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How Competitive is Irish Manufacturing?*

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Abstract: Ireland experienced significant competitiveness gains in the 1990s on the basis of the standard manufacturing unit labour cost-based measure of the real effective exchange rate. A few sectors mostly dominated by multinational companies have accounted for the bulk of value added in production. Their productivity gains have greatly contributed to Ireland's exceptional growth performance in the 1990s, which has earned it the nickname of "Celtic Tiger." However, these sectors represent a disproportionately smaller share of manufacturing employment, and competitiveness in employment-intensive sectors has been much weaker. This paper thus explores Irish competitiveness from the viewpoint of risks to employment.

I INTRODUCTION

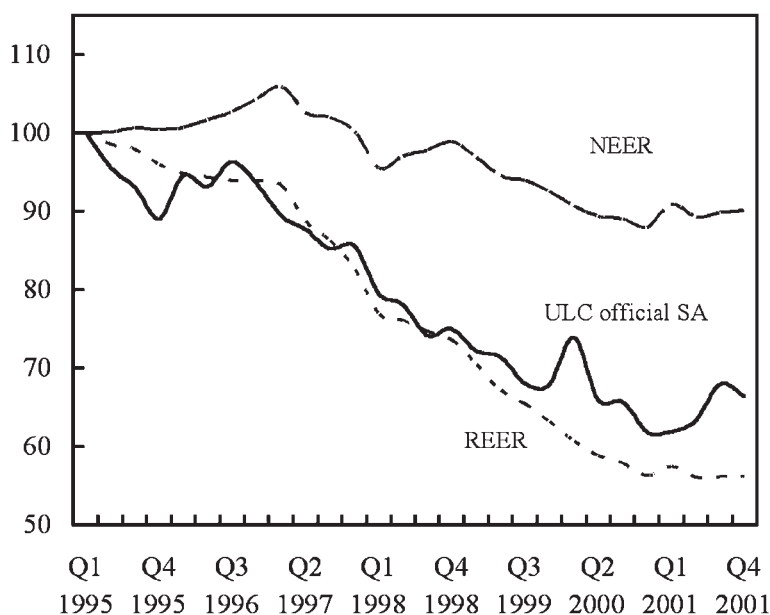
The Irish manufacturing sector has made sizeable competitive gains in recent years. When the standard unit labour cost-based measure of the real effective exchange rate (REER) is used to gauge external competitiveness for manufacturing, Ireland's competitive position appears to have improved remarkably during the recent half decade (Figure 1).¹ The improvement has been mainly due to a persistent drop in Irish unit labour costs (ULCs) and, to a lesser extent, depreciation of the nominal effective exchange rate. The main contribution to falling ULCs has come from a surge in manufacturing

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¹ Throughout this paper, a decline in a REER or NEER index denotes a depreciation or gain in competitiveness. See Appendix for data sources.

productivity, which, until 2001, more than offset the impact arising from increases in hourly wages. In 2001, a cyclically-driven fall in the production of tradables and a surge in hourly wages arrested the trend improvement in external competitiveness. However, given past gains, the overall competitive position of the Irish manufacturing sector based on the standard indicator still remains strong.² Moreover, the outstanding performance of Irish manufacturing has helped to keep the current account close to balance in recent years, despite substantial outflows of factor payments and large deficits in the services balance.

Figure 1: *Developments in Competitiveness*



Nevertheless, this paper argues that these considerable gains in competitiveness have not been broad-based. Such gains reflect developments against particular international markets, especially the United Kingdom. In addition, the overall success has been accounted for mainly by the astonishing performance of a handful of sectors mostly dominated by multinational

² The most recent data suggest that a rebound in manufacturing production in the first quarter of 2002 resulted in a significant drop in ULCs. The developments across sectors were, however, uneven and may be partly related to very strong productivity gains that are characteristic of cyclical turning points. Therefore, it could be premature to suggest that the Irish manufacturing productivity has returned to its earlier trend.

companies, whose gains in productivity often result from intangible foreign inputs of production, such as global investment in research, product development, and advertising. Section II sets the structure and development of the Irish tradable sector in its historical context.

This paper also argues that there are important employment and welfare consequences to the differences in competitiveness across manufacturing sectors. The key industries that account for the bulk of value added in production represent a disproportionately smaller share of total manufacturing employment. Section III discusses the concepts and standard measures of international competitiveness. However, the marked difference between production and employment shares in Irish manufacturing industries implies that the standard measures are inadequate. To address the risks for manufacturing employment, it is vital to gauge developments in competitiveness across different sectors as well as their vulnerability to an acceleration in wage inflation or a potential sustained appreciation of the euro. A new measure of overall competitiveness is introduced to address these concerns. Section IV assesses competitiveness using this new measure and also decomposes trends in competitiveness to determine the sources of gains and losses. Section V concludes.

II IRISH MANUFACTURING COMPETITIVENESS IN A HISTORICAL CONTEXT

Ireland's dramatic change in its development strategy in the 1960s laid the foundation for its impressive economic performance in the recent decades. Following its independence in 1922, Ireland adopted protectionist external policies, including high tariff barriers and a prohibition on foreign ownership of firms operating in Ireland. The motivation was to promote growth of indigenous manufacturing. However, the failure of this strategy was evident by the late 1950s, as the "infant industries" remained uncompetitive *vis-à-vis* the rest of the world. Within less than a decade, the Irish policymakers replaced this import competing strategy by the dismantling of most tariff barriers and a policy aimed at attracting foreign direct investment (FDI) by offering investment grants and zero corporate profit taxes on manufactured exports (Barry, Bradley, and O'Malley, 1999). In the late 1960s, the government undertook a concerted effort to improve the education system, by removing the fees on secondary education.³ These efforts contributed to an educated and well-trained Irish labour force.

³ See Durkan, *et al.* (1999) for details.

Ireland sustained huge inflows of FDI over the next three decades, attracting the highest share of inflows in the EU. Tables 1 and 2 depict the shares of FDI in gross domestic product and gross fixed capital formation in selected countries. Ireland's inward stock of FDI comprised 23 per cent of GDP, while FDI inflows represented 19 per cent of gross fixed capital formation in 1997.⁴ These inflows were higher than those for Western Europe, EU or the United States, and were on par with some emerging market countries. These substantial inflows can be attributed in part to Ireland's outward orientation starting in the 1960s, and its investment in public education. Gunnigle and McGuire (2001) note, for instance, that the education level of the workforce constituted a critical factor in the location decision of many US multinationals.⁵ Furthermore, strong efforts toward substantial and sustained fiscal adjustment in the late 1980s provided policy credibility that supported continued FDI inflows.

FDI contributed to the fast pace of growth and employment in the Irish economy. Between 1989 and 1997, total employment increased by 15 per cent, of which about 70 per cent was in foreign-owned industry.⁶ The increase in FDI also helped Ireland converge with, and eventually surpass, the EU countries in terms of its standard of living and output per capita.

Table 1: *Inward and Outward FDI Stocks as a Percentage of Gross Domestic Product Selected Years*

		1980	1985	1990	1995	1997
EU	Inward	5.5	8.6	11.0	12.7	15.2
	Outward	6.2	10.3	11.8	15.4	18.6
Ireland	Inward	18.5	23.5	12.2	18.2	23.3
	Outward		1.0	4.8	6.3	7.9
US	Inward	3.1	4.6	7.2	7.7	8.4
	Outward	8.1	6.2	7.9	10.0	10.6
Malaysia	Inward	21.1	23.7	24.1	31.8	38.1
	Outward	1.7	4.4	6.2	13.1	13.0
Singapore	Inward	52.9	73.6	78.2	71.2	81.6
	Outward	66.6	44.1	21.4	41.9	46.2

Source: World Investment Report, 1999 (United Nations).

⁴ The number for FDI as a proportion of GNP would be much higher than as a proportion of GDP because GDP is higher for Ireland than GNP. See Barry, Hannan, and Strobl (1999).

⁵ Indeed, 78 per cent of the FDI inflows into Ireland in 1998 were of US origin.

⁶ See Barry, Hannan, and Strobl (1999).

Table 2: *Inward and Outward FDI Flows as a Percentage of Gross Fixed Capital Formation, 1987–97*

		1987–1992	1993	1994	1995	1996	1997
EU	Inward	5.8	5.9	5.6	7.2	6.8	8.5
	Outward	8.3	7.6	8.9	10.0	11.4	14.8
Ireland	Inward	8.9	14.9	9.6	13.4	20.6	19.0
	Outward	5.5	2.9	5.0	7.6	5.7	7.0
US	Inward	6.0	5.1	4.7	5.8	7.0	9.3
	Outward	3.9	8.8	7.7	9.1	6.9	9.4
Malaysia	Inward	18.1	20.3	14.9	11.1	12.1	12.2
	Outward	2.8	5.9	8.9	8.2	9.9	8.2
Singapore	Inward	32.2	23.1	36.1	25.6	23.1	27.3
	Outward	7.4	10.6	19.3	22.3	18.4	13.3

Source: World Investment Report, 1999 (United Nations).

Nevertheless, the activities of multinationals have led to an overstatement of the convergence of Irish output per capita with respect to other advanced economies. The multinational firms operating in the Irish economy have used Ireland mostly as a production base rather than as a final market, and the low corporate tax rate in Ireland has provided incentives for transfer pricing. These firms have repatriated their profits, as reflected in the large negative net factor income from abroad amounting to almost 15 per cent of GDP in recent years (Table 3). Payment of royalties and other fees for the use of patents, etc., have constituted another element of outflows. As a consequence of these outflows, GNP is significantly lower than GDP.

Gunnigle and McGuire (2001) point to some other “downsides” of Ireland’s reliance on FDI. They argue that many firms are located in very volatile sectors, the level of R&D in Ireland is low and linkages into the domestic economy are weak. Moreover, while FDI flows into the manufacturing sector have contributed significantly to the Irish growth experience in the past, the sustainability of this growth is unclear. As Barry, Bradley, and O’Malley (1999) point out, FDI flowed into tradable industries where Ireland had a comparative disadvantage. In particular, FDI went into sectors with increasing returns to scale so that the multinationals could lower production costs and establish distribution networks. The authors also find that the foreign firms tend to be larger, more productive, more profitable, with higher propensity to import their material inputs and are more export oriented compared to the indigenous plants. In addition, a small number of high-tech industries, including organic chemicals, pharmaceuticals, electronic machinery, office and

Table 3: *Net Factor Income from Abroad for Ireland:
Selected Years*

	<i>Net Factor Income from Abroad (% of GNI)</i>	<i>Net Factor Income from Abroad (% of GDP)</i>
1950	6.5	7.0
1960	2.5	2.5
1970	1.7	1.7
1980	-4.0	-3.8
1985	-12.3	-10.9
1990	-12.4	-11.4
1995	-12.5	-11.3
2000	-16.9	-14.6

Source: International Financial Statistics for 1950–1985; Central Statistics Office thereafter.

automatic data-processing equipment, and “miscellaneous foods” have contributed disproportionately to the FDI and export boom (Walsh, 1996).

While foreign affiliates represent a large share of value added and exports, they constitute a much lower share of employment generated in the manufacturing sector (Table 4). In 1998, foreign affiliates produced 82 per cent of the output in manufacturing but employed only 47 per cent of the total employees in manufacturing. The ratio of value added to employment generated in manufacturing by the foreign-owned firms is 1.75, which is much higher than other comparable countries, including those such as Singapore and Malaysia with high value added in foreign affiliates. Since most countries that experience these huge inflows of FDI do not experience a very skewed employment and output structure, the implications of such skewed distribution have gone largely unnoticed in the literature. Walsh (1996) notes that net output per employee is much higher in foreign than Irish firms, but does not analyse its implications for employment.

Barry and Hannan (1995) argue that the influx of multinationals may have distorted wage setting behaviour and thereby worsened unemployment through “Irish disease”. The indigenous firms were small-scale with low productivity and low wages before 1960s. However, the multinationals that entered after the opening of trade had high productivity and access to a large European market. The high marginal productivity of labour in these multinationals implied that the firms could afford to pay higher wages relative to the domestic firms.⁷ Nevertheless, Barry (1996) finds that in the period

⁷ See Fitz Gerald (1999).

Table 4: *Significance of Foreign Affiliates: Value Added, Employment and Exports*

		<i>Value Added of Foreign Affiliates (% of total VA in mfg)</i>	<i>No. of Employees in Foreign Affiliates (% of total employees in mfg)</i>	<i>Exports of Foreign Affiliates (% of total exports)</i>	<i>Ratio of Value Added to Employment</i>
Ireland 1/ 2/	1983	59.0	39.0	83.2	1.513
	1990	68.0	45.0	35.2	1.511
	1998	82.0	47.0	n.a.	1.745
UK	1985	18.0	13.7	n.a.	1.314
	1992	23.6	18.2	n.a.	1.297
Malaysia	1985	30.2	29.8	17.9	1.013
	1994	57.2	43.7	51.0	1.309
Singapore 3/	1980	64.0	52.0	62.6	1.231
	1994	70.4	52.1	60.6	1.351

Source: World Investment Report (1999) for all except Ireland.

1/ Figures for VA and employment from OECD (2001).

2/ 1985 and 1993 for exports instead of 1983 and 1990; *Source:* Walsh (1996).

3/ 1996 for employment and exports and 1985 for exports.

1980 to 1992, wage growth in the traditional sector kept pace with wages in the modern sector, which outstripped productivity growth in the traditional sector. The rise in wages contributed to the decline of the traditional manufacturing sector, and Barry and Hannan (1995) suggest that such crowding out of the indigenous sector could, under certain circumstances, lead to a reduction in total employment. In addition, the foreign-owned firms employ higher proportions of skilled labour than the indigenous manufacturing industry, and Barry and Hannan (1996) find that the skill gap between indigenous and foreign firms has been increasing. As unemployment risks are greater for workers with low education (Sexton and O'Connell, 1996), wage growth in excess of productivity growth in the indigenous sector that results from a distorted wage formation mechanism could have even greater adverse impact on the indigenous employment levels.

While the literature discussed above suggests that high wage growth has crowded out the traditional sector, many studies and recent evidence suggest that large gains in Irish manufacturing competitiveness has contributed to

Ireland's recent spectacular employment and output growth.⁸ Walsh (1999, 2000) states that the Irish policymakers consistently emphasised stabilising nominal wages to increase employment. As others, he finds that the dramatic decline of relative unit labour costs since the mid-1980s substantially improved the competitiveness of manufacturing industry.⁹ Walsh attributes this dramatic decline in relative unit labour costs to low wage inflation, a stable nominal effective exchange rate, and productivity growth in Irish industry resulting from inflows of FDI and foreign technology. An OECD (2002) study also ascribes a decline in unit labour cost to the rapid growth of productivity. The next section discusses measures of international competitiveness, and introduces a measure that is more relevant for the Irish situation.

III MEASURES OF INTERNATIONAL COMPETITIVENESS

The concept of competitiveness is frequently associated with the sustainability of a country's trade balance and the ability of internationally exposed industries to maintain their market shares. While many factors that impinge on a country's competitiveness are qualitative in nature, the assessment of competitiveness typically relies on quantitative indicators of a country's competitive position.

The most common indicators include real exchange rates based on relative unit labour costs or relative consumer price levels, and relative export unit prices (Fagerberg, 1988; Lipschitz and McDonald, 1992; Turner and Van't dack, 1993; Marsh and Tokarick, 1994; and Turner and Golub, 1997). The real exchange rate based on relative consumer prices includes non-traded as well as traded goods, and so may be a less useful indicator of trade performance. Consumer prices are based on prices of final goods, so they exclude intermediate goods, which are an important component of international trade. Furthermore, consumer prices may not be an accurate measure of underlying domestic costs when they are distorted by price controls and excise taxes, or when "pricing to market" results in a temporary change in profit margins rather than changes in competitiveness. Relative export unit values may also reflect pricing to market effects and may be overweighted in primary product prices. Moreover, they are often calculated as average values and thus can be distorted by compositional effects. The real exchange rate based on relative

⁸ See Walsh (1996, 1999 and 2000).

⁹ Relative unit labour costs are computed by an index that measures changes in nominal wages, productivity, and the nominal exchange rate, all relative to trading partners.

unit labour costs helps assess developments in profitability of producing traded goods, as labour represents an important input to production of these goods. Data on wage costs are also generally widely available on a comparable basis for advanced countries. Turner and Van't dack (1993) conclude that the real exchange rate based on relative unit labour costs is probably the best single indicator of competitiveness for advanced economies. This indicator is focused on a large component of trade, and avoids endogeneity with the exchange rate, which affects the CPI and export price measures. International differences in labour costs represent a key component of policies designed to ensure macroeconomic stability. Carlin, Glyn, and Van Reenen (2001) find that the real exchange rate based on unit labour costs is a significant determinant of export market shares for a sample of 14 OECD countries, and that proportionate changes in the components of relative unit labour costs (the nominal exchange rate, wages, and productivity) have approximately the same long-run effect on export market shares.

Unit labour costs depend on wages and productivity:

$$ULC = \frac{\text{Earnings per hour}}{\left(\frac{\text{Output / Employment}}{\text{Hours worked per person}} \right)} \quad (1)$$

The real exchange rate based on unit labour costs is calculated as the ratio of unit labour costs in the home country relative to its trading partner, expressing the data in a common currency:

$$RER_{ULC}^{Ireland,c} = NER^{Ireland,c} * (ULC^{Ireland}/ULC^c) \quad (2)$$

The real "effective" exchange rate is then calculated as the weighted sum over all trading partners, where the weights represent the share of each country in Ireland's external trade.

$$REER_{ULC} = \sum_c tw_c * RER_{ULC}^{Ireland,c} \quad (3)$$

Welfare implications underlie the concern for monitoring external trade performance. Examining trends in external trade can help assess the sustainability of current account balances and whether the current exchange rate is appropriate. A persistent current account deficit would require an eventual adjustment as a combination of depreciation and deflation, and could lead to a balance of payments crisis, which could cause a serious economic disruption. A country may also be concerned with shifts in market shares at the sectoral level because such shifts could imply changes in the sectoral

composition of output and in living standards. While economic policies cannot prevent losses in some sectoral market shares, given dynamic comparative advantage, policies must ensure that the economy is flexible enough to adjust to these shifts at minimum costs and to reallocate resources in order to ultimately improve living standards (Krugman, 1996).

Employment generation constitutes an important component of social welfare. Employment growth is linked to the competitive position of the country and to its sectoral shifts in production. In addition, a sharp rise in unemployment could represent one of the major economic disruptions associated with a balance of payments crisis. Thus, the concern about current account sustainability is fundamentally based on its implications for living standards and social welfare, which are affected by job growth and unemployment.

Although useful for predicting trade flows, the standard real exchange rate based on unit labour costs may provide a misleading measure of unemployment risks in the Irish case. This competitiveness indicator has the limitation that it merely captures labour costs, without considering their proportionate share of total production costs. Movements in unit labour costs may reflect capital substitution, rather than changes in labour productivity. In Ireland, the employment share of the multinational sector is much smaller than its output or value-added share, given higher capital and R&D inputs into that sector. Thus, the multinational sector receives a larger weight in the indicator than is justified by concerns about employment.

This paper introduces a measure of the real exchange rate based on unit labour costs that is weighted to more accurately reflect the pattern of employment across industries, which enables us better to gauge potential unemployment risks. For a particular industry i , the relative unit labour costs between Ireland and country c expressed in a common currency are given by:

$$ULC_i^{Irl,c} = e^c * \frac{ULC_i^{Irl}}{ULC_i^c} \quad (4)$$

where e^c is the nominal exchange rate of country c relative to the Irish currency.

“Effective” unit labour costs in industry i are constructed by summing relative unit labour costs of Ireland over all its trading partners, where the weights, tw_i^c , are based on the shares of Irish exports in industry i that are destined to each country.

$$relative\ ULC_i^{Irl,all} = \sum_c tw_i^c * ULC_i^{Irl,c} \quad (5)$$

An aggregate index, corresponding to a real effective exchange rate (REER), is then constructed by summing over all industries, using weights, ω_i , that can either depend on the employment share of each industry or the output share of each industry in total manufacturing.

$$REER = \sum_i \omega_i * \text{relative } ULC_i^{Irl,all} \quad (6)$$

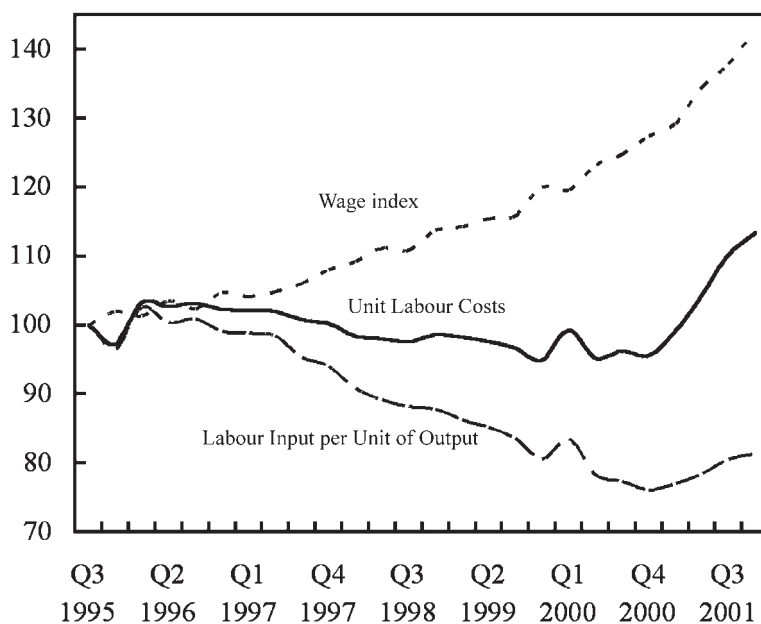
When the weights are based on the output (or value-added) share in each industry, the *REER* is analogous to the standard measure of real exchange rate, unit labour costs. This measure attaches more importance to industries with high productivity. The employment weighted index, however, is more directly linked to the fundamental concern with employment risks.

IV COMPARING ALTERNATIVE MEASURES OF EXTERNAL COMPETITIVENESS

Developments in unit labour costs have been less impressive in employment-intensive sectors. An analysis gauging changes in unit labour costs and competitiveness using the employment weighted index—which better assesses developments in the employment-intensive indigenous sectors as well as the risks to employment posed by the recent downturn and marked wage increases than the standard output-based measure—suggests that past gains in competitiveness have been relatively limited, as Irish unit labour costs have been broadly stable from 1995–2000 (Figure 2). During this period, high productivity growth was offset by rapid wage increases. However, the combination of falling production and steep increases in labour costs during 2001 has had a drastic negative effect on unit labour costs although the output decline is in part cyclical, and hence, may be temporary.

External competitiveness as measured by the employment-weighted REER has been much bleaker than suggested by the standard measure of the REER. The contrast between the two measures of the real effective exchange rate based on employment and output shares is striking (Figure 3). The REER based on weighting the industries by their shares in manufacturing output suggests that overall competitiveness continued to improve dramatically until 2001, in contrast to the broadly stable developments in the employment-weighted index. The more robust gains in competitiveness indicated by the output-based measure are largely explained by the very strong performance of a few industries that have accounted for the most of the recent growth in manufacturing and that are generally characterised by very high

Figure 2: *Decomposition of Irish ULCs, Weighted by Employment Share in Industry*

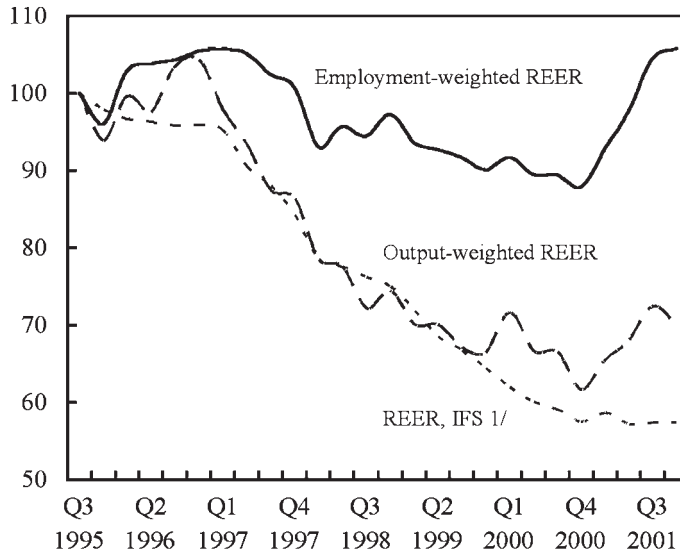


ratios of output per worker. Due to an increasing dominance of these “key” sectors, the two measures have been diverging since early 1997, with the production-weighted measure appearing more immune to rising wage costs.¹⁰

Ireland’s competitiveness has been particularly strong relative to the United Kingdom. Compared to the United Kingdom alone, Irish manufacturing has achieved sizeable competitiveness gains, even as measured with an employment-weighted index (Figure 4). Moreover, the United Kingdom is Ireland’s single largest trading partner, with export shares varying from 14 per cent to 84 per cent in major industries. Therefore, competitiveness gains relative to the United Kingdom have also contributed to maintaining external competitiveness on an effective basis (i.e., compared with all trading partners).

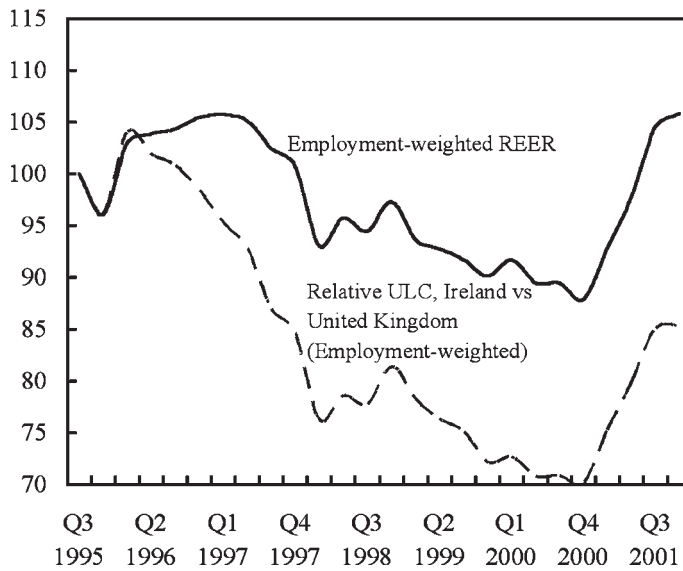
¹⁰ The real effective exchange rate as reported in the IMF’s International Financial Statistics (IFS) matches the index of output-weighted REER relatively closely. However, the recent pick-up in the latter index goes largely unnoticed in the IFS index because it is smoothed using a Hodrick-Prescott (H-P) filter. There are tradeoffs between these measures. The filtering used in the IFS index smoothes out cyclical swings in productivity to obtain a gauge of underlying trends. On the other hand, H-P filters suffer from well-known end-point problems. Moreover, it can be argued that the output-weighted index measures competitiveness more accurately than the IFS index, since it applies industry-specific partner-country trade weights, rather than partner weights based on aggregate export trade.

Figure 3: *Real Effective Exchange rates*



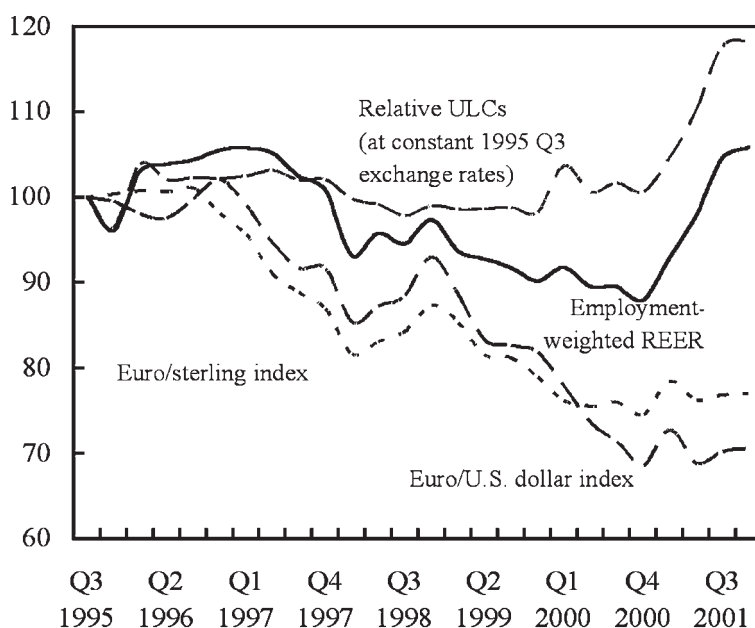
1/ Based on aggregate unit labour costs.
Smoothed with HP filter.

Figure 4: *Real Effective Exchange rates
Multilateral vs United Kingdom*

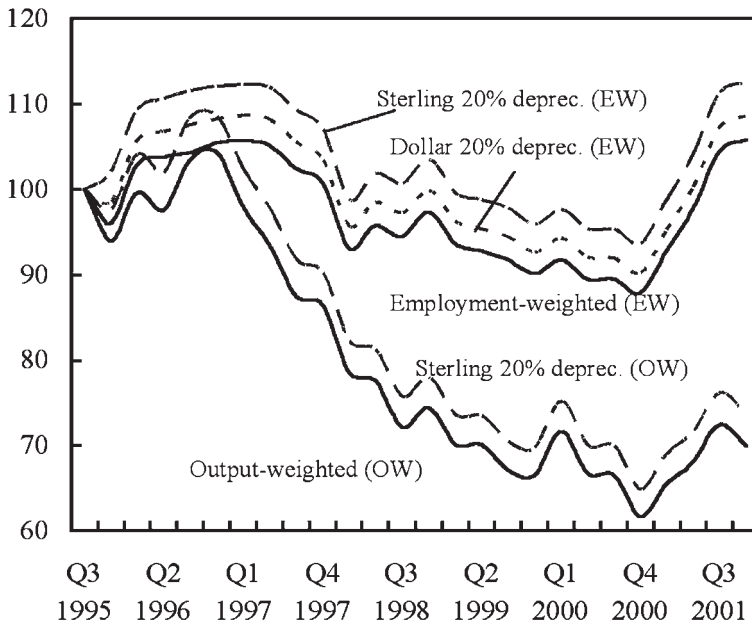


Most of the improvement in external competitiveness measured by the employment-weighted index was due to a weak exchange rate. Disaggregating the contributions of the effective nominal exchange rate and relative ULC components to the real effective exchange rate suggests that much of the past competitiveness gains of the employment-intensive manufacturing industries were related to the weakness of the nominal exchange rate rather than favourable developments in Irish ULCs relative to its trading partners (Figure 5). Indeed, relative unit labour costs at constant 1995:Q3 exchange rates have been broadly stable until 2001, after which they surged by over 15 per cent, partly reflecting a cyclical decline in output. Appreciation of sterling and the US dollar in 1997 and 1999–2000, in particular, contributed to a decline in the REER.

Figure 5: *Exchange Rate Effects*



Irish competitiveness is vulnerable to an appreciation of the euro, particularly against sterling. Historical simulations of exchange rate changes (assuming no response in ULCs) indicate that the employment-weighted index is more sensitive to a sharp depreciation of sterling than to the US dollar (Figure 6). Indeed, if sterling had depreciated by 20 per cent relative to the Irish currency, there would have been an upward shift in the REER by 7 per cent compared with a shift of only 3 per cent for an equivalent depreciation of

Figure 6: *Effects of Key Exchange Rate Changes*

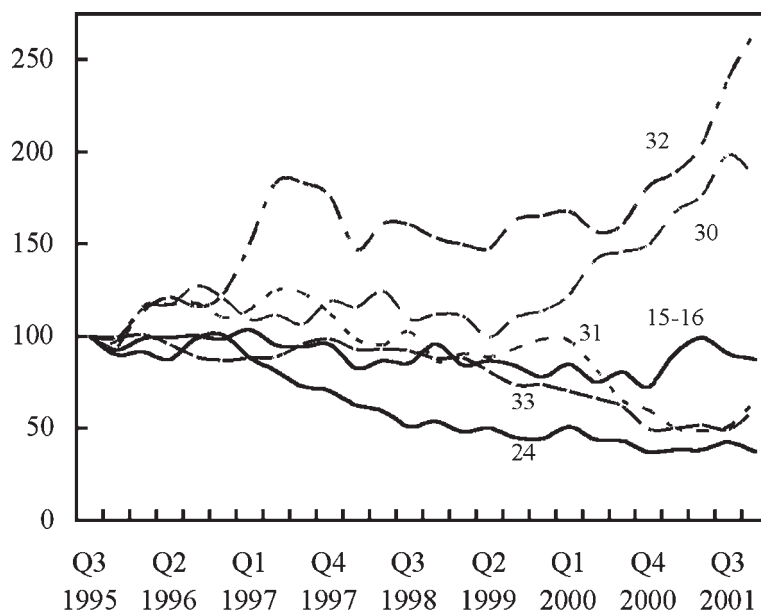
the US dollar. For the output-weighted index, a 20 per cent depreciation of sterling would have led to an increase of the REER by around 5½ per cent, and by 3½–4 per cent for a similar depreciation of the US dollar. Losses in Irish competitiveness resulting from an appreciation of the euro in 2002 would come on top of the already rapid cyclical deterioration that took place in 2001. The level differences in the employment versus output-weighted REERs in 2001 suggest that employment-intensive firms and sectors would be particularly vulnerable to euro appreciation.¹¹

Competitiveness has varied considerably across Irish manufacturing industries. The chemical and pharmaceutical industries (NACE industry 24) registered the strongest competitiveness gains during the period 1995–2001 (Figure 7). This key sector accounted for more than half of manufacturing output in the first quarter of 2002, but only about 9 per cent of the labour share of manufacturing. Within the electronics industries, there was also considerable divergence, with office machinery and communication equipment (NACE sectors 30 and 32, respectively) losing ground, and electrical machinery and medical and other instruments (NACE sectors 31 and 33,

¹¹ Walsh (1996) also recognises that trade with the sterling area is particularly price sensitive and labour intensive.

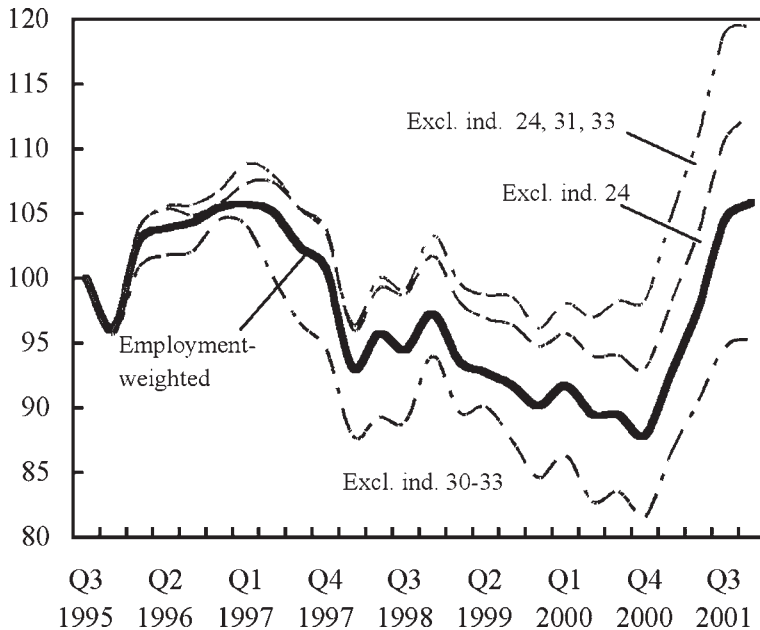
respectively) gaining ground over the half decade. The food, beverage, and tobacco industries (NACE sectors 15–16), which account for 18 per cent of manufacturing employment, had relative unit labour costs that were fairly unchanged over the period.

Figure 7: *Relative Effective Unit Labour Costs.*
Key Industries 1/



- 1/ Industries 15-16: Food, beverages, and tobacco;
 24: Chemicals and chemical products;
 30: Office, accounting and computing machinery;
 31: Electrical machinery and apparatus, nec;
 32: Radio, TV, and communication equipment;
 33: Medical, precision, optical and clocks instruments.

Excluding some of the key sectors from the employment-weighted index reveals that external competitiveness of the remaining manufacturing industries has deteriorated even more sharply. An employment-weighted index—although more useful than an output-weighted index for determining the likely employment consequences of a shock to Irish wages or exchange rates—still masks some important differences across sectors. The chemical industry and some electronics industries have had substantial gains. The profit margins in these industries may act as a cushion against shocks,

Figure 8: *REERs Excluding Key Industries*

although global production decisions must be considered in the context of the multinational firms' overall profits and demand conditions. Moreover, the extremely high level of value added per worker and the small share of labour costs to output suggest that these sectors may not be very sensitive to developments in wage costs. Thus, the employment risks of a shock are likely to be relatively minor. Thus, it is useful to examine developments in Irish competitiveness after excluding these key industries (Figure 8).

- Excluding the chemicals and pharmaceuticals industries (NACE 24), the remaining manufacturing industries suffered a major setback in their competitive position in 2001.
- The employment-weighted REER has deteriorated sharply excluding industries that have recorded the most impressive gains in productivity in recent years and could be considered "productivity outliers" (NACE 24, 31 and 33). This measure of the real effective exchange rate started to appreciate already in 2000 and leaped up by some 20 per cent in 2001. The results are comparable to those that excluded the data for chemicals and pharmaceuticals industries, but the decline in competitiveness is even larger, reflecting the drastic production cuts in the worst performing Information and Communication Technology (ICT) industries (namely, NACE 30 and NACE 32).
- Competitiveness has actually been stronger excluding only the electronics

industries (NACE 30–33). The exceptionally poor performance of the office, accounting and computing machinery industry (NACE 30) and the radio, TV and communication equipment industry (NACE 32) more than offset the gains of the electrical machinery and apparatus industry (NACE 31) and the medical, precision, optical, and clocks instruments industry (NACE 33). This poor performance is partly explained by recent production cuts. However, sectoral analysis of relative unit labour costs *vis-à-vis* trading partner countries reveals that the deterioration of the competitiveness in the production of NACE industries 30 and 32 was underway long before the current global slowdown.

V CONCLUSIONS

While it is a standard practice in international economics to use output as weights when calculating the relative unit labour costs, our concern is that it is not an appropriate measure to gauge Ireland's competitiveness. Much of the gains in the recent years have arisen because of higher output growth of the manufacturing sector, where a handful of sectors dominated by multinational companies gained in productivity from intangible foreign inputs of production. In 1983, the foreign owned firms accounted for 59 per cent of the output and 39 per cent of the employment in the manufacturing sector. However, in 1998, the same firms accounted for 82 per cent of the output and 47 per cent of the employment in manufacturing (OECD, 2001).

Once we account for employment in the calculation of relative unit labour costs, we find that changes in competitiveness in the second half of the 1990s were less impressive than suggested by the standard aggregate indicator. Indeed, the multilateral REER calculated using weights based on relative employment shares—rather than output shares—suggests that gains in competitiveness were fairly limited during 1995–2000. Moreover, earlier gains were more than offset in 2001, partly due to cyclical production cuts. The main reasons for the particularly weak performance in external competitiveness in 2001 were the global economic slowdown, the bursting of the ICT bubble, and the rapid increases in Irish wage costs. Moreover, the analysis indicates that while some sectors remained extremely competitive in the second half of the 1990s, high wage growth and substantial sectoral productivity differentials have resulted in an increased dispersion of competitive positions across various industries. The strong gains in aggregate productivity—particularly in the chemicals and pharmaceuticals industry—have masked a significant deterioration of external competitiveness in sectors that account for the main part of the Irish manufacturing employment.

Irish manufacturing remains vulnerable to an appreciation of the euro. Using the employment-weighted measure for the real effective exchange rate reveals that the depreciation of the nominal effective exchange rate played an important role in generating past competitiveness gains, as illustrated by the disaggregation of the REER index into nominal exchange rate and relative ULC components. The risk to competitiveness is most marked relative to the strength of sterling, given that the United Kingdom has been Ireland's largest trading partner and has contributed to maintaining Irish competitiveness over the last half decade.

APPENDIX: DATA SOURCES

The data frequency for all variables is quarterly.

The Central Statistical Office (CSO) of Ireland was the source of Irish data on production, employment, hours worked, and wages by NACE sector.

OECD was the source of partner country data on unit labour costs. In particular, data on production and employment was available from the OECD Indicators of Industry and Services for each country. The statistics are classified by economic activities following the International Standard Industrial Classification (ISIC Revision 3). Hours worked per employee in the business sector and hourly earnings of the manufacturing sector were taken from the OECD Analytical Database for each country on an aggregate basis. Missing observations, which were more frequent at the end of the sample, were supplemented by unit labour costs in domestic currency for the business sector, from the OECD Analytical Database. Nominal exchange rates were obtained from the IMF's International Financial Statistics.

Irish exports to each country by each industry were taken from the World Bank's World Integrated Trade Solutions, which contains trade statistics from the COMTRADE database made available by the United Nations Statistics Division. SITC industry classifications were matched by description to NACE industries to obtain sectoral direction of trade estimates. Export weights were based on averages over 1998–2000.

The CSO was the source of data on the employment share of each industry in total manufacturing in Ireland and 1995 value-added shares of each industry. The weights used to construct the output-weighted REERs were based on output shares at the beginning of 2002, which were obtained by accumulating 1995 value-added shares of each industry using production indices.

Final index calculations were seasonally adjusted using the Census X-11 method and rebased to 1995: q3 = 100.

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