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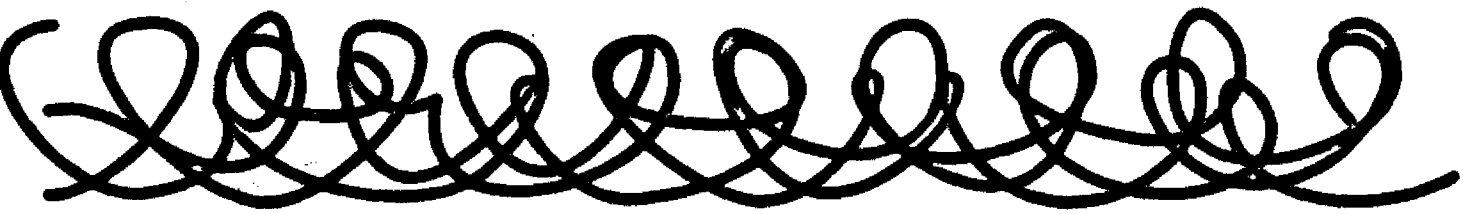
Industrial Development Report 2005
Background Paper Series

Interpreting Ireland's Economic Growth



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Industrial Development Report 2005 Background Paper Series

Interpreting Ireland's Economic Growth

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Office of the Director-General

This series includes the background papers commissioned to cover specific aspects addressed in the Industrial Development Report 2005 "Capability building for catching-up – Historical, empirical and policy dimensions". The digital versions are available, together with the full report, on the IDR 2005's website at www.unido.org/idr.

For further information on the IDR05, please contact f.sercovich@unido.org.

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Introduction

Ireland's economic performance since the late 1980s has earned it the title of the 'Celtic Tiger'. The contrast with the earlier postwar period is spectacular; in the Golden Age of European economic growth in the 1950s and 1960s Irish economic growth was most disappointing. Ireland has been by far the most successful of the lower-income economies that acceded to the European Union in the 1970s and 1980s. Since accession, the structure of exports has been transformed while Ireland has been a major recipient of foreign direct investment (FDI). Not only has Ireland outstripped Greece, Portugal and Spain but it has also eclipsed the outer regions of Britain.

This paper seeks to interpret this experience in three ways; by quantifying growth carefully, by establishing an appropriate theoretical context, and by investigating the part played by government policy. In particular, I examine the development of productive capabilities and the government's role in enhancing them, take account of the special relationship between the Irish and the UK economies, and explore the welfare implications of the large share of the economy devoted to ICT production by multinational companies for export.

Theoretical Background

The most obvious framework with which to analyze Irish economic growth is that of 'catch-up growth' in the tradition of Abramovitz (1986). This approach emphasizes that catch-up is not automatic but depends on 'social capability' and 'technological congruence'. The former relates to the institutions and incentive structures that are the micro-economic foundations of investment and innovation. The latter relates to the cost-effectiveness of imported technology which is influenced by relative factor costs, size of markets and supply of complementary factors of production. In this view, delayed Irish catch-up was triggered off by a belated decision to make good a deficit of human capital and by opening the economy after decades of protectionism (O'Grada and O'Rourke, 1996). In the late 1980s social capability was further strengthened by a 'social contract' which achieved wage moderation in return for tax cuts and was conducive to FDI and reductions in unemployment. Mutatis mutandis, this is similar to the explanation advanced by Eichengreen (1996) for the European Golden Age.

Government clearly has two different but complementary roles in the Abramovitzian model. First, with regard to social capability it has a key role in establishing and maintaining institutional quality. Most obviously this entails adherence to the rule of law and secure property rights but beyond this involves making the rules which relate to corporate governance, competitiveness of markets, or the system of industrial relations all of which impinge on decisions to invest and/or to innovate. Second, with regard to technological congruence government investment strategies, for example, in terms of supplying infrastructure or educating its population, can impact on the attractiveness of technology transfer. These expenditures can potentially 'crowd in' private investment, including FDI, especially if financed by non-distorting taxation.

How powerful the impact of government capital formation is expected to be depends on the growth model which is assumed. In a neoclassical model, say, in the Augmented-Solow tradition of Mankiw et al. (1992), the impact on growth will be transitory

although the level of income per person will be raised permanently. In an endogenous growth (AK) model such as that of Barro (1990) the returns to public investment are so large that the diminishing marginal returns to capital which give rise to the neoclassical predictions are offset and the long-run growth rate is increased.

The relevance of the AK model with its constant returns to (broad) capital accumulation may be greater for Ireland than for most other economies. Ireland may be seen as a regional economy in that labour can flow in and out relatively freely and the UK labour market is an alternative to work at home. In such a case employment is very responsive to labour demand and capital and labour inflows can be mutually reinforcing (Barry, 2002). Thus, public investment that attracts FDI can trigger an extensive growth process which is less vulnerable to diminishing returns because the growth of the employed labour force rises in tandem with physical capital. Increases in employment have indeed been a major feature of growth in Ireland since the late 1980s but based in considerable part on big falls in unemployment. This indicates a need to go beyond the regional economy model for the underpinnings of extensive growth and suggests that changes in the NAIRU (partly but not entirely related to the 'social contract') may have been supportive.

However, Ireland is not only a regional but also a peripheral economy with a small market potential. In recent decades, integration into international markets has been promoted both by falling transport costs and by cuts in tariff and non-tariff barriers to trade. Most obviously, Ireland joined the EU in 1973 and has been part of the European Single Market since 1992. The implications of these developments for industrial location decisions might be important influences on Irish economic growth and are somewhat ambiguous according to the new economic geography since at some levels of transport costs the impact on economic activity will be centralizing and at others dispersing, as the following example based on Krugman and Venables (1990) illustrates.

	Production Costs	Shipping Costs		
		High	Medium	Low
Produce in Both	12	0	0	0
Produce in Core	10	3	1.5	0
Produce in Periphery	8	8	4	0

Production costs are lower when all production takes place at one location because of increasing returns to scale and is cheapest when at the periphery where wages are lower. However, since demand is concentrated in the core, at any level of trade barriers, shipping costs are highest if all production is at the periphery. Cost minimization dictates that at low levels of economic integration production takes place in both regions, as integration becomes complete production goes to the periphery but at intermediate levels of integration production concentrates at the core. This opens up the possibility trade liberalization leads to divergence rather than convergence of incomes (Barry, 1996). Clearly, this has not been the Irish experience of EU membership but it is important to recognize that it might have been.

Ireland is a small open economy in which exports are now bigger than GNP. Moreover, GNP is now much lower than GDP because of the substantial flow of profits repatriated

by multinational companies. The welfare implications (and extent) of Irish catching-up and of the growth strategy based on attracting FDI have to be evaluated in the light of this extraordinary openness. In particular, it will be important to distinguish between faster output growth and the growth of real national income given not only the distortions introduced by transfer pricing but also that prices of some major Irish exportables have been falling steeply.

The Geographical and Historical Contexts

Table 1 shows that throughout the last 30 years Ireland has been a small peripheral economy within Europe if the standard measure of 'market potential', which measures proximity to GDP, i.e., demand, is used. European integration reduced the degree of peripherality from demand before the fast growth period but not by a great deal. The more recent gain in market potential reflects growth in Ireland's own economy.

Table 1. Market Potential: Ireland/EU Maximum (%)

1973	11.6	EU 6
1973	17.4	EU 9
1985	21.7	EU 12
2000	27.6	EU 15

Sources: Keeble et al. (1981) (1988); Brulhart et al. (2004)

The notion of Ireland as a Celtic Tiger relates only to growth since the late 1980s. During the Golden Age of European economic growth Ireland is better thought of as a failure. From 1950 to 1973, real GDP per person grew at 3.0 per cent per year compared with 5.0 per cent per year in Italy a country whose income level in 1950 was similar; by 1973 real GDP per person was only 65 per cent of the Italian level (Maddison, 2003). A cross-country regression analysis for European regions which controlled for initial income and industrial structure concluded that Ireland's growth rate in this period was about 1.3 percentage points per year lower than might have been expected given its opportunity for catching-up (Crafts, 1995). By 1998 Ireland had regained parity with Italy in terms of real GDP per person and was back where a simple model of post-1950 catch-up growth would predict (O'Grada and O'Rourke, 2000). Thus, the Tiger phase of Irish growth can be seen as a belated catch-up that made good the earlier under-performance.

The list of factors that inhibited Irish growth in the Golden Age and which had been reversed by the time of the Celtic Tiger is generally agreed but not their relative importance. Among the usual suspects are policies of protectionism superseded by a full embrace of integration into the European Single Market, irresponsible fiscal policies which generated large public sector deficits and macroeconomic disarray followed by a successful stabilization in the late 1980s, a malfunctioning labour market characterized by excessive real wages followed by a Social Partnership inaugurated in 1987 that delivered wage restraint, and a rise in years of schooling of the labour force which by the late 1980s had at last reached the level that Britain and Germany has attained in the 1950s (Barry, 2003).

Table 2 offers some comparisons of growth performance between the last part of the Golden Age, the troubled period before the reforms which preceded the Celtic Tiger were all in place, and finally the fast growth period after 1987. A distinctive aspect of the acceleration in growth is that, while there was a big increase in the rate of growth of GDP per person, labour productivity growth experienced only a modest rise. After 1987, employment growth was formidable, associated with rising labour force participation rates and a fall in unemployment from 17.5 per cent in 1987 to 4.6 per cent in 2003. Something quite dramatic changed in the Irish labour market which led to a substantial improvement in international competitiveness under the auspices of the social partnership. Real wages grew at 2.1 per cent per year compared with 3.4 per cent growth in real GNP per worker (Walsh, 2004).

Table 2. Growth of Real GDP/Head and Labour Productivity (% per year)

	GDP	GDP/Head	GDP /Worker	GDP/Hour Worked	Employment	Population
1961-73	4.3	3.6	4.2	5.0	0.1	0.7
1973-87	3.5	2.5	3.2	3.9	0.3	1.0
1987-2003	6.7	6.0	3.5	4.7	3.2	0.7

Source: Groningen Growth and Development Centre (2005)

However, the decline in unemployment may largely reflect enhanced investment in human capital. An index of human capital per worker based on educational attainment rose from 1.12 in 1966 to 1.24 in 1987 and 1.35 in 2002. A model of the Irish labour market suggests that, if there had been no further addition to human capital after 1982, GNP per person would now be about 20 per cent lower and unemployment would still be around 17 per cent since with many more unskilled workers to absorb generous unemployment benefits would prevent the required wage adjustment (Bergin and Kearney, 2004).

A second distinctive aspect of the Irish experience is the surge in FDI. Already by 1980 the inward stock of FDI per person in Ireland was more than ten times the average of the EU15. By 2003 the FDI stock per person in Ireland was about $40,000 per person greater than the EU15 level (UNCTAD, 2004). This FDI has been concentrated in clusters in information technology, pharmaceuticals, medical and optical devices (NACE 24, 30-33) which were not sectors in which Ireland traditionally had a comparative advantage and the output from these plants is almost entirely exported. As Barry noted, "the dangers analysed by Krugman and Venables (1990) have been dominated by the ability of the economy to attract multinational investment" (1996, p. 361).

The context of this success can be understood through a model based both on the new economic geography and also factor endowments which explains the location of industry on the basis of interactions between industrial and national characteristics. This suggests that the general evolution of the location of industry within the EU has seen an increasing role for market potential in attracting industries which have many linkage effects but, as shipping costs have decreased, it has gradually mattered less for industries with scale economies. This has allowed some activities that had been spatially concentrated to disperse (Midelfart-Knarvik et al., 2000). These sectors have comprised

a rapidly growing share of Irish manufacturing in the last 30 years and represent almost half of employment in foreign-owned firms (Barry, 2004).

The implication of this 'export-platform' FDI has been a big change in Ireland's revealed comparative advantage. Estimates for 2002 reported in Table 3 which show Irish strength in information technology and pharmaceuticals. These are new exportables which have developed since accession to the EU; Ireland's traditional revealed comparative advantage centred on clothing & footwear and food, drink & tobacco (Barry and Hannan, 2001).

Table 3. Revealed Comparative Advantage, 2002

Food and Live Animals	1.12
Beverages and Tobacco	0.97
Crude materials	0.34
Mineral Fuels	0.09
Animal and Vegetable Oils	0.11
Chemicals	3.30
Pharmaceuticals	4.80
Manufactured Goods	0.15
Machinery and Transport Equipment	0.77
Office Machines and Data-Processing Equipment	4.17
Miscellaneous Manufactures	0.79

Source: Addison-Smyth (2005)

Accounting for Irish Growth

It is generally agreed that recent Irish productivity performance is better measured by GNP rather than GDP (Cassidy, 2004). GNP in 2003 was about 17 per cent less than GDP. GNP leaves out the huge flow of repatriated profits of multinational companies which are inflated by transfer pricing encouraged by Ireland's generous corporate tax regime. It is plausible that the inflation of output by transfer pricing is close to the difference between GDP and GNP (Birnie and Hitchens, 1998).

Making this correction reinforces the point that the speeding up of Irish growth from 1987 was based much more on an acceleration in employment rather than labour productivity growth. As Table 4 reports, real GNP per hour worked grew at 3.1 per cent per year between 1973 and 1987 rising to 3.6 per cent per year in 1987 to 2003. Table 5 shows that, whereas a comparison of productivity levels based on GDP per hour worked suggests that Ireland had virtually caught up the United States by 2003, in terms of GNP per hour worked there was still a gap of more than 17 per cent. And because labour force participation and annual hours worked are greater in the United States the gap in real GNP per head is still about 30 per cent.

Table 4. Growth of Living Standards (% per year)

	GNP	GNP/Head	GNP/Hour Worked	GNP/Head Adjusted for TT	Consumption /Head
1973-87	2.7	1.7	3.1	1.0	1.1
1987-2003	5.6	4.9	3.6	3.9	4.1

Source: own calculations from CSO estimates

Table 5. Real GDP and GNP per Head and per Hour Worked (% United States)

	GDP/Head	GDP/Hour Worked	GNP/Head	GNP/Hour Worked
1973	41.1	44.3	41.3	44.5
1987	44.5	63.3	40.0	57.0
2003	84.3	99.7	69.8	82.6

Source: Groningen Growth and Development Centre (2005) and own calculations. Measured on a PPP basis.

Ireland is an export-orientated economy which had exports equal to 101 per cent of GNP in 2003 while between 1987 and 2003 the merchandise terms of trade fell by about 10 per cent. This means that real national income grew by less than real GNP per person because purchasing power over imports was eroded. A correction for this has been made in Table 4 based on the Geary and Burge method (Gutmann, 1981) which takes 1 percentage point per year off the growth rate of real GNP per person between 1987 and 2003. Table 4 also reports that real personal consumption per head grew at 4. 1 per cent per year during these years. The implication is that the Celtic Tiger delivered rather less in terms of Irish living standards than conventional measures of economic growth would suggest.

Table 6 reports the results of a conventional neoclassical growth accounting study. This indicates that Irish labour productivity growth has resulted more from TFP growth than capital-deepening. Indeed, a striking feature of the Celtic Tiger years is that the capital to labour ratio grew more slowly in Ireland than any other EU country except the Netherlands. TFP growth averaged about 3 per cent per year in both the 1980s and 1990s measured in terms of GDP but correcting this to a GNP basis reduces TFP growth to 1.68 and 2.51 per cent per year in the 1980s and 1990s, respectively. Once again, the message is that Irish productivity growth was highly respectable rather than spectacular and that its acceleration in the Tiger years was quite modest.

Table 6. Sources of Labour Productivity Growth (% per year)

	GDP/Hour Worked	Capital/Hour Worked	TFP Growth	TFP Growth on GNP Basis
1979-89	4.41	1.43	2.98	1.68
1989-99	3.31	0.24	3.07	2.51

Source: O'Mahony (2002) and own calculation for GNP basis

It is well-known that ICT contributed massively to a resurgence in productivity growth in the United States from the mid-1990s but that the EU countries were much less successful in this respect both because they had less ICT production and because they were much slower to invest in ICT equipment. Ireland, however, is an exception to this generalization since it has a very large ICT production sector based on American FDI. Irish TFP growth was given a large boost because of this as technological progress in ICT production accelerated. As Table 7 reports, growth accounting estimates by van Ark et al. (2003) attribute 3.70 percentage points per year of Irish labour productivity growth to ICT in the period 1995 to 2000 with 3.02 percentage points from ICT production while the contribution of other TFP growth at 1.25 percentage points was unremarkable, although well above the EU average.

Table 7. Contributions to Labour Productivity Growth: Ireland vs EU (% per year)

	Ireland		EU	
	1990-5	1995-2000	1990-5	1995-2000
ICT Capital-Deepening	0.21	0.68	0.28	0.40
ICT TFP	1.17	3.02	0.14	0.20
ICT Total	1.38	3.70	0.42	0.60
Other Capital-Deepening	0.43	0.93	1.05	0.40
Other TFP	1.79	1.25	0.98	0.43
GDP/Hour Worked	3.60	5.88	2.45	1.43

Source: van Ark et al. (2003)

It is also worth noting that the 'social savings' (consumer surplus) gains from ICT amounted to only 3.6 per cent of GDP in 2001, not that much above the EU average of 3.1 per cent (Bayoumi and Haacker, 2002). This implies that a very substantial part of the TFP growth in ICT production benefited consumers in the rest of the world to whom Ireland exported ICT goods. This underlines the need explicitly to take into account open economy aspects when evaluating Ireland's economic performance.

Supply-Side Policy

Since the 1960s, Ireland's economic development strategy has centred on attracting FDI and has thus been based primarily on technology transfer. In this section, the overall dimensions of supply-side policy will be analyzed here in the context of the ideas of

Abramovitz and Barro while the geographical aspects and the impact on FDI will be examined in detail in the next section.

Table 8 gives an overview of Ireland's position relative to its EU peer group in terms of education, infrastructure, regulation and taxation based on the most recent data available. Prima facie, the picture is one of relatively low taxation and light regulation, a strong performance in education but rather backward in terms of infrastructure. In fact, Ireland is an outlier in terms of corporate taxation with a tax rate less than half the next lowest while its rating on maintenance and development of infrastructure places it a bit below India.

Table 8. Aspects of Today's Supply-Side Policy in Ireland

Indicator	Score	Ranking in EU
PISA		
Reading	515	2/14
Mathematics	503	7=/14
Science	505	6/14
Science & Engineering Tertiary Education (% age 20-29)	9.2	3/15
Educational System (1-10)	7.50	3/15
R & D (% GNP)	1.39	11/15
Maintenance and Development of Infrastructure (1-10)	3.83	14/15
Communications Technology (1-10)	5.83	15/15
Product Market Regulation (0-6)	1.1	2=/15
Employment Protection Regulation (0-6)	1.0	2/14
Direct Tax Revenues (% GNP)	20.9	2/15
Corporate Tax Rate (%)	12.5	1/15

Sources: PISA: OECD (2004a); Tertiary Education, R & D: European Commission (2004); Educational System, Infrastructure, Communications: IMD (2004); Product Market Regulation: Conway et al. (2005); Employment Protection Regulation: Nicoletti et al. (2000); Direct Tax Revenues: OECD (2004b); Corporate Tax Rate: Spengel and Wiegard (2004)

A more detailed consideration of the evidence confirms but also qualifies this picture in some respects. With regard to infrastructure in Ireland, econometric investigation finds that there was no significant effect of public sector capital on private sector output in the years 1958 to 1990 (Kavanagh, 1997). A recent review noted that there had been substantial under-investment in public infrastructure especially in the years 1980 to 1993 with the result that the economy "was unprepared for success" (Fitzgerald, 2002). On the other hand, telecom investments in the early 1980s were instrumental in facilitating Ireland's move into electronic commerce (MacSharry and White, 2000).

Ireland's approach to education and research and development has until recently emphasized science and technology graduates but more in the context of complementing FDI than undertaking substantial domestic innovation. Thus Ireland has spent relatively little on research but has the highest proportion in the EU of college students studying scientific subjects. University enrolment increased from 19,500 students in 1971 to 63,100 in 2003 while the fraction studying science, computing and IT rose from 11.7 to 19.5 per cent over the same period. In order to encourage the location of ICT production

in Ireland, there was a very rapid expansion of electrical engineering courses in the late 1970s and Ireland now scores well on IT skills. That said, in the mid-1990s about 50 per cent of the Irish labour force had levels of competence inadequate to participate in the 'knowledge economy' compared with around 25 per cent in the best-placed country, Sweden (OECD, 2000).

The distinctive feature of the Irish educational system is its large number of non-university tertiary level students (almost 40 per cent of all students at this level) who typically take 2-year courses at sub-degree level mostly in engineering and technology, science and computing, or business studies. Thus, in the 1970s, Ireland's successful response to the human-capital needs of FDI was rapidly to develop a low-cost way of producing a large volume of technical graduates and it was this rather than the quality of the educational system as a whole that facilitated their rapid growth (Wickham and Boucher, 2004).

Relatively little R & D has taken place in Ireland with expenditure only reaching 1 per cent of GNP in the late 1980s and at 1.4 per cent of GNP in 2001 well below the EU average. Business sector R & D was about 1.0 per cent of GNP in 2001 and a striking feature of recent Irish experience is the relatively low research orientation of the foreign-owned sector - their R & D expenditure was only 0.6 per cent of output in 2001, about half what it had been a decade earlier. Spending on innovation by firms has been modest; on a definition for a survey by Eurostat it was only about 70 per cent of the EU average in 1996 and success in converting this into new products was just above average (Hinloopen, 2003). Ireland has no great tradition of research in its universities which have primarily concentrated on teaching undergraduates and it has been well behind the European leaders in both patenting and publication of science and engineering journal articles, as Table 9 reports.

Table 9. Patenting and Journal Articles

	Patents/Capita 1992-4	Patents/Capita 2000-2	Articles/Capita 1992-4	Articles/Capita 2000-2
Austria	41.4	67.9	391.6	547.5
Belgium	34.0	70.3	459.2	570.7
Denmark	38.6	85.5	813.6	926.9
Finland	63.7	140.4	724.7	962.9
France	50.5	67.3	467.9	527.4
Germany	86.1	132.9	436.2	529.1
Greece	0.9	2.1	175.7	294.1
Ireland	14.7	34.1	291.7	424.7
Italy	22.1	30.0	279.1	375.7
Netherlands	55.1	83.0	749.9	784.4
Portugal	0.4	1.2	81.6	194.9
Spain	3.8	7.2	252.1	373.5
Sweden	75.7	187.3	985.5	1133.2
United Kingdom	40.1	65.0	748.4	823.8

Sources: OECD Patent Database and US National Science Foundation

Since the late 1990s there has been a new emphasis in supply-side policy on strengthening Ireland's capabilities in R & D with a view to making a transition towards a more knowledge-intensive economy in the context of moving further up the ladder of comparative advantage. The National Development Plan has allocated 2.48 billion euros to public support for R & D in the period 2000 to 2006. A new agency, Science Foundation Ireland, was created in 2000 to administer a 646 million euro Technology Foresight Fund designed to improve links between the research community and the enterprise sector. The Programme for Research in Third-Level Institutions has established 24 major research centres with a particular emphasis on bio-science/medical research. The government economic development agency, Forfas (2004a), has stated that by 2010 it wishes R & D to be 2.5 per cent of GNP of which the business sector should do about two-thirds. A new R & D tax credit was introduced in 2004.

This represents quite a change in stance from that of traditional Irish industrial policy which simply sought to address unemployment by subsidizing job creation through grant aid to approved investment projects. Thus, during the 1980s about £1.63 billion was paid in grants of which about 60 per cent went to foreign-owned firms. Most start-ups were aided - 77 per cent of foreign-owned and 70 per cent of indigenous firms (Industrial Policy Review Group, 1992).

With regard to income taxation, the notable feature is a reversal of the pre-1980 trend towards a much higher tax take which rose between 1955 and 1980 from 11.8 to 21.3 per cent of GDP (OECD, 1981). The change in strategy came under the auspices of the social partnership agreements which saw the standard and top rates of income tax fall by about 10 percentage points between the late 1980s and late 1990s during which time tax cuts accounted for about a third of increases in real take-home pay (Barry, 2004). Throughout the period since EU accession, Irish governments have fiercely defended low corporate taxation against tax harmonization pressures.

The acceleration of Irish economic growth coincided with a doubling of inflows of EU Structural Funds to about 3 per cent of GDP through the 1990s. These have been used for investment in infrastructure and human capital as well as subsidies to private sector investment. The direct impact of these inflows may have added about 0.5 percentage points per year to Irish growth during the 1990s and the long run effect is estimated to raise the level of Irish GDP by about 2 per cent (Barry et al., 2001). The indirect effects remain to be researched but may have been more important if, for example, it could be established that the easing of the government budget constraint was important to cementing the social partnership along the lines that Eichengreen and Uzan (1992) suggested that the Marshall Plan had its main impact on early postwar European growth.

A perspective on the overall impact of Ireland's public expenditure and taxation policies in terms of the Barro growth model can be obtained using the econometric results in Kneller et al. (1999). Their estimates indicate that an increase of 'productive public expenditure' or a reduction in 'distortionary taxation' by 1 per cent of GDP raises the growth rate by about 0.1 per cent per year. Compared with the EU15, the share of GDP devoted to productive public expenditure in the 1990s was about 3 percentage points below the average while the share of distortionary taxation was about 8 percentage points lower. Overall, this fiscal stance might be predicted, ceteris paribus, to have

given Ireland a small growth advantage over its EU peer group but this would result entirely from lower taxation not higher government spending.

Attracting FDI

Table 10 reports estimates of the stock of inward FDI per person in Ireland compared with the UK and the EU as a whole. This shows that Ireland has been hugely more successful than its European peer group in attracting FDI, the inflow of which from the United States during the 'new economy' years of the late 1990s was ferocious. This section seeks to understand why Ireland has been the destination for so much FDI in the context of new economic geography.

Table 10. Inward FDI Stock/Person ($)

	Ireland	UK	EU15
1980	9198	1119	639
1985	9091	1131	780
1995	11084	3419	3049
2003	49259	11183	8767

Source: UNCTAD (2004).

Table 11 reports that by 2000, foreign-owned firms accounted for employment of almost 123,000 people, or 48 per cent of total employment in manufacturing. They completely dominated employment in chemicals (pharmaceuticals), office & data processing, radio, TV & telecoms and in medical & optical instruments which together comprised 52 per cent of foreign-owned manufacturing employment. On a European-wide basis none of these sectors was becoming more spatially concentrated and three were classified as CD by Midelfart-Knarvik et al. (2000). Compared with industry in general, these sectors are high-skilled but are not ones with high linkage effects.

Table 11. Sectoral Allocation of FDI Employment, 2000

	Jobs in FDI Firms	FDI/ Total (%)	Location	IRS	S/L	Linkages
Food, Drink & T.	13170	27.4	CD	L	M	H
Textiles, Clothing	3703	33.7	DC	L	L	M
Wood	1111	17.8	DD	L	L	M
Paper & Printing	7457	31.3	DD	M	H	M
Chemicals	17874	77.0	R	H	H	M
Rubber & Plastics	3951	36.4	R	L	M	M
Non-M Minerals	1584	14.2	DD	M	M	M
Metal Products	3554	21.0	DD	M	L	M
Machinery	6436	44.7	CD	M	H	M
Office & Data Pr.	18303	88.3	CD	M	H	L
Electrical App.	9438	62.3	CC	M	M	M
Radio, TV	12785	85.3	CD	M	H	L
Instruments	15335	84.7	CD	M	H	L
Transport Equip.	5365	55.8	DC	H	M	M
Other	2912	25.5	R	L	L	L
Total	122978	48.1				

Sources: Barry (2004) based on Census of Production; Midelfart-Knarvik et al. (2000) classify industries as C is spatially concentrated, D is spatially dispersed, R is residual with the first letter referring to 1970 and second letter to 1997, and allocate industries by top (H) middle (M) or bottom third (L) according to scale economies (IRS), skill-intensity (S/L), and linkages.

Analysis of decisions of American multinationals as to whether to locate in Ireland suggests that agglomeration benefits have been important in terms of knowledge spillovers and thick labour markets but that there has also been a demonstration effect - initial success provided a strong signal to other firms to follow (Barry et al., 2003). For example, by 2000, 16 of the world's top 20 pharmaceutical companies had manufacturing plants in Ireland (MacSharry and White, 2000). Especially as Irish labour becomes more expensive and as competition from the EU enlargement countries intensifies, the strength of these external economies of scale will be a key determinant of whether foreign-owned manufacturing re-locates away from Ireland. There are more signs that this will happen in computer assembly than in software (Barry and Curran, 2004).

The focal point of Irish industrial policy, at least since the establishment of the Industrial Development Agency (IDA) in 1969 has been FDI. The IDA has operated on the basis of targeting key sectors and seeking to persuade leading players to invest in Ireland, an EU country. Two of these target sectors from the 1970s were electronics and pharmaceuticals in which there was no domestic industrial tradition. The pro-active approach of the IDA was to break the mould of Ireland's traditional comparative advantage and to deliver complementary investments, for example in upgrading telecoms infrastructure or boosting college courses in relevant subjects (MacSharry and White, 2000). A key selling point was Ireland's generous corporate tax regime.

Ireland introduced Export Profit Tax Relief in 1956 on 50 per cent of profits and from 1958 on all profits from exports of manufactures up to 1990. This scheme was abolished

in 1978 and replaced by a 10 per cent corporate tax rate on all manufacturing industry for profits made before 2000, and in 1990 this period was extended to 2010. In 1998, a deal with the European Commission was announced in which these commitments would be honoured but from 2003 a universal corporate tax rate of 12.5 per cent would apply (a reduction from 28 per cent on service sector businesses).

Both anecdotal and econometric evidence suggests that inward FDI has been greatly stimulated by Irish tax policy, the more so once Ireland was within the EU. The estimated tax elasticity of US FDI flows suggests that the stock of US manufacturing investment is about 70 per cent higher than if Ireland had had a tax rate equivalent to the next lowest in the EU (Gropp and Kostial, 2000). Ireland has been viewed by American multinationals as an attractive location from which to access European markets (Slaughter, 2003) and, although peripheral within the EU, Ireland is geographically much closer to world markets than the typical developing country (Redding and Venables, 2004).

Economic theory suggests that a massive inflow of FDI resulting in the development of a large foreign-owned manufacturing presence might have both negative and positive implications for indigenous firms. Adverse effects would come in the form of some sort of 'crowding out'. This might be direct competition at the micro-level where more efficient foreign entrants displace incumbent domestic producers. Alternatively, the mechanism might be indirect working through the price mechanism. For example, increased demand for labour might raise wage rates or exports by foreign-owned firms might push the exchange rate up affecting the international competitiveness of the Irish-owned sector. Positive effects could result either from technological spillovers or pecuniary externalities resulting from backward linkages. The latter would not be relevant under perfect competition and constant returns to scale but could benefit the economy if production in the indigenous sector is characterized by imperfect competition and scale economies in which case costs may fall as employment rises (Markusen and Venables, 1999).

It is certainly true that employment in indigenous manufacturing has fallen in the last 30 years. From 1973 to 2000, this fell from 73 to 52 per cent of manufacturing employment and from 158,000 workers to 133,000. However, during the Celtic Tiger phase employment in Irish-owned manufacturing rose by about 10 per cent. There is in fact relatively little direct competition between foreign-owned and indigenous firms either in the product or labour markets. Foreign-owned firms mainly produce for export and in sectors where there is little domestic firm presence and they mainly employ workers who are much more highly-skilled. Investigations of crowding out through macroeconomic feedbacks have focused on the labour market and have concluded that these were of no importance throughout the 1990s given the elasticity of the Irish labour supply (Barry, 2004).

Over time backward linkages have become stronger. In the mid-1980s purchases of Irish raw materials and components were about 15 per cent of total purchases of foreign-owned manufacturing firms but by 1997 this had risen to 21 per cent (Forfas, 1999). For the electronics sector the rise of purchases from Irish suppliers was greater from 8 to 24 per cent of total purchases and there is a clear pattern that as the length of stay of a multinational increases it buys more intermediates from the local economy (Gorg and

Ruane, 2001). Investigation of the input-output implications found that for each 100 jobs in foreign-owned manufacturing backward linkages created about 100 jobs in services and about 10 indigenous manufacturing jobs (O'Malley, 1995). Econometric analysis also indicates that the arrival of multinationals has positive effects on the growth of domestic firms; a recent estimate is that holding constant multinational presence at the 1972 level would have implied about 800 fewer indigenous plants in 2000 (Gorg and Strobl, 2004).

The existence of these backward linkages opens up the possibility of favourable impacts on indigenous productivity through pecuniary externalities but the magnitude of any such effects has not yet been established. However, there is evidence that the presence of foreign-owned firms has small positive effects on the productivity performance of domestic firms in the same sector presumably through technological spillovers. Ruane and Uour (2002) found for 1991-1998 that, controlling for use of physical capital and for labour force skills, at the 4-digit level the larger the absolute size of employment in multinationals the higher the level of labour productivity in domestic firms.

By the 1990s, the IDA was placing much more emphasis on targeting service sector activities. Ireland has emerged as a very strong performer in terms of offshored business services. McKinsey Global Institute (2003) identified a market of $25.7 bn in 2001 and found that by far the most popular destinations were Ireland ($8.3 bn) and India (£7.7 bn). UNCTAD (2004) reported that Ireland had 25 per cent of the global market for offshored IT and IT-enabled services. More recently, however, there are signs that Ireland's share of new projects is falling, as Table 12 reports. In view of its high labour costs compared with developing countries, it seems unlikely that Ireland can maintain a strong presence in offshored services except in high-skilled activities in which there are significant agglomeration economies, say, software development rather than packaged software (Barry and Curran, 2004).

Table 12. Export-Oriented FDI Projects, 2002-3.

	Call Centres	Shared Service Centres	IT Services	Regional Headquarters
World	513	139	632	565
EU 15	169	38	208	185
Ireland	29	19	14	15
UK	43	7	73	64

Source: UNCTAD (2004)

In fact, there is now a clear recognition across Ireland's enterprise development agencies that the original Celtic Tiger model is under threat since costs have risen and competition for FDI has intensified. This is informing a desire to attract 'higher-quality' FDI. A transition to higher-value manufacturing and more internationally-traded services is seen as the next phase of Irish growth (Forfas, 2004b). Among the sectors that might be in the forefront of this are bio-pharmaceuticals, supply chain management, cardiovascular technologies, and healthcare services. The aim is to build on expertise and clusters.

Ireland has a very large stock of inward FDI. Tax policy has been fundamental in attracting foreign investment but Ireland has also made complementary investments in skills formation and in telecommunications. Sectors with strong productivity growth potential such as ICT have migrated to Ireland and its peripherality within the EU has not proved a big handicap. There has been a virtuous circle in that external economies of scale and demonstration effects have reinforced Ireland's attractions.

Lessons from the Irish Experience

Ireland has enjoyed a remarkable phase of catch-up growth since the late 1980s after having missed out in the Golden Age of European growth which ended in the early 1970s. This raises three questions. How successful has Irish economic policy been? Can the Irish experience be replicated elsewhere? Will rapid economic growth be sustainable?

It is important point to recognize that well-designed policy has been at the heart of Ireland's success, although favourable changes in the economic environment played a part. Ireland has benefited from globalization of capital markets and from the productivity implications of the ICT revolution but nevertheless had to position itself to take advantage of these opportunities. Irish policy was pro-active in pursuit of a development strategy based on attracting FDI through a generous fiscal regime supported by investments in upgrading skills and infrastructure. It is clear that FDI responded strongly to these initiatives.

Yet, a striking feature of the Celtic Tiger phase was the very rapid growth of employment based on a transformation of the Irish labour market. This suggests that complementarities have been central to Irish economic policy in creating an elastic labour supply to go along with FDI. Thus, the change in wage bargaining under the social partnership and investment in human capital allowed the incentives to FDI to have growth-rate effects of the type envisaged by an AK model. Resultant gains in cost competitiveness also underpinned Ireland's attractiveness for FDI (Barry et al., 2003).

The welfare gains from rapid growth have been impressive but less than a casual glance at conventional national accounts measures might suggest. While real GDP per person grew at 6 per cent per year between 1987 and 2003, the growth of real per capita consumption was 4.1 per cent per year. The difference is partly a result of transfer pricing and repatriation of profits which have meant that GNP has grown less than GDP and partly a result of a large export surplus combined with declining terms of trade.

Ireland's rapid catch-up can be interpreted in terms of the concepts of social capability and technological congruence introduced by Abramovitz (1986). Institutional quality was already high but incentives for investment were strengthened by fiscal policy and by reforms in wage bargaining. Technology transfer through FDI was enhanced by improvements in education and infrastructure, although it might be argued that more should have been done. In these aspects, the Irish example can be emulated given good governance and adequate public investment.

In some respects, however, Ireland may be a special case and not a role model. First, very few countries can expect to equal the exceptional contribution of ICT to labour

productivity growth because it will not be possible to establish similarly big ICT production sectors for export. Second, Ireland's attractiveness to FDI has been based partly on its location near to European markets and its EU membership. Clearly, countries like the Czech Republic are similarly favoured but most are not. Third, Irish practitioners themselves think that the IDA model is very hard to copy because it meets resistance from vested interests in the bureaucracy, is vulnerable to corruption and is typically unlikely to be adequately funded (MacSharry and White, 2000).

The Celtic Tiger model of growth that was so successful from the late 1980s to the turn of the century requires adaptation and, in any event, growth will be less rapid in future. The most obvious reason for this is that employment growth will be slower now that reserves of unemployed workers have been exhausted. The real challenge to policy-makers, however, is to assist in enhancing Ireland's innovative capabilities and to facilitate a move to a more knowledge-intensive economy and thereby to reduce exposure to competition for FDI from low-tax, low-wage economies. The emphasis will switch towards provision of highly-educated personnel and support for advanced technologies with rather less reliance on low corporate taxes to underpin technology transfer through FDI.

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The graph on the cover, generated by means of fractal geometry model, simulates a pattern formed by three ring vortices playing catch up with one another (also called 'chaotic leapfrogging').

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