these services from Shannon to London are at 06.30, 10.35, 12.25, 13.05, 16.20, 19.50 and 20.00. The Aer Lingus departure times are shown in Table 5, column 1.

The development of the Shannon-Gatwick route offers new options to passengers who used Heathrow as a hub. The Shannon-Gatwick route in 2006 provided connections to US Points not served from Heathrow such as Atlanta, Charlotte, Dallas/Forth Worth, Minneapolis/St Paul, Las Vegas and Orlando, with a total of 2.2 million passengers. In addition Gatwick offers connections to points also served from Heathrow such as Detroit, Newark, and Philadelphia with 38 per cent of the 1.7 million passengers on these routes using Gatwick and 62 per cent using Heathrow. Gatwick's connecting airports in the Irish Atlantic region are Shannon, Cork and Knock. Gatwick in 2006 had 84 daily long-distance departures (Civil Aviation Authority, 2007).

(b) Increased services by Ryanair on direct services from Shannon. In addition to the Luton service at (a) above the new Shannon routes announced on November 7, 2007 were Birmingham, Fuerteventura, Kaunas, Leeds-Bradford, Riga, Tenerife and Dublin. Suspended services from Shannon to Madrid and Rome might be reopened to attract passengers now routed over Shannon-Heathrow.

(c) Increased service on routes from Cork, Kerry, Galway and Knock to London. The new route from Kerry to Luton will seek to serve some of the area's passengers who previously used the Shannon-Heathrow route.

(d) Transfer of Heathrow "captive" traffic from Shannon to the Cork-Heathrow route. Shannon and Cork are eighty miles apart. Passengers located between Cork and Limerick face

marginal increases in travel times to Cork should they wish to retain access to Heathrow. All of the Shannon flights have parallel flight times from Cork as shown in Table 5 so that little disruption of travel schedules is required. In addition Cork has an extra flight at 14.40.

Table 5: Departure Times from Shannon and Cork to London, Autumn 2007

Shannon	Cork
08.45	07.30
12.55	12.10
17.15	16.15
21.30	20.20
	14.40
	(no matching Shannon service)

Source: Aer Lingus timetable, October 2007.

(e) Transfer of some Heathrow captive traffic through Dublin. The high frequency Cork-Dublin service by Ryanair and Aer Arann, with twelve services per day, has increased from 238,000 passengers in 2005, to 400,000 in 2006 and the monthly increase in June 2007 was 25.3 per cent over June 2006, indicating an estimated 600,000 passengers in 2007.

The Shannon-Dublin service which commenced in November 2007, if it replicates the success of the Cork-Dublin route, will give the Shannon region a faster connectivity to the Dublin hub of 150 routes than experienced now by many passengers based in Dublin itself.

(f) Transfer of Shannon's 80,000 connecting passengers at Heathrow to Frankfurt, Paris and Amsterdam. The Shannon-Paris service by CityJet, commencing in February 2008, will be the first market test of these options. Table 6 shows passenger numbers at these hubs. Paris has almost 80 per cent of the Heathrow passenger numbers while Frankfurt and Amsterdam have respectively 77 per cent and 65 per cent of the Heathrow passenger numbers. These airports, unlike Heathrow, are designed as hubs. The business model chosen by the hub airlines at Paris, Frankfurt and Amsterdam has been to feed short haul passengers to their own long haul services. The Civil Aviation Authority (2007) noted that KLM feeds its Amsterdam hub with nearly 50 flights a day from twelve regional UK airports with Air France linking six UK airports to its Paris hub and Lufthansa operating eighteen flights a day to Frankfurt, Munich, and Hamburg from UK regional airports. The problem for Shannon-Heathrow connecting passengers is that long haul airlines at Heathrow have not adopted the Paris/Frankfort/Amsterdam feeder model. The Heathrow long haul airlines are unwilling to rebalance the Aer Lingus share of the through ticket price. Aer Lingus no longer wishes to perform this role because of

its low yields from feeder passengers and withdrew from the One World Alliance in May 2007.

It is also possible that the interline point for Irish traffic to the Middle East, Asia and Australasia will be further east than Heathrow, Paris, Frankfurt or Amsterdam. The Civil Aviation Authority (2007) notes that "…an interesting development has been Emirates' expansion into the UK regions from its Dubai hub. It started a Birmingham service in 2001, having gradually built up its Heathrow, Gatwick, and Manchester services during the 1990s. By 2004 both Birmingham and Manchester were twice-daily, the same year that a new Glasgow service began." Newcastle was added in September 2007 and Emirates serves 88 destinations in 59 countries.

Table 6: Passenger Numbers at Major Hub Airports in Western Europe, 2005

	Passengers (m)
Heathrow	67.9
Paris CDG	53.6
Frankfurt	52.2
Amsterdam	44.2

Source: Davy (2006a).

(g) Transfer of Shannon's connecting North America traffic at Heathrow to direct services from Shannon under the EU/USA Open Skies regime from 2008. Many new routes are planned under this liberalisation. For example, Shannon passengers currently interlining at Heathrow might, after the open skies agreement, interline at Atlanta, Chicago or Dallas. Shannon offers advantages such as being the first European airport on the main transatlantic routes, lack of congestion, and connectivity to the Ryanair hub for onward destinations on 31 routes, including 8 launched in November 2007. The nine biggest US routes from Heathrow in 2006 were New York, Chicago, Los Angeles, Washington, San Francisco, Boston, Miami, and Philadelphia with a total of 4.3 million passengers. All of these US points, plus Atlanta, are scheduled to have direct service from Ireland under Open Skies.

(h) It is open for any EU airline to replace Aer Lingus on the Shannon-Heathrow route by acquiring slots to commence operations there. The extra costs involved at Heathrow over starting other routes and the overwhelming preference of the deregulated market for low-cost airlines and airports make this alternative an unlikely one. Indeed many supporters of the Shannon-Heathrow service seek government intervention to compel Aer Lingus to operate the service. This option is examined in Section 6 below.

6. Economic Aspects of Seeking Government Intervention in the Shannon-Heathrow Slots Issue

The theory of contestable markets, which underpins the policy of deregulation, is based on freedom of entry and exit (Baumol, 1981). On market entry the theory of contestable markets "…merely reinforces the view that a barrier to entry must start off with a heavy presumption against its adoption." The removal of entry barriers in aviation has had a more dramatic impact in Ireland than in any other EU country or in the USA after deregulation in 1978.

In 1985/6, the last year before deregulation in May 1986, the protected airline, Aer Lingus, carried 2.3 million passengers. In 2007 four Irish international scheduled airlines, Ryanair, Aer Lingus, CityJet and Aer Arann, will carry over 60 million passengers. Sections 3 and 4 above showed how, since deregulation, fares have fallen, services have increased and new airports in the Atlantic region of Ireland have commenced services. Nostalgia for a return to an era when the Government might have ordered Aer Lingus to serve routes against its commercial judgement ignores the large gains from deregulation in 1986. The Atlantic region in Ireland has been a particular beneficiary of airline and airport competition, including much enhanced services to the London region.

On the removal of exit barriers in a deregulated market Baumol states that "…perhaps a bit newer is the emphasis on the importance of freedom of exit which is as crucial a requirement of contestability as is freedom of entry. Thus we must reject as perverse the propensity of regulators to resist the closing down of unprofitable lines of activity."

The removal of exit barriers has been important in the growth of aviation in Ireland such as the market exit of British Airways from the Republic, and the exits of Aer Lingus from Kerry, Galway, Waterford, Knock, and Sligo and from the Dublin-Cork route. New entrants such as Aer Arann and Ryanair developed these routes after the British Airways and Aer Lingus market exits.

In Section 5 above eight market responses to the Heathrow-Shannon route cessation were examined. Some were announced within days of the Aer Lingus withdrawal statement and are already in operation with the objective of ensuring no loss of traffic on the London routes. In addition, eight new routes from Shannon were launched in November and show initial positive market reactions. Market entry and exit and market efficiency rather than market failure characterise Irish aviation. Nonetheless, there have been regional and political reasons advanced in the case for government intervention in this case.

Four main reasons have been advanced for government intervention to retain the Shannon-Heathrow services. These are the promotion of business, tourism and regional development in the Atlantic region and the wider benefit of political intervention to

compel Aer Lingus to comply with government orders to operate services in a restoration of the pre-deregulation "national airline" model. These reasons are examined below.

(i) THE PROMOTION OF BUSINESS CASE

This case that the government should intervene to require Aer Lingus to remain on the Shannon-Heathrow route in order to promote business in the area and that even if other airlines increase the total number of passengers at Shannon airport they will not adequately serve the business community in the area.

Aer Lingus does not have business class and it has a policy not to reintroduce it. The Ireland-United Kingdom market has adopted the low cost airline model apart from a single route from Dublin to London City. The business community in Ireland has not chosen the full-service airline product on the London City-Paris route described above. The market option for any airline to purchase slots at Heathrow and operate a business class service from Shannon remains open and unlikely. The record is that high value business travellers did not support in sufficient numbers the cost of full service provision on Irish routes whether on British Airways club class, British Midland diamond class, Aer Lingus business class or the shortlived Ryanair business class. Business class before deregulation delivered some inflight services for business passengers curtained off from the remainder of the aircraft while charging fares which could not be sustained in a deregulated market such as £650(€825) from Dublin to Brussels, a fare of over €1,200 at 2007 prices.

Davy (2006b) found that 23.15 per cent of Ryanair passengers were on business trips. This is higher than the 14 per cent of all visitors to Ireland and the 12 per cent of visits by Irish residents abroad who cited business as the reason for their trips according to CSO data for 2005.

Ryanair passengers who had travelled on the airline before totalled 83.17 per cent. Just under 4 per cent rated their overall flight experience as poor or very poor. Food was purchased on board by 24 per cent of Ryanair passengers and 36 per cent bought it at the airport. Under 6 per cent of Ryanair passengers would pay more for an extra legroom seat.

The Civil Aviation Authority study on "No Frills Carriers; Revolution or Evolution?" (2006) found that "no-frills carriers have had a noticeable impact on the profile of business passengers. Passengers travelling on business have lower incomes overall now than ten years ago, and this is true across all airline types. This suggests that no-frills carriers have had a beneficial effect here, as the factors which have made trips more viable for lower income business passengers, in particular the removal of fare restrictions and the availability of lower fares to and from more destinations,

particularly from the UK regions, have resulted from the entry of no-frills carriers." (5-26).

The Irish and UK evidence is that low cost airlines and airports improve the competitiveness of the business sector and that their services are heavily used by business travellers who have overwhelmingly chosen the low cost model for air travel between the two countries. Should the market change against the low cost model in favour of the traditional business class airline product in the future there will be no requirement for government intervention. There is no market obstacle to the provision of full service business class flights between Heathrow and any Irish airport. Costs would be higher because slots at Heathrow are in limited supply and an entrepreneur wishing to operate such services would require yields per passenger correspondingly greater than on other routes.

(ii) THE TOURISM PROMOTION CASE

The case for government intervention to retain the Shannon-Heathrow route in order to promote tourism is a variation on the high value business travellers theme above. High spending tourists will be less inclined to travel on low cost airlines and average spending per tourist will fall according to this argument. Deregulated aviation is, therefore, claimed to be detrimental to luxury hotels and golf courses.

Lower air fares have two possible impacts on the income distribution of air travellers. Lower fares both increase the ability of low income people to fly at all and the ability of high income people to fly more frequently. The UK evidence is that the latter impact is greater than the former. The Civil Aviation Authority (2006) found that "…in relation to the leisure market, the advent of low cost carriers does not appear to have had a notable effect in terms of the income profile of passengers, In fact, the profile of UK leisure passengers in terms of income profile is similar between no-frills carriers and full service carriers, and has changed little over the last decade, and although numbers of leisure passengers from all income groups has increased, the majority of the absolute increase has come from those in higher and middle income and socio-economic groups." (5-16). Fears that the passengers on low cost airlines might reduce average tourism spending are not supported either in the comparison of inflight spending by passengers. Goodbody (2007) found ancillary expenditure per passenger on Ryanair at €9.40 to be 90 per cent of the expenditure per passenger on Aer Lingus at €10.20.

The case that the government should intervene to increase the supply of a higher cost product (Heathrow-Shannon air services) because the deregulated market produces a lower cost product (Shannon-other London airports services) which is used by low income passengers is regressive. The policy implication is that that

governments should never deregulate a market in which low income persons would benefit from the resulting price reductions.

(iii) THE REGIONAL DEVELOPMENT CASE

The case that the entire Atlantic region of Ireland requires government intervention to retain the Shannon-Heathrow services is not supported by the data in Table 2 above. The nine counties on the Atlantic coast are served by nine airports, seven with direct service to London and two with service over Dublin. Government intervention to require Aer Lingus to retain the Shannon-Heathrow services risks undermining the new services and routes developed since deregulation and the development of alternatives to Shannon-Heathrow services examined in Section 4 above.

In regard to fears concerning the regional impact of low cost carriers the CAA stated that "…for the UK regions, there has been a marked change in the availability of flights for leisure and business purposes. This again is a consequence of deregulation, but it is primarily the no-frills carriers that recognised that there was significant demand for travel from regional airports, and exploited these opportunities, creating benefits for passengers in the regions, for the airports in question and for the regional economy".

In the absence of origin and destination surveys it is not possible to say how many Shannon-Heathrow passengers work or live near these airports. The deregulated market has opened up many new air services and airports both in the Atlantic region of Ireland and in the greater London area. Air travel between the Atlantic region and London grew 2.7 fold between 1990 and 2006. As shown in Section 4 above new airlines and airports accounted for 94 per cent of that increase while Shannon-Heathrow traffic has been static and its market share has declined.

(iv) THE CASE FOR RESTORATION OF THE PRE-DEREGULATION NATIONAL AIRLINE

The benefit claimed in this case for government intervention to retain the Shannon-Heathrow services stresses the political benefits of governments' ability to use a national airline as a policy instrument, including ordering Aer Lingus to run services against its commercial judgement. In a deregulated market this interventionist policy would undermine an airline's commercial freedom and harm its finances and viability. Before deregulation in Europe the national airline policy seriously reduced the efficiency of state-owned airlines and required a virtual ban on new entrants on trunk routes in order to generate the excess revenues to support the resulting inefficiency. The result throughout Europe was the highest air fares in the world, low productivity and distressed state airline syndrome (Doganis, 2001). The elements of distressed state airline syndrome were substantial losses, overpoliticisation, strong unions, overstaffing, no clear development strategy, bureaucratic management and poor

service quality. Privatisation of Aer Lingus in 2006 was intended to reduce political interference in its business decisions but within months politicians overlooked their sale of the airline and called for government intervention in its commercial decisions. Goldman Sachs (2004) indicates that only small financially troubled airlines in Europe still remain in state control such as Air Malta, Czech, Malev, Olympic and TAP.

7. The Outlook for Further Heathrow Slot Transfers

A prospect raised in the public debate over the Shannon slots at Heathrow is that further slot transfers could take place from the Cork and Dublin routes. There is also the prospect that the Belfast International-Heathrow route might fail to cover the cost of slots and the extra operating costs at Heathrow.

The passenger data in Table 7 show that, from a monopoly start, the decline in the Heathrow market share of its London traffic has been faster at Shannon than at Dublin by 9 points and than at Cork by 3 points. The allocation of 20 Heathrow slots to the Dublin route, 13 held by Aer Lingus and 7 held by British Midland, gives 100,000 passengers per slot in 2006 compared to 106,000 per slot used on the Cork-Heathrow route. The number of passengers per slot used on the Shannon-Heathrow route varies between 81,000 and 107,000, depending on whether three or four slots are used on the route. The Heathrow-Ireland market in 2006 had 2.7 million passengers, 73 per cent on the Dublin route, 16 per cent on the Cork route and 12 per cent on the Shannon route.

Table 7: London Airport Shares of Passengers on Dublin, Cork and Shannon Routes, 2006

London Airport	Dublin %	Cork %	Shannon %
Heathrow	46.7	40.9	37.7
Gatwick	17.5	31.1	18.7
Stansted	24.2	27.9	33.9
Luton	8.5	-	9.7
London City	3.3	-	-
Passengers 000s	4,268	1,038	856

Source: Civil Aviation Authority.

8. Summary and Conclusions

Slots at Heathrow have acquired a scarcity value due to unsatisfied demand for access to the airport by new entrants and by incumbents wishing to increase their flight numbers.

The slots were allocated by grandfather rights. Aer Lingus and British Midland are beneficiaries of that allocation of property rights at Heathrow and in 2007 allocated slots worth over €400 million to their services to Dublin, Cork and Shannon. Yields on Heathrow services to Ireland must cover this outlay and the other additional costs of serving a high cost airport. In the deregulated aviation market on Ireland-United Kingdom routes since 1986, passengers

have transferred the majority of their London trips to London airports other than Heathrow such as Stansted, Gatwick, Luton, and London City. The decline in the Heathrow share of Ireland-London traffic has been faster at Shannon than the declines at Dublin and Cork. Shannon passengers to the other London airports in 2006 outnumbered those on Shannon-Heathrow by 65 per cent.

Passenger numbers between the seven Atlantic region airports with direct service, and London in 2006 were 270 per cent of the 1990 number. Of the 1.687 million extra passengers in this market 94 per cent used new entrant airports and airlines. The deregulated market has not isolated the Atlantic coast of Ireland. Airports such as Stansted, Gatwick, Luton, Knock, Derry, Kerry, Galway and Waterford, with new airlines, have increased connectivity, almost trebled the market size and reduced fares and costs.

Arguments favouring government intervention to retain the Shannon-Heathrow service on the grounds of promotion of businesses, tourism and regional development are shown to be weak as is the case made that Ireland needs a "national airline" policy with government powers to order Aer Lingus to serve routes such as Shannon-Heathrow. Airline deregulation has been a major success in the Irish economy and alternatives to the Shannon-Heathrow services are already attracting consumer support. The market failure arguments for government intervention do not apply. Successful deregulation requires the removal of both barriers to entry *and* barriers to exit.

REFERENCES

AER LINGUS, 2006. "Initial Public Offering Prospectus, Part 111".

AER LINGUS, 2007. "Announcement of transfer of Shannon-Heathrow slots to Belfast", 7 August.

BARRETT, S. D., 2002. "Airport Competition in the Deregulated European Aviation Market" in P. Forsyth, K. Button, and P. Nijkamp (eds.), *Classics in Transport Analysis*, Edward Elgar, Vol. 2, pp. 575-592.

BARRETT, S. D., 2004. "How do the demands for airport services differ between full-service carriers and low-cost carriers?" *Journal of Air Transport Management*, Vol. 10, pp. 33-39.

BAUMOL, W.J., 1982. "Contestable Markets; An uprising in the theory of industrial structure," *American Economic Review,* Vol. 72, pp. 1-15.

BYRNE, P., 2004. *Fuelled By Belief, the CityJet Story*, Dublin: Liffey Press, p. 133.

CIVIL AVIATION AUTHORITY, 2006. "No-Frills Carriers: Revolution or Evolution?" CAP 770.

CIVIL AVIATION AUTHORITY, 2007. "Connecting the Continents, Long Haul Passenger Operations from the UK", CAP 771, Section 2.8.

DAVY STOCKBROKERS, 2006a. *Aer Lingus*, 9, pp. 27.

DAVY STOCKBROKERS, 2006b. *Ryanair as a consumer growth company*.

DOGANIS, R., 2001. *The Airline Business in the 21st Century*, Routledge, pp. 188-193.

DOGANIS, R., 2006. *The Airline Business*, Routledge, p. 25.

GOODBODY STOCKBROKERS, 2007. *Seven Go Hunting, An Analysis of Europe's Low Cost Airlines.*

GOLDMAN SACHS INTERNATIONAL, 2004. *Evaluation of Ownership Options Regarding Aer Lingus Plc*, Dublin: Government Publications.

KAHN, A., 2005. "Reforming the FCC and its Mission; Lessons from the Airline Experience", *Journal on Telecommunications and High Technology Law,* Vol. 4, No. 1, pp. 43-58.

RYANAIR, 2007. "Ryanair responds to Aer Lingus closure of Shannon-Heathrow route", 14 August.

"Ulster says 'no' to high fares, Ryanair announces 23rd base at Belfast City Airport", 6 September.

"31st new route from Shannon base and 3 new routes from Dublin", 25 October.

"It's official- easyJet is just another high fares airline", 5 November.

"Ryanair launches 8 new routes from Shannon", 7 November.

WELDON, N., 2002. "Pioneers in Flight, Aer Lingus and the Story of Aviation in Ireland", Dublin: Liffey Press, p. 267.

BUILDING FOR THE FUTURE? INTERPRETING AN "IRISH" CURRENT ACCOUNT DEFICIT

*Martin O'Brien**

1. Introduction

In recent *Commentaries*, attention was drawn to the dramatic increase in the Irish current account deficit on the balance of payments. The deficit, which stood at -0.7 per cent of GNP in 2004, widened sharply to over -4 per cent of GNP in 2005 and at the end of 2006 was -4.9 per cent of GNP. Analysis of the Irish current account has taken on a new dimension in the context of European Monetary Union, where the union level current account is broadly in balance, while individual member states exhibit diverse balance of payments positions. Since Euro Area member states are insulated against speculative currency attacks as a result of the single currency, the traditional concerns about financing the deficits of countries with negative balance of payments positions do not directly arise. However, the dispersion between Euro Area countries current account balances has increased in recent years. Ireland is among a group of countries (Greece, Portugal and Spain) that have seen their current account deficits grow significantly within EMU.

Individual Euro Area member states current account positions may become less relevant over time, as is the case for individual

*I would like to thank Alan Ahearne, Alan Barrett and an anonymous referee for detailed and constructive comments on previous drafts, as well as various colleagues at The Economic and Social Research Institute (ESRI) for helpful references and discussion at various stages of the paper's development. All errors remain my own. E-mail: martin.obrien @esri.ie

states in the US. However, the relatively low level of labour mobility and the lack of a federalised fiscal structure in the Euro Area implies that their respective current account positions are important in highlighting country-specific issues and their adjustment and integration within EMU. If the determinants of balance of payments deficits/surpluses are structural and systematic as opposed to transitory some member states may be faced with difficult periods of adjustment. This arises when the single monetary policy adopted by the European Central Bank is pro-cyclical in these member states, not promoting an automatic stabilising force when the economy grows too far above trend (typically deficit countries) or too far below trend (typically surplus countries). In this context the responsibility is on domestic policymakers to use other tools to ensure any eventual correction is managed optimally, or more preferably to avoid the need for correction in the first instance.

Monetary union can be seen as both a blessing and a curse in terms of a country's balance of payments. The more benign approach relies on the definition of the current account balance as the corollary of flows on the capital account, identified by the difference in aggregate saving and aggregate investment in a country. Modern open economy macroeconomics[1] sees the current account as responding to easier flows of capital resulting from the financial integration brought about by a monetary union. If the member states of the monetary union have sufficiently developed domestic financial institutions (as is the case in the Euro Area) theory suggests capital will flow from countries with a lower return on capital to those with higher returns. This enables the latter to invest without having to have large domestic savings. Countries that exhibit higher rates of economic growth, such as Ireland, provide higher rates of return on capital and are therefore typically characterised by higher rates of inward investment. Theories of economic development suggest that this trend will continue until the return on capital in both sets of countries are equalised, as the countries with initially lower capital stock invests in the necessary infrastructure to promote sustainable growth. Typically, this is accompanied by per capita income levels in both sets of countries converging.

The less benign interpretation takes a more traditional approach, looking at the trade implications of movements in aggregate real incomes and real exchange rates between countries. In the context of monetary union these movements can result in significant shifts in relative competitiveness between member states. These developments are not necessarily worrying if they are consistent with the necessary adjustment to being part of a monetary union and are as a result transitory. However, if these movements in aggregate incomes and real exchange rates do not lead to an appropriate adjustment the current account balance may reflect an

[1] See for example Obstfeld and Rogoff (1995).

unsustainable competitiveness position. In this instance the particular member state obviously cannot devalue their currency in the light of competitiveness pressures. For a country with a current account deficit this is typically compounded by relatively higher inflation as a result of growth being above trend. Higher inflation leads to relatively lower real interest rates, adding further stimulus to an already overheating economy. This could potentially lead to long and painful adjustment periods where net exports and real activity in the economy steadily decline until such a time as competitiveness is regained.

This paper focuses on whether the recent development of the Irish current account balance within EMU reflects the benign or the worrying interpretations discussed above. As a small open economy, sustaining reasonable increases in the Irish standard of living in the medium to long-term requires a competitive traded sector. Does the evolution of the current account balance within EMU merely reflect higher relative growth in Ireland as opposed to significant losses in competitiveness, and if so is the nature of this growth consistent with the objective of maintaining sustainable growth in the future? Ahearne *et al.* (2007) show how for the Euro Area and some of its individual member states, higher rates of economic growth relative to their main extra-EMU trading partners leads to a fall in their trade balance. However for Ireland, Honohan (2006) noted that the scale and nature of foreign capital flows into the country may have contributed to the housing boom of recent years. To the extent that this foreign capital driven expansion in the construction sector impacted upon Ireland's competitiveness it has provided a "double-hit" on the trade side of the balance of payments.

The paper proceeds with both formal and comparative analysis to determine how we should interpret Ireland's growing current account deficit, paying particular attention to the role of competitiveness and the implications for policy. Section 2 outlines the development of Irish current account determinants. In Section 3 an econometric analysis examines which process, falling competitiveness or relatively higher economic growth, is more relevant to the long run determination of the current account. Section 4 places the Irish current account in a comparative Euro Area context and highlights the importance of the construction boom in the recent development of the Irish balance of payments deficit. Section 5 discusses the implications of the analysis and concludes.

2. Determinants of the Current Account

The current account is dominated by the balance of trade (net exports) and net factor income from the rest of the world. The trade balance has been positive for many years as Irish merchandise exports continue to be greater than the deficit (albeit falling) on services trade that the country faces. However, the balance of trade has been narrowing since 2002 (20 per cent of GNP) to 12 per cent

of GNP in 2006. Net factor income, which includes profit repatriation by foreign multi-nationals operating in Ireland, has continued to be a major outflow, but has also contracted over the same period from -22 per cent of GNP to -17 per cent of GNP (see Table 1). The reduction in profit repatriation outflows concurrent with a fall in exports is unsurprising given Ireland's position as an export hub for many multinational companies. These credit (net exports) and debit (net factor income) flows have in the past cancelled each other out for the most part. However, in 2005 and 2006 the balance of trade fell much faster than the negative net factor income contracted resulting in a gap emerging between the two. Some of this may be explained by changes in the US tax regime[2] which incentivised US firms operating abroad to repatriate more profits back to their home country. By the end of 2006, however, this distortion should be fully accounted for. The balance of payments statistics for 2007 Q1 indicate no significant difference in income flows with respect to the preceding quarters suggesting the effect of the US tax changes may not have been of most significance.

It would appear that the deterioration in the balance of trade is a driving force behind the widening of the current account deficit from 2002 to 2006. This may be evidence of underlying competitiveness problems for the Irish economy. Such problems are usually reflected in an appreciation of the real exchange rate. Figure 1 shows that Ireland's real exchange rate[3] has indeed appreciated in recent years. This reflects two realities: first the nominal appreciation of the Euro since the start of the century against the currencies of our main extra-Euro Area trading partners and second the rise in relative consumer prices in Ireland compared to those of our main trading partners both within and outside the Euro Area. The nominal exchange rate movements are obviously an issue which domestic factors have no influence over as Ireland has such a small share of the Euro Area economy. However, domestic factors can and have had an important effect on increases in relative consumer prices.

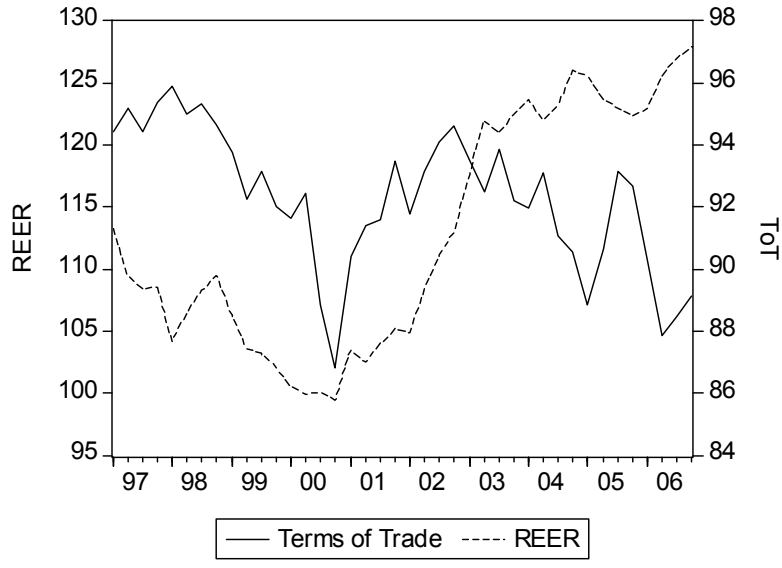
The rise in relative consumer prices can be attributed in part to strong domestic demand, spurred on by historically low interest rates, extremely favourable employment growth and fast wage growth. Many authors see this rise in relative prices as a necessary adjustment to Euro Area membership[4] as expectations of a faster

[2] The American Job Creation Act, 2004.

[3] The real exchange rate used in this paper is the OECD Real Effective Exchange Rate index, which is a weighted exchange rate index based on the country's share of both its domestic and foreign markets vis-à-vis its main competitors deflated by their relative consumer price indices. A rise in the index points to a fall in competitiveness. See Durand *et al.* (1992) for a more detailed discussion.

[4] See, for example, Traistaru-Siedschlag (2007).

Figure 1: Irish Real Effective Exchange Rate and Merchandise Terms of Trade



Source: OECD Main Economic Indicators Database (2000=100); External Trade Statistics, Central Statistics Office (1990=100).

convergence in living standards took hold. To the extent that the wage inflation experienced during this period was matched by productivity growth, the impact on competitiveness would be less and the divergence in real interest rates and real exchange rates across the Euro Area, exacerbated by the single monetary policy, would diminish over time. Table 1 highlights trends in key macroeconomic variables, which show that productivity growth has not matched real wage growth in recent years. This indicates underlying competitiveness pressures with which the economy cannot continue indefinitely. Eventually a period of competitive disinflation is required, where growth slows, and perhaps rising unemployment until such a time as real and nominal wage growth moderates and productivity growth improves. Ireland appears to be entering such a process at the moment.

Blanchard (2001) highlighted how Ireland's real exchange rate needed to appreciate during the EMU integration process given that excess demand was driven both domestically and internationally. Referring again to Table 1, both domestic consumption and net export growth were significant in the early years of monetary union. The growth in net exports has diminished over time as the real exchange rate has appreciated. To the extent that the appreciation, attributable in part to rising relative consumer prices, was in the context of productivity growth outstripping real wage growth it could be considered as part of the convergence process. However, the more recent reality of low productivity growth points towards

Table 1: Various Macroeconomic Indicators, Growth Rates (Unless Specified*)

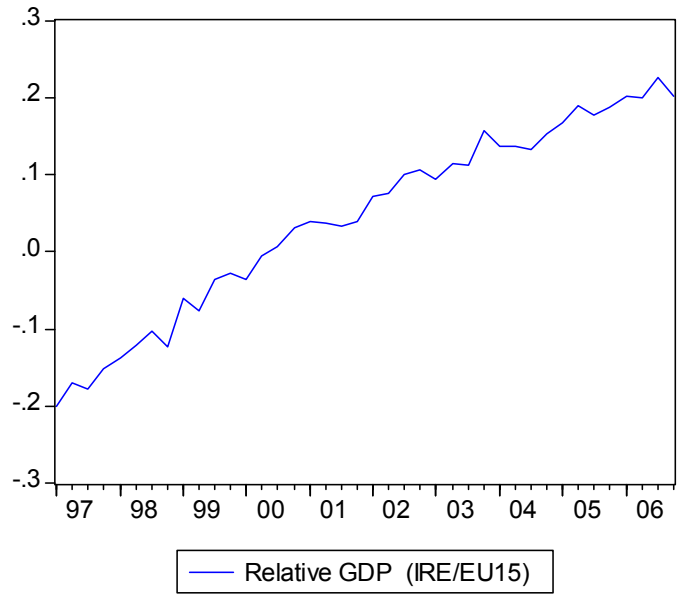
	1999	2000	2001	2002	2003	2004	2005	2006
GDP	11.3	13.2	5.3	5.9	5.1	3.2	5.9	5.7
GNP	8.5	12.2	3.9	2.8	5.5	3.9	4.9	6.5
Consumer Prices	1.6	5.6	4.9	4.6	3.5	2.2	2.5	4.0
Unemployment Rate*	5.6	4.3	3.9	4.4	4.6	4.4	4.4	4.4
Productivity (GDP per worker)	2.8	3.9	4.2	4.6	1.7	1.5	1.0	1.1
Real Wages	3.5	2.0	2.5	0.9	2.8	3.9	3.1	0.9
Consumer Expenditure	8.3	10.4	5.4	3.8	3.2	3.8	6.6	6.2
Exports	15.5	19.8	8.6	4.5	0.5	7.3	3.9	4.9
Imports	12.4	20.8	7.2	2.4	-1.2	8.6	6.5	5.3
Balance of Trade % GNP*	15.6	15.0	17.6	20.3	18.3	16.9	13.9	12.0
Net Factor Income % GNP*	-16.9	-16.5	-18.7	-22.2	-18.6	-17.9	-18.3	-16.6

Source: National Income and Expenditure Accounts 2006, Central Statistics Office.

more structural constraints which may have to be addressed through competitive disinflation and a real adjustment.

Meanwhile, a simple comparison of Irish and Euro Area or EU15 economic growth rates would suggest that the widening of the balance of payments deficit is due at least in part to Ireland's higher growth in recent years. Figure 2 plots the ratio of an index of Irish GDP to EU15 GDP expressed in logs from 1997-2006. The steady rise in the series is attributable to Irish GDP growth being consistently above that of the EU15 over the period.

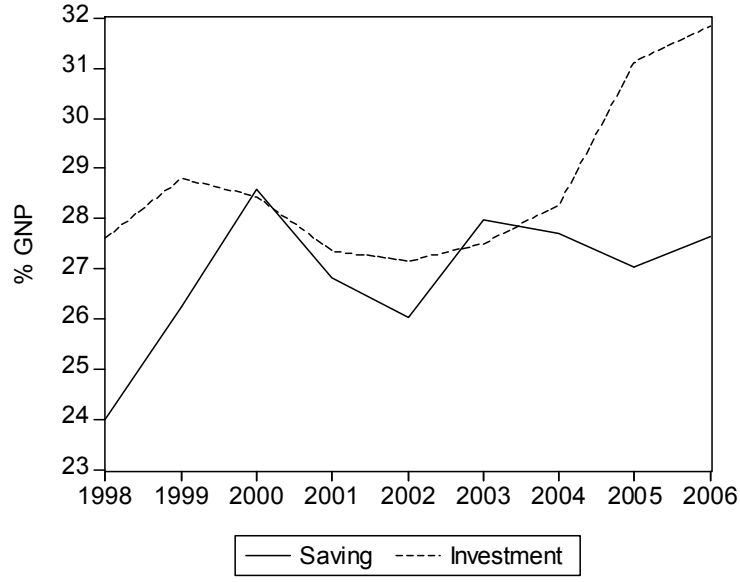
Figure 2: Quarterly OECD Indices of Irish GDP Relative to EU15 GDP, 1997-2006



GROWTH AND CAPITAL FLOWS

The combination of higher growth rates and international financial market integration can have significant impact on a country's balance of payments position. Blanchard and Giavazzi (2002) highlight the potential effect on the current account in the context of Euro Area integration.[5] The process allows member states with potentially higher growth rates, due to coming from a low base, to borrow much more readily and invest without having to have high levels of domestic saving. Greater integration of international capital markets can cause capital to flow more readily to countries with higher potential growth rates. Ahearne *et al.* (2007) have found this to be the case in the Euro Area, where investment capital can now more easily flow from the core countries (Germany, France etc.) to the peripheral countries (Ireland, Greece, Portugal, Spain) where the rate of return can be higher because of the relatively low initial capital stock level. This aids in the integration process in that these peripheral countries can more easily finance expenditure on infrastructure and expand potential output. This investment, (Total Gross Domestic Physical Capital Formation in Figure 3), does not necessarily arise because of a current account deficit but may in fact cause it when the deficit is expressed as the excess of investment over saving. Thus, running a current account deficit is not necessarily a bad thing.

Figure 3: Gross National Savings and Total Gross Domestic Physical Capital Formation (Investment), % of GNP



Source: *National Income and Expenditure Accounts*, 2006, CSO.

[5] The analysis focused on the Greek and Portuguese deficits. Blanchard (2006) revises the opinion for Portugal indicating that structural competitiveness issues were more pertinent for that country than the income convergence theory.

The Irish experience in recent years has seen the excess of investment over saving increase, particularly from 2004 to 2005. This is particularly striking when one considers the relatively high rate of national savings in Ireland. Gross national saving stood at 27.6 per cent of GNP in 2006 whereas investment was 31.8 per cent of GNP. This interpretation of the current account is usually discussed in an inter-temporal setting, where neoclassical growth theory predicts investment capital will flow from high income countries to low income countries until the latter converges in terms of per capita income.

The recent development of the Irish current account does not fully fit the inter-temporal interpretation, as per capita income converged to EU15 levels before the balance of payments began its steady movement into deficit. However, higher relative growth can also impact negatively upon the trade balance, as seen in Ahearne *et al.* (2007). The construction sector boom in Ireland is undoubtedly a factor in the higher relative growth rate in most recent years. The extent to which the high rate of investment in construction was financed by foreign capital, as illustrated by Honohan (2006), is also reflected in the increasing gap between investment and national saving in Figure 3. The empirical analysis in this paper aims to highlight the relative importance of competitiveness pressures and higher growth rates by examining the role of both the real exchange rate and relative output levels in determining the current account.

COMPETITIVENESS AND THE REAL EXCHANGE RATE

The real exchange rate has been a mainstay in the theoretical literature on current account determination, from the more traditional approaches (Friedman, 1953; Dornbusch, 1976) to the new open macroeconomics models (Obstfeld and Rogoff, 1995). The primary channel considered is through domestic and foreign consumers switching their expenditure away from domestically produced goods which become relatively more expensive as the real exchange rate appreciates. Krugman and Obstfeld (2001) highlight the "value" and "volume" effects that changes in the real exchange rate have on the balance of trade and hence the current account. The value effects refer to the fact that as a currency appreciates the value of each unit of exports rises vis-à-vis each unit of imports, leading to an increase in the terms of trade and an improvement in the balance of payments in the short run. The volume effects are expected to be more dominant in the long run as the fall in competitiveness as a result of the real exchange rate appreciation leads to net exports diminishing.[6] Therefore, in the long run determination of the current account we expect a negative relationship between changes in the real exchange rate and the evolution of the current account balance.

[6] These theoretical underpinnings are usually described in the context of a real depreciation, leading to the textbook J-curve effect on the balance of payments.

Ireland's terms of trade[7] increased substantially from 2000 Q4 to 2002 Q4 alongside the real exchange rate appreciation, as can be seen in Figure 2. This was accompanied by a reduction in the balance of payments deficit during 2002, moving into surplus in 2003. However, since 2003 the continued real exchange rate appreciation has not been matched by increasing terms of trade and the current account balance has moved steadily into deficit since the beginning of 2004 as the trade balance has fallen. Not only does this provide more evidence for the role of competitiveness pressures in analysing Ireland's balance of payments but it also may indicate that a real adjustment is inevitable in the context of continued real exchange rate appreciation, particularly through 2006. The extent to which this is the case depends on the overall importance of the real exchange rate in current account determination, particularly when compared to the independent effect of Ireland's relatively higher growth rate. If the long run current account position is mostly due to higher rates of economic growth, the situation as at the end of 2006 of a balance of payments deficit of over -4 per cent of GDP could be considered appropriate and the prospects for adjustment more benign.

Having discussed both potential drivers of the current account, the next section aims to determine empirically the independent role of competitiveness pressures and relatively higher economic growth rates respectively, on the long run determination of the current account balance.

3. Empirical Analysis

DATA AND METHODOLOGY

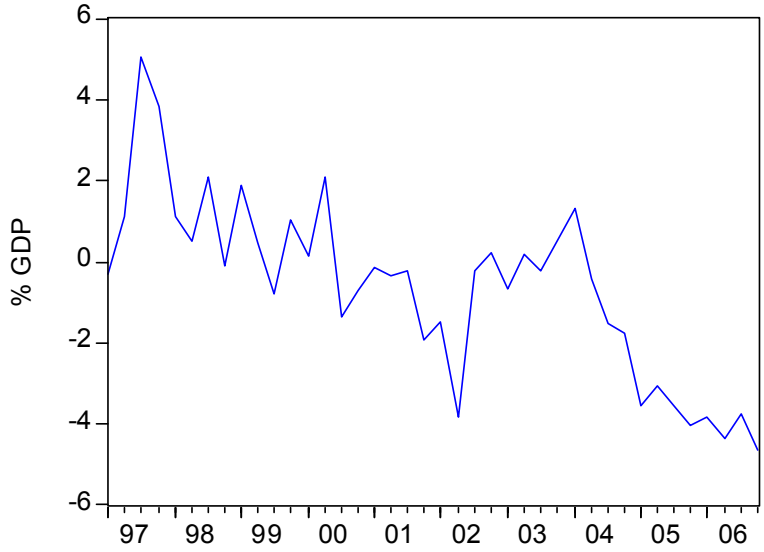
The purpose of this analysis is to examine the potential links between the current account expressed as a proportion of Gross Domestic Product (*CA*), domestic output relative to foreign (EU15) output levels (*Yie*/*Yeu*) and the real exchange rate (*Z*). More specifically, the results should isolate the relative importance of changes in competitiveness (as given by changes in the real exchange rate) and higher growth rates with respect to the EU15 in the evolution of the Irish current account balance.

Data are quarterly in frequency from 1997 Q1 to 2006 Q4.[8] The current account to GDP series are derived from *Quarterly National Accounts* and *Balance of Payments* statistics (CSO). There was distinct evidence of seasonality in the series which was accounted for by an adjustment using the Census X-11 procedure in EViews. For domestic and foreign (EU15) income levels the seasonally adjusted real GDP indices from the OECD are used. The real exchange rate

[7] Terms of trade refer to merchandise imports and exports only.
[8] Given the limited time span and number of observations included, these results are indicative not definitive.

is the Real Effective Exchange Rate index published by the OECD. All OECD indices have a base year of 2000=100.

Figure 4: Current Account Balance (% GDP, Seasonally Adjusted)



The analysis is undertaken using an unrestricted cointegrated VAR set-up (Johansen and Juselius, 1990).[9] Essentially this procedure allows useful long run relationships between the variables of interest to be examined by exploiting the statistical properties of the individual time series. Comprehensive details of the analysis, including all the necessary preliminaries, are available from the author on request.

ESTIMATION RESULTS

The result of the econometric analysis is given by the following long run relationship

$$\begin{array}{lllllllll} CA & = & 1.05 & + & 0.01\ (t) & - & 0.26\ (Z) & - & 0.56\ (Yie/Yeu) \\ & & & & [\ 6.18] & & [-6.00] & & [-4.67] \end{array}$$

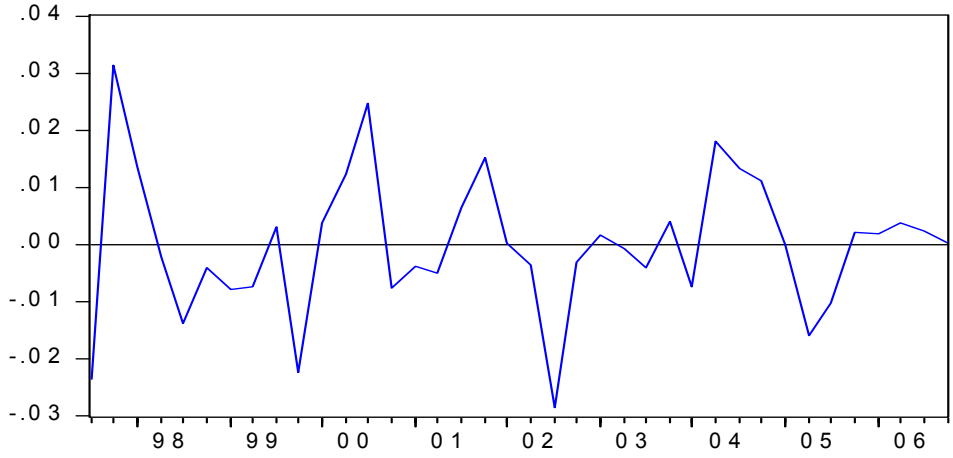
where t is a time trend, Z is the real exchange rate, Yie/Yeu is relative GDP and CA is the current account expressed as a proportion of GDP. The corresponding t-statistics for the coefficients are given in brackets and show that all the coefficients are statistically significant at conventional levels. The primary interest for this analysis is the sign and relative magnitude of the real exchange rate (Z) and relative growth (Yie/Yeu) coefficients. Both coefficients have the expected negative sign: a real appreciation

[9] Many authors have applied VAR analysis to the determination of the current account balance, recent examples of which include Nason and Rogers (2002), Lee and Chinn (2006) and Bems *et al.* (2007).

results in a fall in the current account balance and the same dynamic holds as the pace of growth in Ireland is above that of the EU15. However, the relative growth coefficient is greater than that of the real exchange rate, indicating that this has more relevance in the long run determination of the Irish current account balance.

A further step in the analysis allows us to examine whether the current magnitude of the deficit is an equilibrium position or whether some manner of adjustment is necessary. Figure 5 plots the estimated cointegrating relationship highlighted above over recent years, where deviations from zero indicate the current account balance being away from its long run equilibrium. It is evident that at the end of 2006 the seasonally adjusted current account deficit of over -4 per cent of GDP was an equilibrium position justified by the determinants of real exchange rates and relative growth.

Figure 5: Current Account Balance Long Run Cointegrating Relationship



The results above indicate that at a macro-level the scale of the Irish balance of payments deficit is appropriate. Higher relative growth in Ireland as opposed to our trading partners is more important than real exchange rate appreciation in determining the current account balance. However, much of that growth in most recent years has been driven by a boom in construction, a sector with low productivity growth not open to international competition. The increasing importance of construction in overall economic activity has contributed to the economy-wide slowdown in productivity growth noted in Table 1. Combined with the low productivity growth in other sectors not open to international competition it has possibly contributed to Ireland's loss of competitiveness as wage growth outstripped productivity growth in the most recent past. The next section places the Irish balance of payments deficit in a comparative European context by explicitly examining some of these factors, specifically the nature of capital

investment and, following on from that, the impact this has had on Ireland's competitiveness.

4. Ireland – A Euro Area Comparison

Estimates for the Euro Area balance of payments indicate that the current account was broadly in balance at the end of 2006, with sharp differences across individual member states: Portugal at one end with a deficit touching double-figures as percentage of GDP, and the Netherlands at the other with a near mirror opposite surplus position.[10] In effect, individual Euro Area member states find themselves as net borrowers (deficit position) and net lenders (surplus position). The development of Ireland's current account position in recent years is not particularly unique among Euro Area member states. The trend since 2003 to deficit is similar to that of Spain, Greece and Portugal, although not at the same scale. However, the underlying components of the current account tell a familiar tale for Ireland which differs from all other Euro Area states. Unlike these countries Ireland exhibits a trade surplus, and indeed the largest surplus in the Euro Area. As discussed above, Ireland's position as a major export hub for multi-nationals lends itself towards a large negative flow of income, which as a percentage of GDP is the highest among Euro Area "net borrowers", as per Table 5.

Table 5: GDP Growth, Net Exports and Factor Income as Percentage of GDP, 1999-2006

		1999	2000	2001	2002	2003	2004	2005	2006
Real GDP Growth									
	Ireland	11.3	13.2	5.3	5.9	5.1	3.2	5.9	5.7
	Greece	3.4	4.5	5.1	3.8	4.8	4.7	3.7	4.3
	Spain	4.7	5	3.6	2.7	3.1	3.3	3.6	3.9
	Portugal	3.9	3.9	2	0.8	-0.7	1.5	0.5	1.3
	Euro Area	3	3.8	1.9	0.9	0.8	2	1.5	2.8
Net Exports									
	Ireland	13.3	13.4	14.8	16.3	15.5	14.4	12.1	10.8
	Greece	-8.5	-10.5	-9.4	-8.3	-7.2	-5.9	-6.5	-3.9
	Spain	-1.9	-3	-2.3	-1.9	-2.1	-3.8	-5.1	-5.9
	Portugal	-10.3	-11.1	-9.8	-7.9	-6.5	-7.6	-8.7	-7.6
	Euro Area	0.9	0.2	1	2	1.7	1.7	1	0.8
Net Factor Income									
	Ireland	-14	-14.3	-15.7	-18.1	-15.8	-15.2	-15.1	-14
	Greece	-0.5	-0.8	-1.5	-1.4	-2.4	-2.4	-3	-0.7
	Spain	-1.5	-1.2	-1.8	-1.7	-1.3	-1.4	-1.9	-2.1
	Portugal	-1.5	-2.2	-3	-2.3	-1.7	-2	-2.6	-3.5
	Euro Area	-0.6	-0.7	-0.6	-0.5	-0.5	-0.2	-0.1	0

Source: Eurostat.

[10] See Ahearne *et al.* (2007) for a more detailed appraisal of individual Euro Area member states balance of payments positions.

All the countries listed in Table 5 have experienced an appreciation of their real exchange rate since EMU along with Ireland. While the respective fiscal positions are quite different, the most interesting contrast is found in the role of investment and its contribution to growth. Ireland, Greece and Spain have consistently enjoyed rates of economic growth higher than the Euro Area since 1999. The scale of total investment as a proportion of GDP is, as would be expected, higher in these countries than for the Euro Area as a whole. However, Table 6 presents a worrying trend in the composition of investment use in Ireland in comparison to the Euro Area average. The share of housing in overall investment in Ireland has soared since 2002 to almost two and a half times the Euro Area average in 2006. This is possibly crowding out investment in more productive areas such as transport, commercial machinery and equipment and commercial buildings despite the overall increase in total investment. McElligot and Stuart (2007) have shown that lending by Irish banks has become more concentrated in construction and real estate sectors alongside the sharp increase in overall lending in recent years. While their analysis excludes the household sector, and property related lending includes commercial property, it is noteworthy that the increasing concentration in property related lending they find was at the expense of manufacturing. Spain, a fellow Euro Area "borrower", has similar levels of overall investment, yet its housing investment has been significantly lower than that of Ireland since 1999. For the years that comparable data are available (2000-2004), Portugal's level of productive investment has been above Ireland's except in the area of transport. Meanwhile, Portuguese housing investment was significantly lower than the Irish level. A similar pattern is evident when comparing Ireland and Greece, although the high levels of non-housing investment in the latter could be attributable to preparations for the Olympic games in 2004.

Demographically Ireland, Greece, Spain and Portugal have similar proportions of their population in the typical first time homeowner age bracket (25-34 years). In 2005, the last year comparable data is currently available, Ireland had an estimated 16.7 per cent of its population in this age bracket,[11] behind Spain (17.2 per cent), and ahead of Portugal (15.6 per cent) and Greece (15.4 per cent).[12] At a first glance there should be no apparent reason why Ireland has such a demand for housing over and above the other "net borrower" Euro Area countries given the similar demographic profiles. Other fundamental factors, such as the relatively larger increases in real disposable incomes in Ireland, lower initial dwelling stock and more favourable tax and credit regimes can explain much of the higher demand for housing (Rae and van de Noord, 2006). However, the demographic component is also more complicated

[11] According to *Census 2006* the proportion of 25-34 year olds in the total population was 17 per cent.
[12] Eurostat.

than the simple comparison of population age profiles would have us believe. Ireland has had a population shock since 2004 with the accession of the New Member States (NMS) to the EU. Alongside the UK and Sweden, Ireland opened up its labour market to NMS citizens, unlike Spain, Portugal and Greece. When the Irish and the UK levels of investment are compared (Table 6), housing has

Table 6: Investment Total and by Type, as Percentage of GDP, 1999-2006

		1999	2000	2001	2002	2003	2004	2005	2006
Total									
	Euro Area	20.9	21.4	20.9	20.2	20.1	20.2	20.5	21.2
	Ireland	24.0	23.4	22.6	21.7	22.3	23.6	26.1	26.3
	Greece	22.7	23.1	23.5	23.5	25.3	25.2	23.7	25.7
	Spain	24.6	25.8	26.0	26.3	27.2	28.1	29.3	30.3
	Portugal	26.8	27.1	26.5	25.0	22.9	22.6	21.9	21.2
	UK	17.1	16.8	16.5	16.4	16.0	16.4	16.7	17.2
Housing									
	Euro Area	5.5	5.4	5.2	5.1	5.2	5.3	5.5	5.7
	Ireland	7.4	7.8	8.2	8.3	9.9	11.4	13.0	13.3
	Greece	5.3	4.8	4.8	5.0	5.0	4.8	4.5	:
	Spain	5.5	6.1	6.5	7.1	7.8	8.4	8.9	9.3
	Portugal	13.6	5.6	5.3	5.0	4.1	4.0	11.5	10.7
	UK	2.8	2.9	3.0	3.3	3.4	3.7	3.9	4.3
Other Construction*									
	Euro Area	5.2	5.3	5.4	5.3	5.3	5.3	5.3	5.5
	Ireland	6.2	6.3	6.4	6.1	5.4	5.2	5.0	5.1
	Greece	7.7	8.1	8.5	8.2	8.8	9.0	8.2	:
	Spain	7.1	7.2	7.5	7.7	7.7	7.9	8.3	8.4
	Portugal	:	8.3	8.7	8.4	8.1	8.0	:	:
	UK	4.7	4.5	4.5	4.5	4.7	4.6	4.9	5.2
Machinery (Industry)									
	Euro Area	5.8	6.1	5.8	5.3	5.1	5.0	5.0	5.1
	Ireland	4.3	4.6	3.7	3.0	3.0	2.5	2.8	2.6
	Greece	5.7	6.2	5.9	5.5	5.9	4.9	4.8	:
	Spain	5.6	5.7	5.3	4.9	4.7	4.6	4.7	5.0
	Portugal	6.4	6.5	6.3	5.6	5.2	5.3	4.9	4.7
	UK	6.6	6.6	6.0	5.3	4.8	4.7	4.6	4.5
Transport Equipment									
	Euro Area	2.0	2.1	2.0	1.9	1.9	2.0	2.0	2.1
	Ireland	4.1	2.9	2.5	2.6	1.9	2.2	2.7	2.2
	Greece	2.7	2.7	3.1	3.5	4.0	5.0	4.5	:
	Spain	2.3	2.4	2.3	2.1	2.2	2.2	2.3	2.4
	Portugal	3.1	3.0	2.6	2.1	1.9	1.8	1.8	2.0
	UK	1.6	1.4	1.5	1.5	1.4	1.3	1.2	1.2

Source: Eurostat and CSO.

* Includes roads.

increased in both since 2004, but the magnitude of the Irish increase is significantly greater. This is not surprising given that proportionately the UK has not had as large a population shock and it has a long history of in-migration. However, the investment in machinery in Ireland has fallen significantly in the face of the increased dependence on residential construction, a trend that is not

as stark in the UK. Barrell *et al.* (2007) show how the migration into Ireland from the NMS leads to productivity growth below what it would have been without the population shock, as public infrastructure and in particular the housing stock[13] do not rise sufficiently to curb a fall in the ratio of capital to labour. The resulting increase in the rate of return on capital causes capital flows into Ireland to increase and a balance of payments deficit on the current account. Despite evidence of the dampening effect on wage growth immigration has had in Ireland (Barrett *et al.*, 2006) it has still not been sufficient to curb wage growth in excess of productivity growth. This may be due to the concentration of migrant labour in sectors with lower productivity growth i.e. construction and services.

CONSTRUCTION AND COMPETITIVENESS

Has Ireland's reliance on construction to drive overall economic growth impacted negatively on competitiveness? One way of judging this is to refer to a theoretical definition of the measure of competitiveness used in this paper, the real exchange rate. Movements in the real exchange rate between two markets (in this case Ireland and the Euro Area) can be decomposed into changes in the deviation from purchasing power parity (PPP)[14] and the difference between the relative price of non-traded and traded goods in the home (Ireland) market and the foreign (Euro Area) market. For our purposes traded goods are taken as the output from the manufacturing industry and non-traded goods as the output of the construction industry, which in Ireland has been heavily biased in house building.[15] Nominal exchange rate movements do not feature as the Euro Area is used as the foreign market. A back of the envelope calculation of these movements of the Irish real exchange rate vis-à-vis the rest of the Euro Area yields the results in Table 7.

The "Total" column in Table 7 shows that Ireland's real exchange rate has consistently appreciated with respect to the rest of the Euro Area since 1999, indicating a loss of competitiveness. In terms of the decomposition of these changes, the contribution of changes in the relative price of non-traded goods was larger than deviations from PPP in the traded sector in every year. As detailed in the Appendix, the relative price of non-traded goods with respect to traded goods is a proxy for the domestic price level. Therefore, as the price of the construction sector output increased faster than that

[13] See also Duffy *et al.* (2005) for more detailed discussion of the relationship between immigration and the Irish housing market.

[14] The PPP hypothesis holds if the price of internationally traded goods are equal in both the home and foreign markets when expressed in terms of the same currency.

[15] See Appendix 1 for details. A more comprehensive decomposition would also incorporate the services sector, which is becoming increasingly tradable. This is an avenue for further research.

of manufacturing industry in Ireland as compared to the Euro Area, the overall Irish price level increased more rapidly also. This led to the appreciating real exchange rate and a fall in competitiveness. The effect is compounded by the increasing share of construction in total output over the period, driven in part by housing investment financed by foreign capital.

Table 7: Decomposition of Movements (Annual Percentage Changes) in Irish Real Exchange Rate Vis-à-Vis the Euro Area, 1999-2006

	Total	PPP Deviations	Relative Price of Non-traded	of which	
				Relative Price of Non-traded (Ireland)	Relative Price of Non-traded (Euro Area)
1999	8.9	3.6	5.3	8.5	3.3
2000	18.2	2.4	15.8	19.1	3.4
2001	7.6	1.9	5.7	8.2	2.5
2002	3.1	-0.4	3.5	5.9	2.5
2003	1.7	-6.4	8.0	12.4	4.3
2004	3.1	-7.2	10.4	14.3	3.9
2005	3.0	-2.7	5.7	9.4	3.7
2006	1.4	-2.0	3.5	7.9	4.4

Source: Own calculations based on *National Income and Expenditure Accounts, 2006* (CSO), and Eurostat. See Appendix 1 for details.

Extending this type of analysis, as seen in Canzoneri *et al.* (2002), relates the relative price of non-traded goods to relative productivity in the traded and non-traded sectors via the supply side Balassa-Samuelson hypothesis. Since the formation of the single currency the average annual rate of productivity growth for the Irish economy has been 2.6 per cent. When broken down on a sectoral basis average annual productivity growth for the same period in industry was 7.4 per cent, whereas in construction productivity actually fell by 3 per cent on average each year since 1999. The higher productivity growth in the traded industry sector is consistent with the relative price of the non-traded construction sector increasing, thus contributing to a higher inflation in Ireland, á-la Balassa-Samuelson.

An equally valid interpretation focuses on the demand side, as per De Gregorio *et al.* (1994). They highlight the role of higher aggregate demand in increasing the share of the non-traded sector in employment, reducing productivity and raising the relative price of non-traded goods since these goods cannot be imported. The strong growth in aggregate demand in Ireland, thanks to low interest rates and robust employment and wage growth, has undoubtedly contributed to a rise in the relative price of non-traded goods, in particular housing. Honohan (2006) noted the sharp rise in mortgage related credit in tandem with a sharp rise in the net

external liabilities of the Irish banking sector, which imported foreign capital equal to about 40 per cent of GDP in 2005 to lend to Irish residents. Monetary union has not only provided a low interest rate environment for Irish households and banks to borrow from abroad but has also contributed to the integration of financial markets to make the process much easier.

5. Discussion and Conclusion

In a broad sense, the scale of the current account deficit witnessed towards the end of 2006 is appropriate given its determinants. The primary determinant of the current account balance, as seen from Section 3, is Ireland's relatively high rate of economic growth. The scale of investment financed by foreign capital is what can be expected when financial markets become more integrated, as has been fostered by EMU. This investment is best put to use in those sectors that have the scope to increase potential output and have prospects for reasonable productivity growth. Private productive infrastructure and the necessary supporting public infrastructure would be prioritised in a best-case scenario. The trends highlighted in Sections 2 and 4 show that the recent development of the Irish current account deficit does not fit this scenario.

Ireland is unique in the Euro Area concerning the relationship between the scale of housing investment and the development of the current account deficit, with damaging effects on Ireland's competitiveness. Despite the evidence in favour of the benign interpretation for the current account position at the end of 2006 in Section 3, it is evident that the nature of economic growth in recent years, dominated by growth in non-traded sectors, cannot be maintained. Indicators such as the divergence between movements in the terms of trade and the real exchange rate (Figure 1), and the relatively much higher wage and asset price growth in Ireland, are somewhat consistent with a "dis-equilibrium" real appreciation, as discussed by Boz (2007), particularly since 2003. The crowding out effect that the dominance of the non-traded construction sector appears to have had on the traded sector needs to be undone. As 2007 progresses, a slowdown in housing investment is apparent. Can this be accompanied by an increase in Ireland's traded sector performance?

Without government intervention, be it through fiscal policy or more structural reform such as eliminating barriers to competition in sectors with low productivity growth and promoting labour mobility, the lack of competitiveness for exports is usually addressed through competitive disinflation. Faced with increasing costs and low productivity gains relative to their international competitors, firms in Ireland would streamline by laying off workers in an effort to reduce costs. Nationally this would result in increasing unemployment until such a time as nominal and real wages have reduced to a level where firms exporting from Ireland regain competitiveness. The real exchange rate Irish firms face in this instance would thus depreciate making exports more attractive

internationally and imports more expensive for the domestic market. This could be a long and difficult adjustment.

Prior to the days of independent central banks policymakers often devalued their domestic currency to avoid such a painful adjustment. This nominal policy instrument is not available to the Irish government given membership of EMU, and as such any domestic policy to minimise the detrimental effects of the adjustment must come from the real side of the economy and an increase in unemployment. In any case, if wage growth is not curbed simultaneously a nominal devaluation of the currency can only delay the necessary real adjustment. The imported inflation through the higher price of goods and services bought in from abroad would feed through to wages and eventually end up impacting negatively on competitiveness.

What are the options available to the government to alleviate the impact of the adjustment process on unemployment? There are obvious incentives to promote productivity growth as a medium to long-term objective. Short-term actions can be taken to tackle the sources of the increasing costs faced by Irish exporters which have contributed to the contraction of net exports. These immediate policy options should also aid in the medium-term objective of productivity growth.

The first option is to reduce nominal wages (or at least nominal wage growth) relative to that of our trading partners. As part of the National Wage Agreements, government only directly effects the wages in the public sector, while the effect on wages in the private sector are considered to be minimal. Despite this, the containment of costs in non-market public services as a result of wage restraint would be more consistent with the reality of public sector productivity growth being much lower than that in the market economy. As with productivity in the construction sector, public sector productivity has actually fallen in recent years at an average annual rate of 2.6 per cent over the period 1999-2006.

An accompanying measure is to increase competitiveness and reduce prices in the non-traded sector relative to the traded sector (Blanchard, 2006). There are two elements to this strategy.

First, in promoting competition in previously closed sectors, particularly services, significant gains in efficiency and productivity can be achieved. This also promotes more flexible wage and price-setting behaviour in labour and product markets, which in turn can offset the need for significant increases in unemployment. Competition and regulation reform in utilities, transport services,[16] and the professions could benefit both consumers and Irish

[16] See, for example, Malaguzzi-Valeri (2006) and Lyons *et al.* (2007) in terms of electricity and Massey (2007) in terms of bus transport.

exporters. In a comparative study of twenty-one OECD countries Ireland is ranked twentieth, ahead only of Greece, in relation to regulatory barriers in energy, transport and communications (Conway and Nicoletti, 2006).

Second, and more immediately, government spending on non-tradables can be curtailed thereby reducing the overall demand for these goods and services. By reducing the relative price of non-tradables, the costs that exporting firms and their workers face in consuming these non-tradables decreases, which in turn increases the relative price of tradables in the domestic economy, increasing profitability in the traded sector. This adjustment would also send important price signals to investors concerning the relative returns on traded and non-traded sectors. In the Irish case, for example, the returns to investment in the domestic construction sector, which has relatively low productivity, may be diverted to the more productive traded sector as the relative price of the latter increases thus supporting the long-term objective of productivity growth. Any incentive to stimulate investment in the residential construction sector would not be advisable. Workers would be more likely to agree to nominal wage restraint in an environment where the prices of non-tradables would be reduced. The nominal wage restraint would then be passed on in the form of reduced relative prices for Irish exports on international markets and the necessary real depreciation would occur. Blanchard (2006) argues that there is also scope for a government to run a somewhat expansionary fiscal policy to smooth the adjustment in this case, in so far as the expenditure is biased toward the traded sectors as opposed to the non-traded. The provision of economically viable public infrastructure should also be continued.[17]

Government action in this latter regard may be desirable, but only if necessary. There are signs that an adjustment is taking place in 2007 as the construction sector slows. Now that the scale of economic activity devoted to housing in Ireland is winding down, investment in productive sectors in the economy should pick up. This has the potential to increase the role of the traded sector and contribute more positively to productivity growth and potential output thus making the appropriate balance of payments deficit (in terms of scale) more acceptable (in terms of its determinants lending themselves towards more sustainable growth). The market, therefore, may be leading the adjustment process and government intervention may not be necessary. The coming months will reveal how well the transition process out of construction is faring and whether policy intervention is warranted. Inappropriate intervention, particularly if it stimulated the residential construction sector would be worse than doing nothing at this juncture.

[17] See Morgenroth and Fitz Gerald (2006) for a discussion of the role of public infrastructure in promoting growth and competitiveness.

APPENDIX 1: THEORETICAL DECOMPOSITION OF THE REAL EXCHANGE RATE

Assume that national price levels are given by a weighted average of the price of non-traded and traded goods

$$p_{i,t} \equiv \alpha_i p_{i,t}^{NT} + (1-\alpha_i) p_{i,t}^{T} \quad (1)$$

where the superscripts NT and T refer to non-traded and traded goods respectively and α_i is the share of non-traded goods in Gross Value Added (GVA) in country *i*. In the following decomposition of the real exchange rate, industrial goods are considered tradable (*T*) and construction output considered non-tradable (*NT*). The real exchange (z) rate of Ireland *i* with respect to the Euro Area *j* is thus

$$z_{i,t} = d_{i,t} + p_{i,t} - p_{j,t} \quad (2)$$

where all variables are expressed in natural logarithms and $d_{i,t}$ is the deviation from PPP, given as

$$d_{i,t} = p_{i,t}^{T} - p_{j,t}^{T} \quad (3)$$

Using (1) and (3), (2) can be written as

$$z_{i,t} = d_{i,t} + \alpha_i q_{i,t} - \alpha_j q_{j,t} \quad (4)$$

where $q = \ln(p^{NT}/p^{T})$, the relative price of non-traded goods in the respective markets. Using the difference operator Δ, real exchange rate movements can be decomposed into deviations from PPP in

traded goods and movements in the relative price of non-traded goods in both markets.

$$\Delta z_{i,t} = \Delta d_{i,t} + \alpha_i \Delta q_{i,t} - \alpha_j \Delta q_{j,t} \quad (5)$$

Data for the respective series were taken from the National Income & Expenditure Accounts, 2006 (CSO), and Eurostat. All series have 2005 as the base year.

p^{NT} = price deflator for construction GVA
p^{T} = price deflator for industry GVA

AHEARNE, A., J. VON HAGEN and B. SCHMITZ, 2007. "Internal and External Current Account Balances in the Euro Area", *Policy to Reduce Global Imbalances conference paper*, Washington D.C., February.

BARRELL, R., J. FITZ GERALD, R. RILEY, 2007. "EU Enlargement and Migration: Assessing the Macroeconomic Impact", ESRI Working Paper No. 203, Dublin, July.

BARRETT, A., A. BERGIN and D. DUFFY, 2006. "The Labour Market Characteristics and Labour Market Impacts of Immigrants in Ireland", *The Economic and Social Review*, Vol. 37, No. 1.

BEMS, R., L. DEDOLA and F. SMETS, 2007. "US Imbalances: The Role of Technology and Policy", *Journal of International Money and Finance*, Vol. 26, No. 4.

BLANCHARD, O., 2001. "Country Adjustments within Euroland. Lessons After Two Years" in Defining a Macroeconomic Framework for the Euro Area: Monitoring the ECB 3. CEPR.

BLANCHARD, O. and F. GIAVAZZI, 2002. "Current Account Deficits in the Euro Area: the End of the Feldstein-Horioka Puzzle?", *Brookings Papers on Economic Activity*, Washington D.C.

BLANCHARD, O., 2006. "Adjustment Within the Euro: The Difficult Case of Portugal", *Portuguese Economic Journal*, Vol. 6, No.1.

BOZ, E., 2007. "Can Miracles Lead to Crises? The Role of Optimism in Emerging Markets Crises", IMF Working Paper No 07/223.

CANZONERI, M., R. CUMBY, B. DIBA and G. EUDEY, 2002. "Productivity Trends in Europe: Implications for Real Exchange Rates, Real Interest Rates, and Inflation", *Review of International Economics*, Vol.10, No.3.

CHINN, M.D. and E.S. PRASSAD, 2003. "Medium-Term Determinants of Current Accounts in Industrial and Developing Countries: An Empirical Exploration", *Journal of International Economics*, Vol. 59, No. 1.

CONWAY, P. and G. NICOLETTI, 2006. "Product Market Regulation in Non-manufacturing Sectors in OECD Countries: Measurement and Highlights", OECD Economics Department Working Paper No. 530.

DE GREGORIO, J., A. GIOVANNINI and H.C. WOLF, 1994. "International Evidence in Tradables and Non-tradables Inflation", *European Economic Review*, Vol. 38, No. 6.

DORNBUSCH, R., 1976. "Expectations and Exchange Rate Dynamics", *Journal of Political Economy*, Vol. 84, No. 6.

DUFFY, D., J. FITZ GERALD and I. KEARNEY, 2005. "Rising House Prices in an Open Labour Market", *The Economic and Social Review*, Vol. 36, No. 3.

DURAND M., J. SIMON and C. WEBB, 1992. "OECD's Indicators of International Trade and Competitiveness", OECD Economics Department Working Papers, No. 120.

FRIEDMAN, M., 1953. "The Case for Flexible Exchange Rates" in Essays in Positive Economics, Chicago: University of Chicago Press, pp. 157-203.

HONOHAN, P., 2006. "To What Extent Has Finance Been a Driver of Ireland's Economic Success" in A. Barrett *et al.*, *Quarterly Economic Commentary*, Winter, Dublin: The Economic and Social Research Institute.

JOHANSEN, S., and K. JUSELIUS, 1990. "Maximum Likelihood Estimation and Inference on Cointegration – with an Application to the Demand for Money", *Oxford Bulletin of Economics and Statistics*, Vol. 52, No. 2.

KRUGMAN, P. and M. OBSTFELD, 2001. *International Economics: Theory and Policy*, 5th ed., New York: Addison-Wesley.

LANGEDIJK, S. and R. WERNER, 2007. "Adjustment in EMU: A Model-based Analysis of Country Experiences", *European Economy*, DG ECFIN Economic Papers No. 274, Brussels, March.

LEE, J. and M.D. CHINN, 2006. "Current Account and Real Exchange Rate Dynamics in the G7 Countries", *Journal of International Money and Finance*, Vol. 25, No. 2.

LYONS, S., J. FITZ GERALD, N. McCARTHY, L. MALAGUZZI-VALERI and R. TOL, 2007. "Preserving Electricity Market Efficiency While Closing Ireland's Capacity Gap" in A. Barrett *et al.*, *Quarterly Economic Commentary*, Autumn, Dublin: The Economic and Social Research Institute.

MACKINNON, J., A. HAUG and L. MICHELIS, 1999. "Numerical Distribution Functions of Likelihood Ratio Tests for Cointegration", *Journal of Applied Econometrics*, Vol. 14, No. 5.

MALAGUZZI-VALERI, L., 2006. "Comparison of Electricity Deregulation Around the World and Implications for Ireland" in A. Barrett *et al.*, *Quarterly Economic Commentary*, Autumn, Dublin: The Economic and Social Research Institute.

MASSEY, P., 2007. "Delayed Indefinitely: Regulatory Reform of the Irish Bus Industry" in A. Barrett *et al.*, *Quarterly Economic Commentary*, Spring, Dublin: The Economic and Social Research Institute.

McELLIGOT, R. and R. STUART, 2007. "Measuring the Sectoral Distribution of Lending to Irish Non-Financial Corporates", Central Bank and Financial Services Authority of Ireland Financial Stability Report.

MORGENROTH, E. and J. FITZ GERALD (eds.), 2006. *Ex-ante Evaluation of the Investment Priorities for the National Development Plan 2007-2013*, Dublin: The Economic and Social Research Institute.

NASON, J.M, and J.H. ROGERS, 2002. "Investment and the Current Account in the Short Run and the Long Run", *Journal of Money, Credit and Banking*, Vol. 34, No. 4.

OBSTFELD, M., and K. ROGOFF, 1995. *Foundations of International Macroeconomics*, Cambridge, Massachusetts: MIT Press.

RAE, D. and P. VAN DEN NOORD, 2006. "Ireland's Housing Boom: what has driven it and have prices overshot? Paris: OECD Economics Department Working Paper No. 492.

TRAISTARU-SIEDSCHLAG, I., 2007. "Macroeconomic Adjustment in Ireland under the EMU" in A. Barrett *et al.*, *Quarterly Economic Commentary*, Spring, Dublin: The Economic and Social Research Institute.

IRISH CLIMATE POLICY FOR 2012: AN ASSESSMENT

Richard S.J. Tol[*]

Abstract

The Irish government plans to reduce greenhouse gas emissions by 3 per cent per year. This can only be achieved by drastic measures on the demand side, such as a rapid reduction in the number of cattle or people. The Irish government also plans to introduce a carbon tax. A tax that applies to emissions that are not covered by the EU emissions trading system, and that roughly equals the expected permit price, would achieve emission reduction at almost the lowest possible cost. A carbon tax that is levied on emissions covered by the EU ETS, would not reduce emissions, but would cost Ireland and the rest of the EU money.

1. Introduction

As elsewhere, climate policy in Ireland is intensifying – but as with most things in Ireland, the acceleration is particularly strong. Previously, Irish policy lagged behind that of other European countries, but Ireland now seems to be ahead. There may be three reasons for this. First, the media frenzy in the UK has affected the Irish public. Second, Ireland is no longer a poor country in the EU, and expectations for environmental policy are higher. Third, the Green Party entered government.

The historical development of Irish carbon dioxide emissions is surprising at first sight. Diakoulaki and Mandaraki (2006) show that industry emissions grew by 25 per cent between 1990 and 2003, while output grew by 150 per cent for the same period. This implies that industry decarbonised at a rate of more that 5 per cent per year – an astounding rate, perhaps the highest in the world, and achieved without much of a climate policy. In 1990, Irish manufacturing

[*] The author would like to thank an anonymous referee, Morgan Bazilian, John Fitz Gerald, Honora Huntington, and Sue Scott for their helpful comments. Financial support by The Economic and Social Research Institute's Energy Policy Research Centre is gratefully acknowledged. Email: richard.tol@esri.ie

emitted 825 tonnes of CO_2 for every million Euro value added, compared to an EU average of 790 g/€. In 2003, the EU average had fallen to 636 g/€, but the number for Ireland was only 261 g/€ – second to Sweden only. The main reason for this dramatic change is that Irish growth was concentrated in energy-extensive sectors (services, pharmaceuticals), while some energy-intensive production (base chemicals, metal) actually shrank. Power generation was modernised too; and new capacity has been gas-fired and wind-powered.

This places Ireland in a good position with regard to its emissions. The same is not true for further emission reduction. Much of the low-hanging fruit has been picked. There are no old peat or fertiliser plants that can be closed. A large share of Irish infrastructure, whether in transport, in power generation or in buildings, is of recent date (if not still under construction), and will not be replaced for decades. In 2005, 32 per cent of CO_2 emissions were from power generation, 28 per cent from transport, and 15 per cent from residential energy use. This reduces the ability of climate policy to influence energy use in the medium term.

The rapid and perhaps unanticipated shift in position has left Irish climate policy in a state of flux. There is a clear mismatch between ambition and implementation. McCarthy and Scott (2007) focus on the policy instruments that are envisaged to meet the emission targets. In this paper, the focus is on two key elements of the climate policy of the current government: the 3 per cent per year target (Section 2), and the carbon tax (Section 3). Section 4 concludes.

2. The 2012 Emission Reduction Target

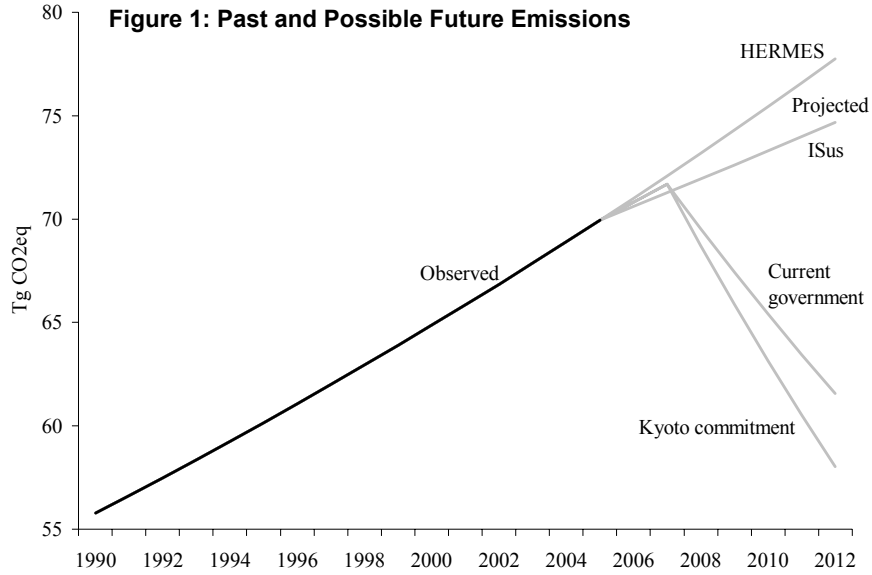
As part of the agreement for government, Ireland is to reduce its greenhouse gas emissions by 3 per cent per year. It is not clear where this target comes from: 3 per cent per year corresponds to an 80 per cent emission reduction in 50 years time. This is in line with stabilisation of the atmospheric concentration of greenhouse gases at 400 ppm CO_{2eq}. Such a concentration would imply an 85 per cent chance of keeping the rise in the global mean temperature below 2°C (den Elzen and Meinshausen, 2006). A maximum global warming of 2°C is the official target of the European Union.

However, the 2°C target does not meet the cost-benefit test (Nordhaus and Yang, 1996) and its justification on non-economic grounds is questionable too (Tol, 2007). Furthermore, there are cheaper strategies to meet a 400 ppm CO_{2eq} target. In general, one would not recommend a constant rate of emission reduction. Rather, one would let the price of carbon rise with the interest rate (Hotelling, 1931). With constant prices and technologies, this would imply that emission abatement accelerates over time. Climate policy would accelerate stronger if the price of fossil fuels rises over time, and if technological progress reduces the costs of renewable

energies (Wigley *et al.*, 1996). This is the cheapest way of meeting any target.

Figure 1 shows the implication of the 3 per cent target: a rather sharp trend break. Figure 1 also shows the Kyoto commitment – under the EU burden sharing agreement, Irish emissions are to be 113 per cent of their 1990 value, averaged over the period 2008-2012. A 3 per cent per year emission reduction would bring 2008-2012 emissions to 118 per cent of 1990. The new government is as committed to the Kyoto Protocol as the previous government.

Figure 1: Past and Possible Future Emissions



Therefore, the logical interpretation is that whereas the previous government had planned to cover the gap between actual and target emissions by importing emission permits, the current government intends to cut emissions in Ireland by 3 per cent per year and buy permits only for the gap between the 118 per cent and the 113 per cent. Carbon permits can be imported through the EU Emissions Trading System, and through Joint Implementation and the Clean Development Mechanism under the Kyoto Protocol.

Figure 1 also shows projected emissions in the absence of policy, with average emissions growth rates of 1.5 per cent per year (*HERMES*; Fitz Gerald *et al.*, 2002) and 0.9 per year (ISus; O'Doherty and Tol, 2007). An absolute 3 per cent emission reduction per year implies a 3.9-4.5 per cent annual emission reduction from baseline, or 21.1-24.6 per cent in the five year period of government. This is a considerable task.

Estimates of the costs of emission reduction suggest the following relationship:

$$\frac{C}{Y} = \alpha \left(\frac{R}{E} \right)^2 \quad (1)$$

where C is emission reduction cost, normalised by gross domestic product Y; R is emission reduction, normalised by business as usual emissions E; and a is a parameter, interpretable as unit cost (€/tCO_2). Estimates of a vary between 1 and 2, for a cost-effective implementation (see Barker *et al.*, 2007; Weyant *et al.*, 2006). For the short term, $a = 2$ may be more appropriate. This means that a 1 per cent emission reduction from baseline would cost 0.02 per cent of GDP; and that a 10 per cent emission reduction would cost 2 per cent of GDP. The carbon tax would be in the order of €400/tCO_2 – about 8 times higher than the expected price of permits in the EU ETS, and about 40 times higher than the estimated social cost of carbon (Tol, 2005). €400/tCO_2 is about 25 ¢/kWh and ¢90 per litre gasoline.

The planned 3.9-4.5 per cent emission reduction would thus cost about 0.3-0.4 per cent of GDP per year. (If climate policy were not cost-effective, the costs could be much higher.) Over a period of 5 years, this would amount to 1.5-2.0 per cent of GDP. To phrase this differently, the Irish economy is currently projected to grow by 2.9 per cent. This is without climate policy. With climate policy, projected growth is 2.5-2.6 per cent – a reduction in the growth rate of one-fifth to one-tenth. Put differently still, the economy would grow in 10 years what it would otherwise grow in 8 or 9 years.

In fact, the problem is more severe than these numbers suggest. The above relationship is for emission reduction that is announced well in advance. It assumes that the bulk of emission reduction would be achieved at the supply side of the energy sector – particularly fuel switching and energy efficiency improvement – without reducing the services provided by energy use. In a five-year period, however, emissions are by and large reduced at the demand side, that is, by reducing the volume of energy services.

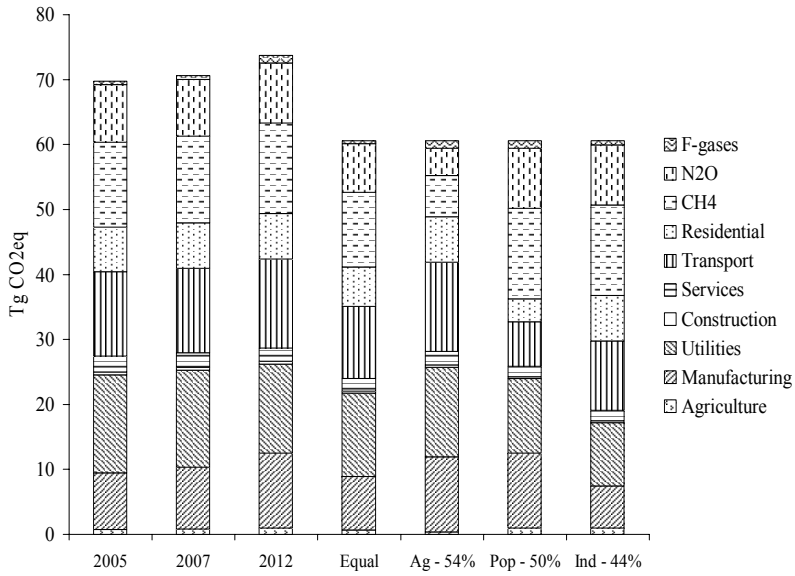
According to Lyons *et al.* (2007), some 10 per cent of the power generation capacity needed for 2012 does not yet exist – but there is planning permission for two new gas-fired plants. This means that at most 20 per cent of 2012 electricity will be carbon-neutral – only slightly higher than what it is today. The gas-fired power plants will replace oil-fired ones, but as the oil plants are used at peak times only, the effect on emissions is minimal. Closing existing plant before the end of their economic lifetime would be very expensive, and would lead to electricity shortages as the lead time to build new plant is too long. The current government, therefore, has almost no control over the stock of power plants in 2012, and the amount of carbon dioxide emitted from electricity generation.

Similar reasoning holds for other major emission sources. The 2012 housing stock will not be very different from today's, as

buildings currently under construction and those with planning approval are subject to the current building standards. Public transport will expand at best marginally between now and 2012. The Irish car fleet is relatively young, and with slowing economic growth, fewer people will replace their cars. On a time scale of 5 years, emission reduction policy can affect the demand side only. The supply side is largely fixed.

Figure 2 has the 2005 distribution of emissions over the main sectors, and the projected emissions for 2007 and 2012. This gives some idea of the size of the challenge to reduce emissions by 3 per cent per year. To make things easy, the low projection is used, so that an emission reduction of one-fifth rather than one-quarter is required.

Figure 2: Greenhouse Gas Emissions by Source as Observed for 2005 and as Projected for 2007 and 2012 – and again in 2012 for Four Extreme Policy Proposals



Four **extreme** policy cases are considered in Figure 2. In the first case, all sectors reduce emissions by the same proportion. In the second case, emissions associated with agriculture are reduced by 54 per cent. Roughly, this would imply that the cattle population would be cut in half. In the third case, residential emissions are cut by 50 per cent, services and transport by half that, and electricity use by one-third. Roughly, this would imply that one-half of the population emigrates – or that the average resident uses 50 per cent less energy. Only some 10 per cent of electricity use is for consumer electronics, so one would have to give up the television, the dishwasher, the washing machine and the refrigerator; and refrain from travelling by car for four days a week. In the fourth case, industrial emissions are cut by 44 per cent, services and transport by

half that, and electricity by two-thirds. Roughly, this would imply that more than two-fifths of production would move offshore.

If emissions in the absence of additional policy were to grow by 1.5 per cent per year rather than 0.9 per cent, as assumed here, emission reduction would become harder still. Reducing emissions by 3 per cent reduction per year is a radical proposal.

Besides, the extreme emission reduction scenarios above would not affect climate change, as emissions would increase elsewhere. For Ireland to reduce emissions from agriculture, for example, it would not suffice to ban every second cow from the island. In fact, the consumption of dairy and meat would have to be cut in half, or the reduction in Irish production would be compensated by an increase elsewhere. Similarly, reducing industrial output in Ireland is irrelevant if production is moved abroad. In a statistical sense, one could reduce Ireland's greenhouse gas emissions in the short term by targeting a small group of producers (e.g., farmers). However, actual emissions reduction would affect all consumers.

The emission reduction target of the Irish government can only be met by draconian measures. It would therefore better be abandoned.

3. A Carbon Tax

The government agreement also indicates that there will be a carbon tax, but it is as yet unknown when the tax will be introduced, how high the tax will be, or who will pay the tax.

In principle, a carbon tax is the preferred instrument for reducing greenhouse gas emissions, outperforming even auctioned permits (Pizer, 1999). At present, however, the EU emission trading system (ETS) is the prime instrument. The EU ETS covers only carbon dioxide emissions, and only a part of all CO_2 emissions. This may be politically expedient, but it does increase the cost of compliance. If the Irish carbon tax covered the other emissions, and the carbon tax equalled the permit price, then emission reduction costs would be at their theoretical minimum.

The price of permits has varied considerably (see Figure 3) while taxes are fixed and announced in advance. A carbon tax cannot equal the permit price. However, there is also a futures market for the EU ETS – see Figure 4 – and the government could use this to set the carbon tax. For example, the government could announce the carbon tax in September of the previous year, using the future price of September 1 as the basis.[1]

[1] There is probably sufficient liquidity in the EU ETS to prevent Irish companies from influencing the futures price at the EU market.

Figure 3: The Spot Price of Carbon Permits in €/tCO_2 (top panel) and the Traded Volume in Metric Tonnes of CO_2 (bottom panel)

Source: www.eex.de (2 Oct, 2007).

Figure 4. The Futures Price of 2008 Carbon Permits in €/tCO_2 (top panel) and the Traded Volume in Metric Tonnes of CO_2 (bottom panel)

Source: www.eex.de (2 Oct, 2007).

The actual permit price will deviate from the future permit price. This would lead to a different carbon price in different parts of the economy, and emission reduction would be more expensive than needed. However, the welfare loss is probably limited. Welfare losses are large if direct competitors face different carbon prices, because in that case differentiated regulation creates distortions on the output markets. If it is different sectors that are regulated

differently, markets are distorted only to the extent that these sectors compete on the input markets for labour and capital. See Boehringer *et al.* (2006).

There is an interesting twist to this. There are arguments to allow companies, that are not covered by the EU ETS, to voluntarily opt in. A company may do so to enhance its image, or because it can reduce emissions at a lower cost than the expected permit price. If taxes and permits co-exist, then a company can opt out of the tax and opt into the permit market. If the permit price (spot or future) falls below the tax, this is the rational course of action. The permit market would be even more attractive if there is a promise of grandfathered permits in the future. If the opt-in clause for the EU ETS becomes solid, then the expected permit price puts a cap on the effective carbon tax.

In the absence of an opt-in clause, tax industries would lobby for inclusion in the EU ETS if the tax is higher than the permit price. Lobbying is probably more intense and perhaps more successful with taxes than with direct regulation, because the difference between carbon tax and permit price is obvious.

In sum, a carbon tax alongside a permit market is not an optimal solution, but it is not bad either – provided that carbon tax and permit price are reasonably close. Market or political forces would prevent divergence of tax and permit price.

However, it is not clear that the carbon tax will apply only to the sectors not covered by the EU ETS. It may be that tax will apply to the ETS sectors as well, as suggested by Minister Eamon Ryan in an interview with the *Irish Times* (July 13, 2007). In the Appendix, we show the consequences with a simple model of the international emission permit market. The results are intuitive.

Let us assume, reasonably, that Ireland is a net importer of carbon permits. A carbon tax would make it less attractive for Irish companies to import emission permits from the rest of the European Union, because extra permits imply higher emissions imply higher taxes. As a result, emissions would fall further in Ireland than in the case without a carbon tax. However, emissions would increase in the rest of the EU as there would be less export of emission permits to Ireland. These two effects exactly offset each other, because the EU ETS imposes a cap on total EU emissions. Total EU emissions are not affected by a carbon tax in Ireland. Only the distribution of emissions between the member states is affected by an Irish tax. A domestic tax superimposed on internationally traded emission permits has a leakage rate of 100 per cent.

Furthermore, the reduced demand for emission permits would depress the European price of emission permits, albeit only slightly.

This means that the rest of the EU exports fewer permits for a lower price – total emission reduction costs rise in the rest of the EU.

However, the drop in the price of emission permits is less than the carbon tax. As a result, in Ireland, the sum of the carbon tax and the permit price is always greater than the permit price if the tax is zero. In Ireland, more emissions are reduced and at a higher price. The cost of emission reduction, therefore, goes up in Ireland too.

In sum, an Irish carbon tax on sectors covered by the EU ETS increases the costs of emission reduction in Ireland and in the other member states. It makes everybody worse off, without improving the environment, as emissions are unchanged.

4. Discussion and Conclusion

Politics and climate policy mix badly. It will take a global, century-long effort to drive greenhouse gas emissions to zero – but every politician wants to be seen doing something in every constituency while in office. The optimal solution for the climate problem consists of a carbon tax that starts low but increases over time – combined with additional incentives for industry to develop energy sources that are cheap, safe, convenient, and carbon-free.[2]

In this paper, two key components of Irish climate policy are discussed. The emission reduction target of 3 per cent per year for the current government period would be very difficult to meet, if not infeasible, and would be very expensive. It is best forgotten. A carbon tax is an excellent idea, provided that the tax does not deviate too much from the price of emission permits in the EU ETS, and provided that the tax is applied to emissions outside the EU ETS only.

[2] A carbon tax provides an incentive for the commercialisation of carbon-free energy, but companies can appropriate only a small share of the benefits of their own R&D. Additional incentives are therefore justified.

BARKER, T., I. BASHMAKOV, A. ALHARTHI, M. AMANN, L. CIFUENTES, J. DREXHAGE, M. DUAN, O. EDENHOFER, B.P. FLANNERY, M.J. GRUBB, M. HOOGWIJK, F.I. IBITOYE, C.J. JEPMA, W.A. PIZER, and K. YAMAJI, 2007. "Mitigation from a Cross-Sectoral Perspective" in B. Metz *et al.* (eds.), *Climate Change 2007: Mitigation – Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge: Cambridge University Press, pp. 619-690.

BOEHRINGER, C., T. HOFFMANN, and C. MANRIQUE-DE-LARA-PENATE, 2006. "The Efficiency Costs of Separating Carbon Markets under the EU Emissions Trading Scheme: A Quantitative Assessment for Germany", *Energy Economics*, Vol. 28, No. 1, pp. 44-61.

DIAKOULAKI, D. and M. MANDARAKA, 2007. "Decomposition Analysis for Assessing the Progress in Decoupling Industrial Growth from CO_2 Emissions in the EU Manufacturing Sector", *Energy Economics*, Vol. 29, pp. 636-664.

den ELZEN, M.J.G. and M. MEINSHAUSEN, 2006. "Multi-Gas Emission Pathways for Meeting the EU 2oC Climate Target" in H.-J. Schellnhuber *et al.* (eds.), *Avoiding Dangerous Climate Change,* Cambridge: Cambridge University Press, pp. 299-310.

FITZ GERALD, J., J. HORE, and I. KEARNEY, 2002. *A Model for Forecasting Energy Demand and Greenhouse Gas Emissions in Ireland*, Working Paper 146, Dublin: The Economic and Social Research Institute.

HOTELLING, H., 1931. "The Economics of Exhaustible Resources", *Journal of Political Economy*, Vol. 39, No. 2, pp. 137-175.

LYONS, S., J.D. FITZ GERALD, N. McCARTHY, L. MALAGUZZI VALERI and R.S.J. TOL, 2007. "Preserving Electricity Market Efficiency while Closing Ireland's Capacity Gap", *Quarterly Economic Commentary,* Dublin, Autumn, pp. 62-82.

McCARTHY, C. and S. SCOTT, 2007. *Controlling the Economic Cost of Climate Policy*, 30th Economic Policy Conference of the Dublin Economic Workshop, Kenmare, October 12-14.

NORDHAUS, W.D. and Z. YANG, 1996. "RICE: A Regional Dynamic General Equilibrium Model of Optimal Climate-Change Policy", *American Economic Review*, Vol. 86, No. 4, pp. 741-765.

O'DOHERTY, J. and R.S.J. TOL, 2007. "An Environmental Input-Output Model for Ireland", *The Economic and Social Review*, Vol. 38, No. 2, pp. 157-190.

PIZER, W.A., 1999. "The Optimal Choice of Climate Change Policy in the Presence of Uncertainty", *Resource and Energy Economics*, Vol. 21, pp. 255-287.

REHDANZ, K. and R.S.J. TOL, 2005. "Unilateral Regulation of Bilateral Trade in Greenhouse Gas Emission Permits", *Ecological Economics*, Vol. 54, pp. 397-416.

TOL, R.S.J., 2005. "The Marginal Damage Costs of Carbon Dioxide Emissions: An Assessment of the Uncertainties", *Energy Policy,* Vol. 33, No. 16, pp. 2064-2074.

TOL, R.S.J., 2007. "Europe's Long-Term Climate Target: A Critical Evaluation", *Energy Policy*, Vol. 35, pp. 424-432.

WEYANT, J.P., F.C. de la CHESNAYE, and G.J. BLANFORD, 2006. "Overview of EMF-21: Multigas Mitigation and Climate Policy", *Energy Journal* (Multi-Greenhouse Gas Mitigation and Climate Policy Special Issue), pp. 1-32.

WIGLEY, T.M.L., R.G. RICHELS, and J.A. EDMONDS, 1996. "Economic and Environmental Choices in the Stabilization of Atmospheric CO_2 Concentrations", *Nature*, Vol. 379, pp. 240-243.

APPENDIX

The model closely follows Rehdanz and Tol (2005), but considers a case that these authors omitted.

Let us assume that there is an international market of tradable emission permits with two players: a small, importing country (Ireland) and a large, exporting country (the rest of the European Union). The importing country levies a tax on emissions.

Companies in the importing country *A* solve the following welfare programme:

$$\min_{R_A,P} C_A = \alpha_A R_A^2 + \pi P - \tau R_A \text{ s.t. } R_A + P \geq E_A - A_A =: T_A \quad \text{(A1)}$$

where *C* are emission reduction costs; *E* are baseline emissions, *A* is the emission allocation, so that *T* is the emission reduction target; *R* is emission reduction, and *P* are imported permits; π is the permit price; τ is the carbon tax; *a* is unit emission reduction cost. In a more general set-up, the quadratic specification would be replaced by any convex function, but then the model cannot be explicitly solved.

The exporting country *B* solves:

$$\min_{R_B,P} C_B = \alpha_B R_B^2 - \pi P \text{ s.t. } R_B - P \geq E_B - A_B =: T_B \quad \text{(A2)}$$

Note that (A1) and (A2) are independent of the initial allocation of permits. Regardless of whether permits are grandparented or auctioned, the initial allocation is a sunk cost or benefit. The permit price in (A1) and (A2) represents the opportunity cost of emissions.

The first order conditions of (A1) and (A2) are:

$$2\alpha_A R_A - \lambda_A - \tau = 0 \quad \text{(A3)}$$

$$2\alpha_B R_B - \lambda_B = 0 \quad \text{(A4)}$$

$$\pi - \lambda_A = 0 \quad \text{(A5)}$$

$$-\pi + \lambda_B = 0 \quad \text{(A6)}$$

$$R_A + P - T_A = 0 \quad \text{(A5)}$$

$$R_B - P - T_A = 0 \quad \text{(A6)}$$

This solves as:

$$\pi = \frac{2\alpha_A\alpha_B(T_A + T_B) - \alpha_B\tau}{\alpha_A + \alpha_B} \tag{A7}$$

$$P = \frac{\alpha_A T_A - \alpha_B T_B - \tau/2}{\alpha_A + \alpha_B} \tag{A8}$$

$$R_A = \frac{\alpha_B(T_A + T_B) + \tau/2}{\alpha_A + \alpha_B} \tag{A9}$$

$$R_B = \frac{\alpha_A(T_A + T_B) - \tau/2}{\alpha_A + \alpha_B} \tag{A10}$$

This solution collapses to the base case of Rehdanz and Tol (2006) for τ=0.

For τ>0, the following holds:

$$R_A + R_B = \frac{\alpha_B(T_A + T_B) + \tau/2}{\alpha_A + \alpha_B} + \frac{\alpha_A(T_A + T_B) - \tau/2}{\alpha_A + \alpha_B} = T_A + T_B \tag{A11}$$

That is, Country A reduces more, but Country B reduces less, and these effects exactly offset one another. As emission reduction is shifted from the country with low emission reduction costs, to the country with high emission reduction costs, total emission reduction costs increase. Note that this follows from the constraints, rather than from the specification of the abatement cost function.

Emission imports fall, and so does the price. However, in Country A, the shadow price of emissions goes up. Equation (A3), (A5), and (A7) imply

$$\pi + \tau = \frac{2\alpha_A\alpha_B(T_A + T_B)}{\alpha_A + \alpha_B} - \frac{\alpha_B\tau}{\alpha_A + \alpha_B} + \tau = \pi_{\tau=0} + \left(1 - \frac{\alpha_B}{\alpha_A + \alpha_B}\right)\tau \tag{A12}$$

In Country A, the shadow price increases, and more emissions are abated; more is done at a higher price, so the total cost goes up. Per (A3) and (A5), this holds for any abatement cost function. The quadratic specification only ensures a neat expression like (A12).

In Country B, less is done at a lower price – but less is exported at a lower price. The latter effect is larger than the former. This is easily seen. The tax in Country A does not affect the cost structure in Country B. As Country B would voluntarily reduce domestic emissions and export more permits if the tax falls, it must be that, at the margin, emission reduction costs are lower permit revenue.

Algebraically, the lost export revenue minus the saved abatement costs equals:

$$\frac{\alpha_B \tau}{\left(\alpha_A + \alpha_B\right)^2}\left[\frac{\tau}{4} + \alpha_B T_B - \alpha_A T_A\right] \qquad \text{(A13)}$$

This is positive if T_B is large relative to T_A, that is, if the exporting country's emission reduction target is larger, in absolute terms, than the importing country's target. This is a fair assumption for Ireland and the European Union. The tax in Country A, therefore, increases the total costs in Country B.

So, a tax in Country A would increase costs in both countries, and would not change emissions.