

# VOLATILITY IN IRISH QUARTERLY MACROECONOMIC DATA

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## 1. Introduction

The Central Statistics Office has been publishing quarterly estimates of the main Irish *National Accounts* aggregates since Quarter 1 of 1997, and the data releases have become a central focus of short-term analysis and commentary. Particularly close attention is paid to the estimates for Gross Domestic Product (GDP), internationally the most common measure of economic activity and the base for measuring public spending and debt ratios in the EU, and to Gross National Product (GNP), which many prefer as an activity measure. The analysis of the Irish quarterly data seems to support the following contentions:

- The quarter-to-quarter volatility in real macroeconomic aggregates, including gross output (GDP) and gross income (GNP), is very pronounced for the Irish data, more so than for other OECD countries.
- The principal source of volatility in Irish real GDP lies in the recorded figures for industrial output.
- Within the industrial output category, which is the aggregate of manufacturing and construction, the excess volatility can be traced to a small number of manufacturing sub-sectors.
- These sub-sectors are known to be dominated by exporting multinationals, whose shares in recorded output greatly exceed their shares in employment or in the generation of domestic demand. Recent patterns of growth in these manufacturing sub-sectors show very sharp rises in output, exports and Gross Value Added (GVA), unaccompanied by commensurate movements in employment or payroll.

The adjustment from Gross Domestic to Gross National Product might be expected to net out much of the influence of these volatile manufacturing sectors, since the latter measure (GNP) deducts net factor payments from the measure of gross output. These factor payments include, and are normally dominated by,

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## 2. Choosing the Macro Indicator

repatriated profit flows of the multinational sector, and output fluctuations should correlate with high factor payment flows. However the real GNP series is almost as volatile as real output. On average, the annualised growth rate of real GNP changes by 11 absolute percentage points from one quarter to the next, after allowing for seasonality, over the period for which quarterly Irish figures have been available. That is to say, the mean *absolute* deviation in the growth rate of the series is 11 percentage points. No other economically advanced country appears to have such a volatile pattern in macroeconomic activity.

The ratio of GDP to GNP in Ireland was 125 per cent in 2002, extraordinarily high by international standards. In virtually all other EU member states, the two measures and their rates of growth are almost coincident. Since the lower GNP figure is closer to a measure of the income that is domestically available, it is the more useful of the two in discussions of resource allocation and of tax burdens, and for transnational comparisons, notwithstanding its extraordinary volatility. An even better measure, Gross National Disposable Income, is not available quarterly, but has begun to approximate to GNP in recent years.

Where GDP and GNP, and their quarterly fluctuations, coincide, either will serve as a macro indicator. International comparisons of Government spending ratios, for example, will show a similar pattern whether GDP or GNP is used. But the divergence between the two series in the Irish data is now so large that care must be taken, both in monitoring macroeconomic trends and in making international comparisons. Figure 1 shows the ratio of GDP to GNP for the EU countries in 2001. Only in Ireland does the figure vary outside a range of 98 per cent to 102 per cent.

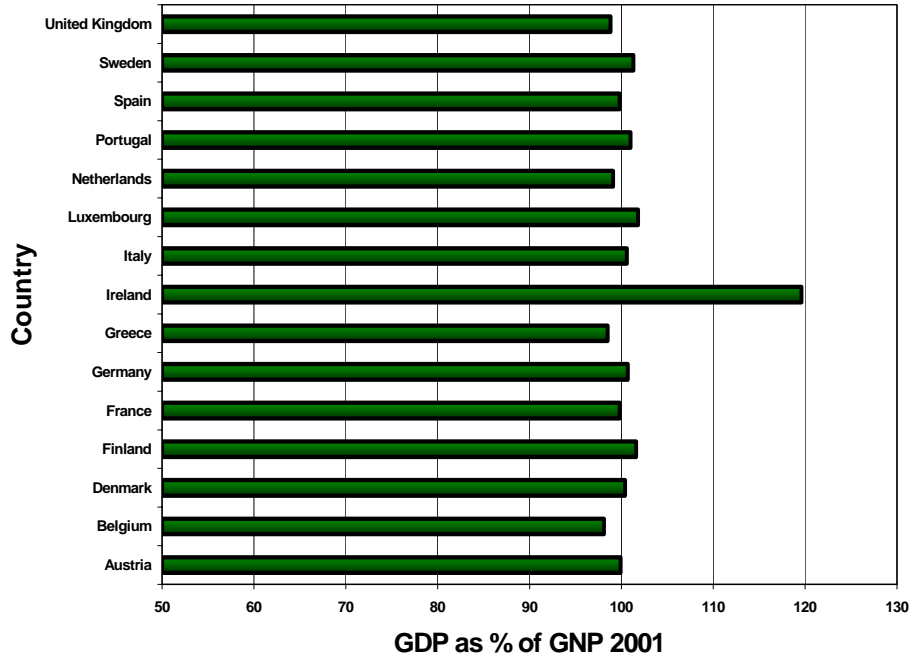
This marked excess of GDP over GNP is a relatively recent phenomenon. Up to the mid-1970s the two measures were almost coincident. There have been two bursts of rapid growth in the ratio, from about 1976 to about 1984, and the years since 1998, as is clear from Figure 2.

Net factor flows were inwards, dominated by emigrants' remittances, in the 1960s, but the steady reversal over the period since has been dominated by the outflows associated with the multinational sector. There have been other influences of course, including the flows consequent on portfolio decisions by both public and private sectors. In measuring Irish economic performance, and bearing in mind that only the (real and nominal) GDP and GNP figures are available on a quarterly basis, the GNP measure gives a more realistic fix on what is happening to the flow of economic resources available for domestic disposition. Its extreme volatility is however a drawback, and the value of the new quarterly data would be greatly enhanced if the problem identified here could be addressed.

Clearly the Irish GDP data ought not to be used to compare Tax or Public spending ratios with those in other countries, given that one-fifth of GDP as measured does not belong to Ireland. Some

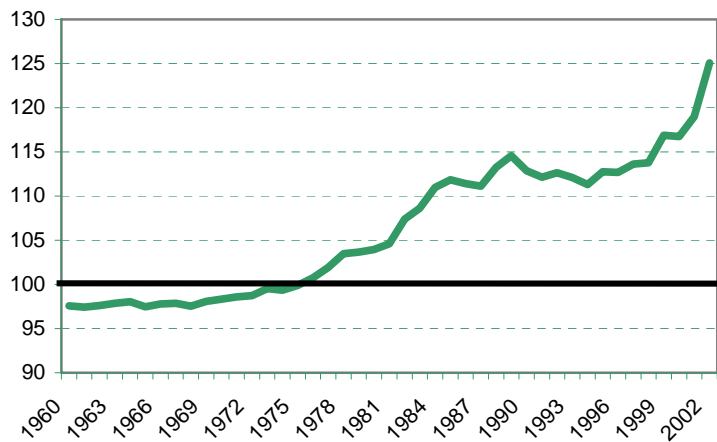
international agencies also use GDP measures to compare productivity trends across countries, which also makes little sense for Ireland.

**Figure 1: GDP as per cent of GNP, EU Member-States, 2001**



Sources: EU Commission, European Economy; IMF, International Financial Statistics.

**Figure 2: GDP as per cent of GNP, Ireland, 1960 to 2002**



Sources: Department of Finance, Budgetary and Economic Statistics, March 2002, CSO National Income & Expenditure Accounts.

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### 3. Volatility in Irish Quarterly Macro Data

The CSO's *Quarterly National Accounts* series analysed here run from Q1 1997 to Q2 2003, a total of 30 observations. The CSO has recently begun to seasonally adjust these numbers, and the new official estimates supersede various freelance attempts to do so (e.g. McCarthy, 2001). The analysis which follows is an update, using the official seasonal adjustment factors, of an earlier exercise (McCarthy, 2002) which used freelance factors. The quarter-to-quarter growth rates in real GDP and GNP, seasonally adjusted, are shown in Table 1, with US real GDP growth rates for comparison, all expressed at annualised rates as is the convention. These annualised quarterly growth rates tell us what growth would be if the present quarterly growth rate were sustained for a year. For a discussion of the processes of seasonal adjustment, annualisation and the caveats associated see Appendix Box 1 in the Winter 2003 edition of the *Quarterly Economic Commentary*.

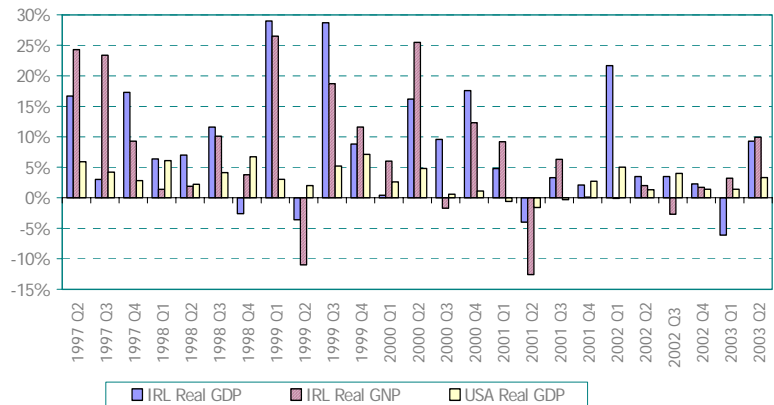
**Table 1: Irish GDP/GNP and US GDP growth, Seasonally Adjusted at an Annualised Rate**

Period	IRL Real GDP	IRL Real GNP	USA Real GDP
	Per Cent	Per Cent	Per Cent
1997 Q2	16.7	24.3	5.9
1997 Q3	3.0	23.4	4.2
1997 Q4	17.3	9.3	2.8
1998 Q1	6.4	1.4	6.1
1998 Q2	7.0	1.9	2.2
1998 Q3	11.6	10.1	4.1
1998 Q4	-2.6	3.8	6.7
1999 Q1	29.0	26.5	3.0
1999 Q2	-3.6	-11.0	2.0
1999 Q3	28.7	18.7	5.2
1999 Q4	8.8	11.6	7.1
2000 Q1	0.4	6.0	2.6
2000 Q2	16.2	25.5	4.8
2000 Q3	9.6	-1.7	0.6
2000 Q4	17.6	12.3	1.1
2001 Q1	4.8	9.2	-0.6
2001 Q2	-4.0	-12.6	-1.6
2001 Q3	3.3	6.3	-0.3
2001 Q4	2.1	0.1	2.7
2002 Q1	21.7	-0.1	5.0
2002 Q2	3.5	2.0	1.3
2002 Q3	3.5	-2.7	4.0
2002 Q4	2.3	1.7	1.4
2003 Q1	-6.1	3.2	1.4
2003 Q2	9.3	9.9	3.3
Minimum	-6.1	-12.6	-1.6
Maximum	29.0	26.5	7.1
Range	35.1	39.1	8.7

*Sources:* CSO, US Bureau of Economic Analysis.

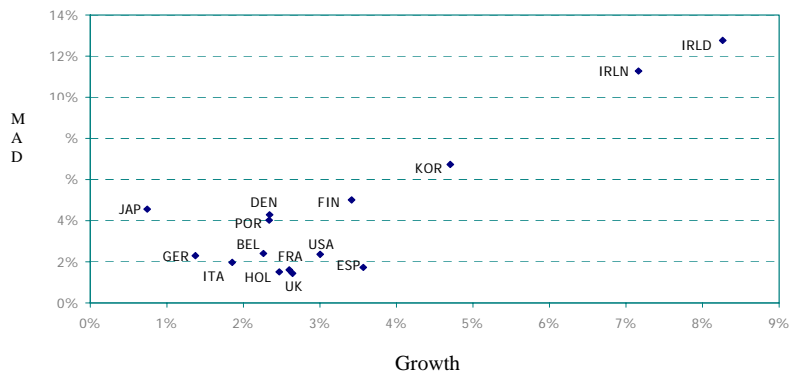
The variation in growth rates in quarterly real GDP for Ireland (expressed at an annualised rate) is from *plus* 29.0 per cent to *minus* 6.1 per cent. In real GNP, the variation is from *plus* 26.5 per cent to *minus* 12.6 per cent. With the US data, by contrast, the highest growth rate was *plus* 7.1 per cent and the lowest *minus* 1.6 per cent. The range from highest to lowest for US GDP is 8.7 per cent, for Irish GDP is 35.1 per cent and for Irish GNP is 39.1 per cent. Even with a higher average growth rate in Ireland, the greater volatility produces regular negative readings at the quarterly frequency. The enormous disparity in the volatility of the Irish and US series is clear from Figure 3.

**Figure 3: Real Annualised GDP/GNP Growth, Ireland and USA**



Sources: Bureau of Economic Analysis; Central Statistics Office.

**Figure 4: Mean Absolute Deviation (MAD<sup>1</sup>) versus Mean Growth Rate, OECD Countries, Q1 1997 to Q2 2003**



Source: Datastream. All available OECD countries shown.

The Irish and US economies are very different and the US figures in the above chart do not provide a definitive comparison. However, when data for a range of OECD countries are analysed in Figure 4, the picture from the simple comparison with the US is confirmed. Comparing other smaller economies, such as Denmark,

<sup>1</sup> MAD is Mean Absolute Deviation, i.e. the mean of the absolute change in the annualised quarterly growth rates (seasonally adjusted).

Finland or Portugal, it is clear that although they also tend to have a higher MAD than most of the larger economies, Ireland still remains a significant outlier both in terms of its growth rate and its MAD.

The Irish real GDP (IRLD) and GNP (IRLN) observations are the clear outliers. These excepted, the OECD countries seem to give a random scatter, with the US figures not at all unrepresentative. Irish real GNP growth seems to be only a little less volatile than GDP growth. Net Factor Payments, the difference between the two, is also volatile, as Table 2 indicates. The quarterly variations in this series, which ‘contributes’ about as much as the whole construction sector to the macro aggregates, are enormous, even at quarterly rates. Annualised, the per cent rates would be over 100 in several cases.

**Table 2: Net Factor Payments, as a Percentage Change at Quarterly Rates, Ireland, Q2 1997 to Q2 2003**

	<b>% Change</b>
1997 Q2	-5.3
1997 Q3	-28.0
1997 Q4	20.6
1998 Q1	11.0
1998 Q2	10.4
1998 Q3	5.0
1998 Q4	-10.6
1999 Q1	10.1
1999 Q2	12.3
1999 Q3	19.0
1999 Q4	-1.2
2000 Q1	-7.2
2000 Q2	-7.9
2000 Q3	20.5
2000 Q4	10.8
2001 Q1	-4.2
2001 Q2	11.5
2001 Q3	-2.5
2001 Q4	3.0
2002 Q1	29.3
2002 Q2	2.3
2002 Q3	6.4
2002 Q4	1.1
2003 Q1	-9.5
2003 Q2	1.7

*Source: CSO Quarterly National Accounts.*

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**4.  
Sources of  
Volatility in  
Irish Real GDP  
Since 1997**

The volatility of Irish real GDP is uncomfortably high. The principal source, as Table 3 indicates, is the Industry sector, which includes both Industry proper (mainly Manufacturing) and Construction.

**Table 3: Mean Absolute Deviation (MAD) of Seasonally Adjusted Growth Rates and Shares of GDP by Sector, Ireland, Q2 1997 to Q2 2003**

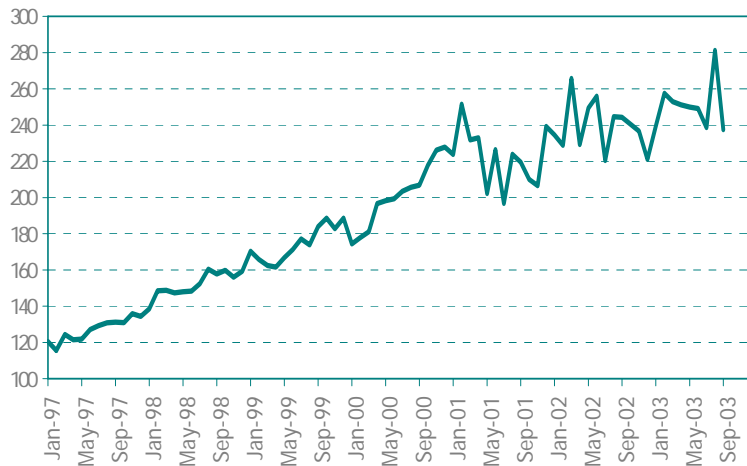
	MAD %	Share of GDP@ Factor Cost 2003 Q2
Agriculture	30.0	4.8
Industry	24.7	47.1
Distribution	10.9	16.6
Public Administration	3.5	3.0
Other Services	5.3	28.3
Net Factor Flows	63.1	

Source: CSO Quarterly National Accounts.

The table also shows that the MAD of Net Factor Flows, on the seasonally adjusted annual basis, is no less than 63 per cent. This means that, from quarter to quarter, the typical absolute swing in the (annualised) rate of growth of this (in Ireland's case, very large) GDP component is 63 percentage points.

Within the sector Industry, the field can be narrowed further to Manufacturing, which accounts for the vast bulk of total industrial output. The monthly Industrial Production Index is plotted in Figure 5, and the pronounced volatility, particularly in the current decade, is evident.

**Figure 5: Monthly Industrial Production Index (sa) 1997 - 2003**



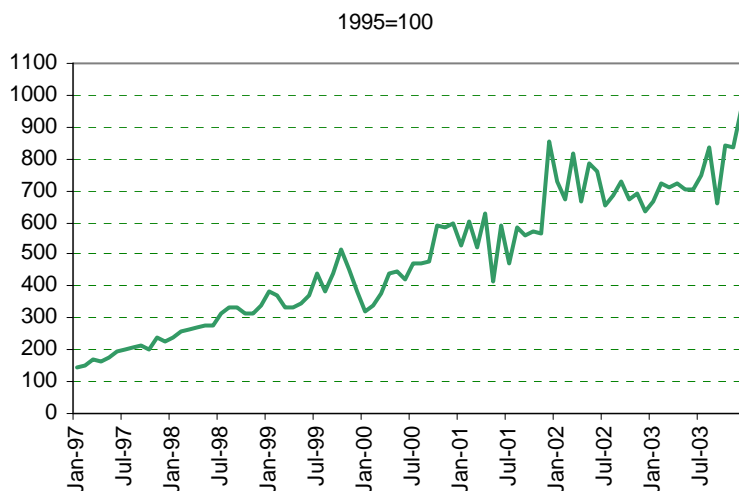
Source: CSO Industrial Production.

GDP components measure value added,<sup>2</sup> and payroll is a sizeable element in most manufacturing sectors. But in some sectors in Ireland, payroll is trivial, and profits, repatriated in due course, dominate the monthly valuation of output. The most striking example is the sector called Manufacture of Basic Chemicals, NACE 241, which accounted for 32 per cent of industrial Gross

Value Added = Wages + Profits.

Value Added (GVA) in 2002. The volatility in this sector is clearly exhibited in Figure 6.

**Figure 6: Monthly Production Index for Basic Chemicals (sa)**



Source: CSO Industrial Production.

The contrast between this sub-sector and the rest of Industry is clear from Table 4.

**Table 4: Manufacture of Basic Chemicals (NACE 241) Versus the Rest of Transportable Goods Industries, 2002**

	Basic Chemicals	All Other Trans. Goods Industries	Basic Chemicals as a % of Total Trans. Goods Industries
Gross Value Added €M	12,218	25,615	32.3
Labour Cost €M	352	6,468	5.2
Labour Cost as % of GVA	2.9%	25.3%	
Numbers Employed	7,878	230,355	3.3
GVA per Employee €000	1,551	111	

Source: CSO Census of Industrial Production 2002, Early Estimate.

Within the Basic Chemicals sector itself there is an even more egregious example. The Sector is dominated by Sub-sector NACE 2414, “Manufacture of Other Organic Basic Chemicals”. In 2000 (the latest year for which we have detailed data) NACE 2414 accounted for 68 per cent of employment but for 97.5 per cent of the GVA of the three-digit sector NACE 241; GVA per employee in NACE 2414 was €1.825 million. Assuming the relativities have remained the same in the meantime, GVA per employee in NACE 2414 could have been in the region of €2.2 million by 2002. Volatility in the monthly estimate of value-added for this sub-sector alone is enough to impart volatility to the total industrial output figures.

But it should be clear that the difficulty is not confined to the industrial output figures. The quarterly GDP and GNP figures are



also being seriously distorted by the fluctuations in the valuation of activity in a single industrial segment.

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## 5. Conclusions

This paper has examined the volatility in the Irish quarterly macroeconomic data. Ireland has shown significantly more volatility than any other OECD country, even when compared to smaller members. The Irish economy has a high GDP/GNP ratio as well as large short-run variations in value-added components other than wages. This paper finds that the Irish quarterly macro data are being seriously distorted by the unusual structure of Irish Manufacturing. This relates to the, no doubt perfectly legitimate, activities of some multinational sectors. These sectors have output valuations dominated by profits rather than wages, and fluctuations in output composition or in transfer pricing or both are clearly at the source of the quarter-to-quarter volatility in overall activity as measured. Care is warranted in interpreting the seasonally adjusted data anyway, since the seasonal factors are based on a period of unprecedented change in the Irish economy. The ESA-95 national accounting rules do not cope easily with a large multinational sector and transfer pricing, and we suggest that the CSO might consider some method of smoothing the Net Factor Payments numbers, and perhaps some other components, on a quarterly basis.

### *REFERENCES*

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