## QUANTITY VERSUS QUALITY:
## THE GROWTH ACCOUNTING IN IRELAND*

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### 1. INTRODUCTION

Recent studies on the Irish economic performance have laid little emphasis on its comparison with other countries. This paper is intended to fill this gap, by analysing growth in Ireland in the light of the differences between this country and the Iberian countries. Portugal and Spain, as well as Ireland are integrated in the same economic area, having a comparable level of development. Since there are no significant differences among the political regimes and the economic systems in these three countries, the comparison of the policies pursued may shed some light on the causes behind economic progress in Ireland over recent years.

Section 2 quantifies the contribution of labour, capital and total productivity to growth in the three countries. This analysis enables us to distinguish a transitory component in recent growth in Ireland, related to convergence towards full employment, and a long-term component. Section 3 discusses the extent to which the transitory component is related to the change in the fiscal policy stance in the second half of the 1980s. Section 4 analyses long-term growth in Ireland, taking into account the move towards increasing economic openness, started at the end of the 1950s, supported by foreign capital, and the developments that have since occurred in the physical, human and institutional infrastructures. Section 5 concludes.

### 2. GROWTH ACCOUNTING

Ireland has been growing at a faster pace than the Iberian countries since the first oil crisis (table 1). From 1974 to 1998, the average growth rate in Ireland stood at around 4.8 per cent compared with 3.5 per cent in Portugal and 2.6 per cent in Spain[1]. In the three countries growth was boosted by exports, which expanded at an average rate of 10.1 per cent, 5.9 per cent and 7.0 per cent respectively over the same period. Growth in Ireland accelerated significantly in the 1994-98 sub-period, having reached a trend growth rate of around 7.2 per cent per year.

In table 1, output growth in Portugal, Spain and Ireland is compared with the accumulation of labour and capital. In the interpreting of the data, it is important to take into account the way in which they are defined. In particular, since labour is measured by the number of workers and the capital stock is derived from data on aggregate investment, these series do not capture differences or changes in the quality of inputs. Hence, the evidence that the capital stock has been growing at a more moderate pace in Ireland than in the Iberian countries, while labour productivity has been growing faster, is largely due to reflect different paths regarding the quality of inputs.

In table 2, the output growth per capita (income in the case of Ireland) is broken down into labour contribution, capital labour ratio and Solow residual. The exercise shows that a significant share of growth in Ireland is not accounted for by a simple accumulation of factors. From 1974 to 1998, the Solow residual was around 2.7 per cent, corre-

## Table 1

### OUTPUT, EMPLOYMENT AND CAPITAL STOCK

### Annual average rates of change

|  | 1964-73 | 1974-83 | 1984-93 | 1994-98 |
|---|---|---|---|---|
| **Ireland** | | | | |
| GDP . . . . . . . . . . . . . . . . . . . . . | 4.6 | 3.7 | 4.7 | 7.2 |
| Employment. . . . . . . . . . . . . . | 0.1 | 0.3 | 0.8 | 3.6 |
| Capital stock. . . . . . . . . . . . . | 1.4 | 3.3 | 2.7 | 3.1 |
| Memo: | | | | |
| Labour productivity . . . . . . . | 4.5 | 3.4 | 3.9 | 3.4 |
| **Spain** | | | | |
| GDP . . . . . . . . . . . . . . . . . . . . . | 6.2 | 2.5 | 2.7 | 2.5 |
| Employment. . . . . . . . . . . . . . | 0.7 | -0.6 | 0.6 | 1.1 |
| Capital stock. . . . . . . . . . . . . | 12.6 | 5.6 | 4.1 | 3.8 |
| Memo: | | | | |
| Labour productivity . . . . . . . | 5.5 | 3.2 | 2.2 | 1.4 |
| **Portugal** | | | | |
| GDP . . . . . . . . . . . . . . . . . . . . . | 5.7 | 3.6 | 3.7 | 2.9 |
| Employment. . . . . . . . . . . . . . | 0.9 | 0.6 | 0.9 | 0.7 |
| Capital stock. . . . . . . . . . . . . | 12.8 | 6.3 | 4.6 | 4.0 |
| Memo: | | | | |
| Labour productivity . . . . . . . | 4.7 | 3.0 | 2.7 | 2.1 |

Sources: OECD (1999b) and Banco de Portugal. All series were filtered by the HP. Capital stock series on Ireland and Spain refer only to the business sector. Average labour productivity is measured by the GDP- employment ratio, with the former valued at market prices, because there are no comparable series at factor costs.

## Table 2

### IRELAND: EXOGENOUS GROWTH ACCOUNTING

### Annual average rates of change

|  | 1964-73 | 1974-83 | 1984-93 | 1994-98 |
|---|---|---|---|---|
| **Ireland** | | | | |
| Participation rate . . . . . . . . . . . . . | -0.7 | 0.1 | 0.4 | 2.2 |
| Employment rate . . . . . . . . . . . . . | 0.0 | -1.1 | 0.3 | 0.6 |
| Labour productivity . . . . . . . . . . | 4.5 | 3.4 | 3.9 | 3.4 |
| of which: | | | | |
| K/L contribution . . . . . . . . . | 0.6 | 1.5 | 1.0 | -0.3 |
| Solow residual . . . . . . . . . . . | 3.8 | 2.0 | 2.9 | 3.7 |
| Net factor income adjustment . . | -0.2 | -0.8 | -0.6 | -0.7 |
| *Per capita* income . . . . . . . . . . . . . | 3.6 | 1.6 | 3.9 | 5.6 |
| **Spain** | | | | |
| Participation rate . . . . . . . . . . . . . | -0.2 | -0.3 | 0.9 | 0.7 |
| Employment rate . . . . . . . . . . . . . | -0.2 | -1.2 | -0.6 | 0.2 |
| Labour productivity . . . . . . . . . . | 5.5 | 3.2 | 2.2 | 1.4 |
| of which: | | | | |
| K/L contribution . . . . . . . . . | 6.2 | 3.2 | 1.8 | 1.4 |
| Solow residual . . . . . . . . . . . | -0.7 | -0.1 | 0.4 | 0.0 |
| *Per capita* GDP . . . . . . . . . . . . . . | 5.1 | 1.6 | 2.5 | 2.4 |
| **Portugal** | | | | |
| Participation rate . . . . . . . . . . . . . | 1.3 | -0.2 | 0.7 | 0.9 |
| Employment rate . . . . . . . . . . . . . | -0.2 | -0.3 | 0.1 | -0.3 |
| Labour productivity . . . . . . . . . . | 4.7 | 3.0 | 2.7 | 2.1 |
| of which: | | | | |
| K/L contribution . . . . . . . . . | 5.8 | 2.8 | 1.8 | 1.6 |
| Solow residual. . . . . . . . . . . . | -1.1 | 0.2 | 0.9 | 0.5 |
| *Per capita* GDP . . . . . . . . . . . . . . | 5.8 | 2.4 | 3.5 | 2.8 |

Sources: Data derived from OECD (1999b) series and Banco de Portugal, taking growth rates in $(Y / N) = (A / N)(L / A)$ $(Q / L)(Y / Q)$ and using $(Q / L) = B(K / L)^{1-\alpha}$, where $Y$ is national income, $Q$ GDP, $N$ total population, $A$ labour force, $L$ the employment level, $B$ technology and $\alpha$ the share of labour in national income (for Spain and Portugal, income was not included in the breakdown). The employment rate $(L / A)$ measures the population employed as a percentage of the labour force. The Solow residual $(\Delta B / B)$, obtained residually, measures the share of the growth of labour productivity which is not explained by the increase in the capital labour ratio, reflecting namely technological progress and the increase in the quality of inputs. The labour shares used correspond to the average figures for the period, i.e. 51 per cent for Ireland and Portugal and 48 per cent for Spain. The original output, income, employment and capital stock series were filtered by the HP.

sponding approximately to 56 per cent of the output growth[2]. This figure is very high by international standards[3]. Over the same period, the Solow residual accounted for only 4 per cent of growth in Spain and 16 per cent in Portugal. The main growth factor in the Iberian countries has been the volume of capital (92 per cent in Spain and 73 per cent in Portugal against 31 per cent in Ireland). In brief, the long run evidence is that there are significant qualitative differences between the growth paths in Ireland and in the Iberian countries.

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(2) These results are not much different from those obtained by Kenny (1996). For the 1970-96 period Kenny obtained an average residual of 2.4 per cent (59 per cent of growth), while our calculations point to an average of 2.8 per cent (60 per cent of growth). Specifying the same labour share as Kenny (1996), i.e. 32 per cent, we would have obtained in our sample a Solow residual equal to 2.4 per cent (51 per cent of growth) for the same period.

(3) According to Gylfason (1999), the growth of total factor productivity over the past 30 years recorded an annual rate of 1.3 per cent (33 per cent of growth) in seven OECD countries and 1.2 per cent (13 per cent of growth) in South-eastern Asia.

The figures displayed in table 2 also reveal that the acceleration of growth in Ireland in 1994-98 largely reflects a higher use of labour. Due to the rise in both the participation rate (2.2 per cent) and the employment rate (0.6 per cent) from 1994 to 1998, it was possible to record annual increases in per capita income as high as 5.6 per cent while la-

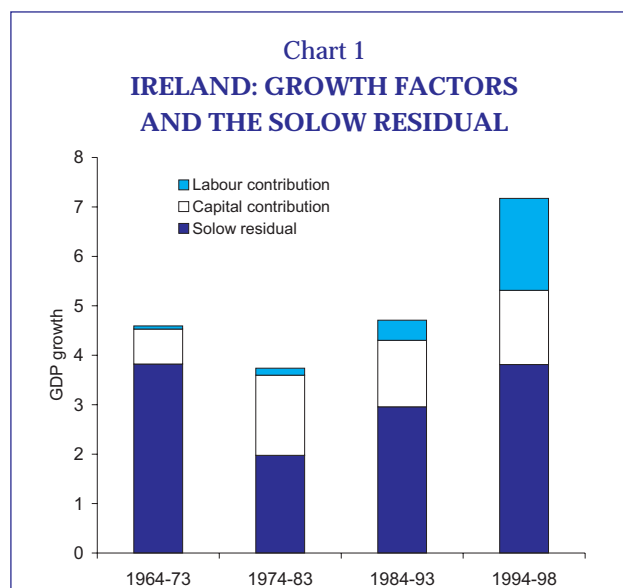bour productivity only increased by 3.4 per cent (see also chart 1)[4]

This evidence suggests that the acceleration of growth in 1994-1998 was the result of a transition process from a state of underutilisation of the existing human resources to a state of higher utilisation of such resources[5]. Throughout this process, the increase in the labour force (resulting from exceptional demographic circumstances and also from factors endogenous to growth itself)[6] contributed to widening the resources constraint of the economy. However, as the level of activity stabilises and the remaining unemployment is eliminated, the output growth is likely to return to its long-term level.

The observation that growth rates of the order of those recorded in Ireland in 1994-98 were only possible due to the existence of available human resources enables to qualify the acceleration of growth as transitory, but obviously it does not explain it. In Spain, for instance, human resources have not been a constraint to growth, but the results obtained in the employment area have been much different from those observed in Ireland (chart 2). With regard to Portugal, data suggest that a surge of growth similar to that observed in Ireland in 1994-98 could not have occurred[7] This analysis suggests two lines of discussion:



**Chart 1**
**IRELAND: GROWTH FACTORS AND THE SOLOW RESIDUAL**

Source: Table 2.



**Chart 2**
**EMPLOYMENT RATE IN IRELAND, SPAIN AND PORTUGAL**

Source: OECD (1999b), population employed as a percentage of the labour force (narrow sense).

— On the one hand, the acceleration of growth and the reduction of unemployment in the 1990s (transitory component) suggest a relevant role for the economic policy shift that

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(4) Due to filtering, the employment growth rate appearing in table 2 is underestimated. The actual employment growth rate in 1994-98 was 4.9 per cent per year (26.8 per cent in the same period), broken down into an increase in the participation rate (2.2 per cent), in the employment rate (1.8 per cent) and in population (0.8 per cent).

(5) For the economic growth of Ireland from the beginning of this century until the 1990s and, particularly, for the causes of high emigration and low participation, see Ó Gráda and O'Rourke (1995).

(6) The increase in the participation rate between 1994 and 1998 (2.2 per cent per year) may be broken down into (i) increase in the weight of working age population (0.9 per cent per year), as a result of a belated baby boom, with a peak in 1980 and which, according to the OECD (1999a), is bound to have repercussions up to 2011; (ii) higher participation among working age population (1.3 per cent per year), due to the increase in real wages (see Section 3). These include the increase in women participation (also pushed by the cultural transformation in process) and, more recently, the reversal of migrating flows. According to the OECD (1999a), the increase in female participation is expected to decelerate in the future, although remaining unchanged up to 2005.

(7) The conclusion above relies on employment rate figures. As to the participation rate, in 1998 the ratio of working population to the working age population (between 15 and 64 years of age) was 62 per cent in Spain, 66 per cent in Ireland, 67 per cent in France, 68 per cent in Portugal, 76 per cent in the UK and 78 per cent in US and Japan (OECD, 1999b). These figures suggest that there is some room for improvement in the three countries under analysis, although the observation remains that Spain has a higher growth potential.

occurred in the mid-1980s. This issue is discussed in Section 3.

— On the other hand, the growth of total factor productivity over the past 40 years (permanent component) must be analysed in the light of the strategy of openness pursued and infra-structure endowments. These aspects are discussed in Section 4.

## 3. THE CONTRIBUTION OF FISCAL POLICY

In the 1970s the systematic recourse to the budget to promote employment in Ireland led to a continued rise in the Government debt. When Ireland joined the European Monetary System (EMS) (in 1979), the direct government debt amounted to 71 per cent of GDP (compared with 56 per cent in 1974), fuelling fears of instability.

During the first half of the 1980s, while seeking to reduce inflation in order to validate the exchange rate system, the government endeavoured to improve its financial position by raising fiscal revenue. From 1979 to 1988, total taxes and social security contributions increased from 30 per cent to 38 per cent of GDP. However, the deficit reduction was negligible, due to high interest payments. With the increase in taxation, the economy stagnated, the unemployment rate increased to 17 per cent and the government debt continued to widen, reaching 118 per cent of GDP in 1988[8].

After 1987, the government financial crisis was fought by means of expenditure cuts. From 1987 to 1990 current expenditure recorded a real cumulative drop of 17 per cent (European Commission, 1996)[9]. In 1988, the government debt started to decline and is expected to fall to around 40 per cent of GDP in 2000.

Although Portugal and Spain have also made significant fiscal adjustments, the one imple-

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(8) The recessive effect caused by the high marginal tax rates prevailing in 1981-86 led some authors to argue that, instead of a fast inflation reduction, it would have been preferable to maintain temporarily some level of monetary financing, while a fiscal reform was being prepared (Dornbusch, 1989).

(9) According to the same source, the cut in current expenditure from 1987 to 1990 is likely to have reached approximately 8 per cent of GDP, 2.8 per cent of which in current transfers (from 16.9 per cent to 14.1 per cent), 2 per cent in public consumption (from 17.0 per cent to 15.0 per cent) and 1.4 per cent in interest payments (from 9.2 per cent to 7.8 per cent).

Chart 3
**GROSS GOVERNMENT DEBT**
As a percentage of GDP
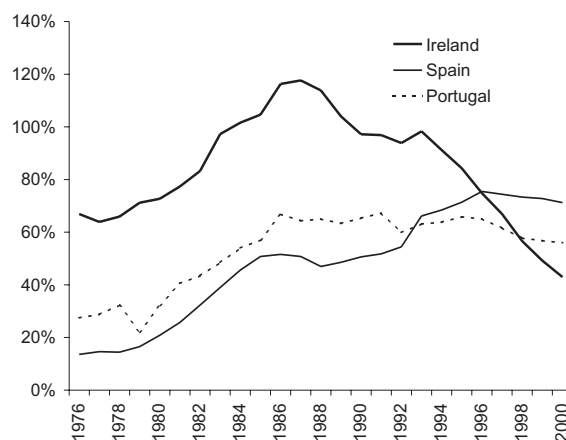


Source: OECD (1999b).

Chart 4
**TOTAL TAXES AND SOCIAL SECURITY CONTRIBUTIONS**
As a percentage of GDP
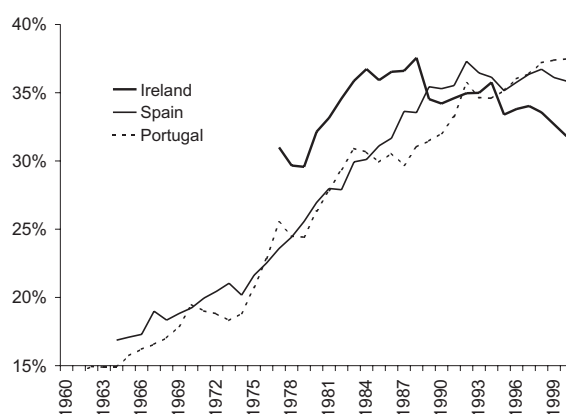


Source: OECD (1999b).

mented in Ireland was more ambitious. Not only because the initial debt was relatively higher (chart 3), but also because the adjustment relied on expenditure cuts. In contrast to Portugal and Spain, Ireland was able to reconcile the deficit reduction with a decrease in the average rates of taxation (chart 4).

The fact that the Irish economy has expanded following cuts in government current expenditure led some authors to argue that this was a case of "expansionary fiscal contraction" (Giavazzi and Pagano, 1990, McAleese, 1990). According to this

Table 3

### SOCIAL SECURITY CONTRIBUTIONS AND PERSONAL INCOME TAX, NET OF TRANSFERS, AS A PERCENTAGE OF WAGE COSTS

|          | 1979 | 1985 | 1989 | 1991 | 1995 | 1997 |
|----------|------|------|------|------|------|------|
| Ireland ........ | 33.9 | 42.4 | 40.6 | 39.8 | 36.9 | 33.9 |
| Spain .......... | 36.4 | 36.6 | 35.9 | 36.5 | 38.5 | 39.0 |
| Portugal ....... | 28.1 | 34.9 | 33.9 | 33.2 | 33.7 | 33.9 |

Source: ECD (1998b). Figures are derived from average wages and the tax regime applicable to single tax payers.

argument, the reduction of public consumption leads private agents to anticipate lower taxes in the future and therefore to increase expenditure. Following this argument, such an increase could more than offset the fall in government consumption. Bradley and Whelan (1997), however, did not find empirical support for this idea.

Whatever the impact of fiscal policy on demand, there are supply-side effects that enable us to revert to the idea of "expansionary fiscal contraction". Indeed, a lower level of taxation may be associated with smaller distortions and therefore with higher productive efficiency at an aggregate level[10].

The reduction of the tax burden seems to have had a significant impact on the labour market. Table 3 presents the recent evolution of direct income taxes and social security contributions, as a percentage of wage costs. In Ireland, the tax burden increased between 1979 and 1985, and decreased again to reach, in 1997, the 1979 level. Spain has recorded an increasing trend, while in Portugal it has remained unchanged since 1985.

In Ireland, the government has reduced income taxes and social security contributions as a counterpart to wage moderation since 1988, when collective bargaining started to be based on social agreement. The exercise presented in table 4 reveals that this strategy has been successful in lowering unit labour costs, while the workers' purchasing power was increasing[11].

In a country where, historically, labour supply has revealed high elasticity, the decrease in the tax burden may have played an important role in

Table 4

### UNIT LABOUR COSTS
#### Annual average rate of change

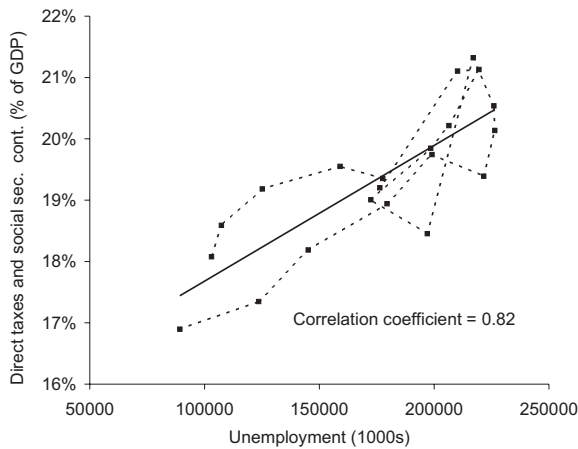|                                          | 1981-85 | 1986-90 | 1991-95 | 1996-97 |
|------------------------------------------|---------|---------|---------|---------|
| **Ireland**                              |         |         |         |         |
| Labour productivity .......... | 4.0 | 3.6 | 3.5 | 4.3 |
| Real compensation per employee ................... of which: | 2.0 | 1.7 | 3.1 | 3.0 |
| Income and social sec. contribution ........... | 2.8 | -0.7 | -1.1 | -2.3 |
| Real take home-pay....... | -1.0 | 2.4 | 3.8 | 6.3 |
| Relative price adjustment.. | 0.2 | 0.1 | 0.4 | -0.8 |
| Real unit labour costs ......... | -2.0 | -1.8 | -0.4 | -1.3 |
| **Spain**                                |         |         |         |         |
| Labour productivity .......... | 3.2 | 1.5 | 2.4 | 0.8 |
| Real compensation per ........ employee ................... of which: | 1.1 | 2.0 | 1.7 | 1.1 |
| Income and social sec. contribution. .......... | 0.1 | -0.1 | 0.7 | 0.4 |
| Real take home-pay....... | 0.5 | 2.8 | 0.8 | 0.3 |
| Relative price adjustment . | 0.5 | -0.7 | 0.2 | 0.3 |
| Real unit labour costs ......... | -2.0 | 0.5 | -0.6 | 0.3 |
| **Portugal**                             |         |         |         |         |
| Labour productivity .......... | -0.2 | 3.0 | 3.1 | 2.2 |
| Real compensation per employee ................... of which: | -1.7 | 2.3 | 2.9 | 2.2 |
| Income and social sec. contribution ........... | 2.0 | -0.4 | 0.0 | 0.2 |
| Real take home-pay....... | -4.3 | 3.9 | 3.2 | 2.2 |
| Relative price adjustment.. | 0.8 | -1.1 | -0.3 | -0.1 |
| Real unit labour costs ......... | -1.5 | -0.6 | -0.1 | 0.0 |

Source: Figures derived from OECD (1999b) series and data from table 3. Figures obtained taking growth rates in $\alpha = (W/P)/(Q/L)$ and replacing $W/P = (W/W_N)(W_N/P_C)(P_C/P)$, where $W$ is the compensation per employee, $L$ employment, $Q$ GDP, $W_N$ the net wage received by workers, $P$ the GDP deflator and $P_C$ the consumption deflator. The taxation levels in 1980 and 1990 were assumed to be equal to those in 1979 and to the 1989-91 average respectively. GDP series and the respective deflator are at market prices, because there are no comparable data at factor cost.

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(10) Moreover, since the government debt is now lower in Ireland, its stabilisation in the future will be consistent with a combination "tax burden-public service", potentially more attractive than in the Iberian countries.

(11) Since these are average figures, data in Table 4 mask important changes occurred in the structure of direct taxation, which together with the adjustment of the social protection schemes also led to the reduction of disincentives to participation.

**Chart 5**
**DIRECT TAXATION AND UNEMPLOYMENT IRELAND**



Correlation coefficient = 0.82

Source: OECD (1999b).

**Chart 6**
**UNIT LABOUR COSTS, MANUFACTURING AND AVERAGE CURRENCY (1995=100**



Source: OECD (1999b).

reducing structural unemployment[12]. This view is partly supported by the high correlation (82 per cent) observed in Ireland between the number of persons unemployed and the level of direct taxation in 1980-2000 (chart 5)[13].
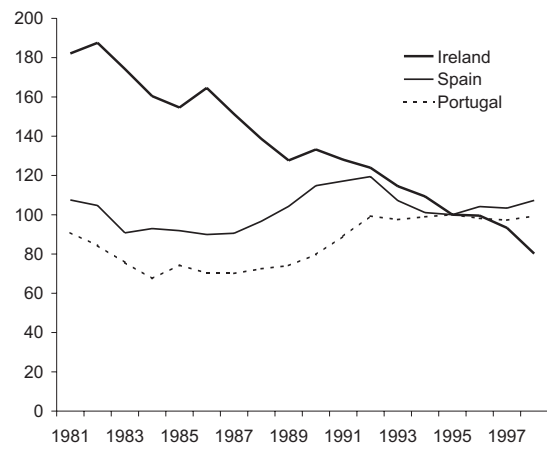
In Spain, unit labour costs have shown a broadly unchanged pattern and the rises in the tax burden have been reflected in a stagnation of workers' purchasing power. In addition to the explanations given for the high level of unemployment in Spain — namely, the high bargaining power of labour unions (Bover et al, 1999) and the existing high level of social protection (Blanchard and Jimeno, 1995) — one might add that income taxation, by creating increasing distortions in the labour market, is not contributing to the eradication of structural unemployment.

The sharp reduction in unit labour costs in Ireland has been improving external competitiveness

(chart 6), thus also contributing to explain the recent growth boom, triggered by exports. In the case of Ireland, the improvement of competitiveness has an additional effect, as multinational companies tend to reallocate production internationally to where wage costs are lower.

## 4. THE ADVANTAGE OF BEING EFFICIENT

The input-output approach underlying the Solow decomposition is useful to quantify the increase in the quality of factors, but it does not point towards any explanation. As an alternative, a growth accounting exercise in light of the well-known *AK* model is presented in table 5. Despite being simple, this model is versatile enough to capture the role of the different sources of growth identified by the Theory of Endogenous Growth[14].

Figures displayed in table 5 suggest that the faster growth of the Irish economy does not result from exceptional saving rates, but rather from a higher quality of the capital employed, measured by both its higher average productivity and smaller economic depreciation.

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(12) The high elasticity of labour supply in Ireland is related to the integration of the Irish labour market with the UK labour market (see, for instance, Honohan, 1992) and has been recently confirmed by the reversal of migrating trends. Building on different estimates for the elasticities of labour demand and supply, Walsh (1998) simulated the impact of direct taxation in Ireland and concluded that the impact on employment would be potentially high.

(13) Note that, since tax revenues are generally pro-cyclical, the expected correlation would be negative. Since the opposite occurred, the thesis according to which the tax reduction might have had a significant impact on the employment level is obviously reinforced.

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(14) For example, the role of the saving rate, the dynamic benefits of physical capital accumulation, the role of human capital and the economic size of the government are described in the light of the *AK* model by Barro and Sala-i-Martin (1995), chapter 4.

Table 5

**IRELAND: ENDOGENOUS GROWTH ACCOUNTING**

| | Ireland | | | | Spain | Portugal |
|---|---|---|---|---|---|---|
| | 1964-73 | 1974-83 | 1984-93 | 1994-98 | 1984-98 | 1984-98 |
| Efficiency . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 0.37 | 0.44 | 0.47 | 0.59 | 0.51 | 0.36 |
| Investment ratio. . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 17.35 | 20.46 | 18.32 | 17.63 | 23.17 | 24.43 |
| Depreciation rate . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 1.92 | 5.21 | 3.85 | 3.31 | 9.20 | 5.33 |
| GDP growth . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 4.59 | 3.74 | 4.71 | 7.17 | 2.66 | 3.40 |

Sources: Figures derived from OECD (1999b) and Banco de Portugal series, using the Harrod-Domar equation. Calculations are made assuming a linear relationship between GDP, $Q$, and the capital stock, $K$, $Q=AK$ and replacing the efficiency level $A$ in the equation describing growth, $g = sA - \delta$, where $g$ is the rate of economic growth, $s$ is the total saving rate (domestic and external) and $\delta$ is the capital depreciation rate, obtained as a residual (the method follows Gylfason, 1999). The series on GDP, gross investment and capital stock were filtered by the HP. The capital stock series refer only to the private sector, whereby this exercise overestimates the quality of capital when measured by the efficiency level and underestimates it when measured by the depreciation rate.

In interpreting these data, it should be taken into account that the efficiency in the use of capital not only depends on externalities associated with investment in physical capital, but also on important policy issues, such as macro-economic stability, removal of distortions, support to education and research, provision of infrastructures, transparency and efficiency of laws and the development of institutions. These factors not only affect the investment level, but also the manner in which economic resources are combined. In the light of theory, a higher efficiency level impacts both on a higher per capita income and on higher growth rates in the long run.

A first conclusion can be directly drawn from the previous discussion: in so far as the recent reduction in direct taxes has contributed to an increased productive efficiency, the case of Ireland may come to show that the reduction of the weight of the government on the economy, may have a positive impact on the pace of economic growth [15].

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(15) This idea of "expansionary fiscal contraction" in a supply-side and dynamic version is based on Barro and Sala-i-Martin, 1995, chapter 4.4. The increase in the weight of the government on the economy affects growth by two different means: on the one hand, there is a distortion that increases with the taxation level, decreasing the average efficiency in the capital utilisation. On the other hand, a higher provision of public goods increases aggregate efficiency. When the weight of the government on the economy is very heavy, the first effect dominates the second, whereby a smaller intervention will have a positive impact on growth.

From a more historical point of view, data in table 5 suggest two lines of discussion:

— On the one hand, it may be questioned to what extent the type of investment made in Ireland has been more favourable to externalities and dynamic benefits than the one made in the Iberian countries. This issue is discussed in Section 4.1.
— On the other hand, it should be analysed whether differences in physical, human and institutional infrastructures may help to explain the different growth path observed. Section 4.2 provides some evidence thereon.

**4.1 The quality of investment**

Table 6 displays the breakdown of gross fixed capital formation (GFCF) by nature in the three countries. This analysis could be illustrative, if for

Table 6

**GROSS FIXED CAPITAL FORMATION BY NATURE**

1986-95 average, as a percentage of GDP

| | Ireland | Spain | Portugal |
|---|---|---|---|
| Construction. . . . . . . . . . . . . . . . | 9.3 | 14.4 | 13.0 |
| Transport equipment . . . . . . . . . | 2.9 | 2.1 | 4.1 |
| Machinery . . . . . . . . . . . . . . . . . | 4.4 | 4.9 | 7.6 |
| Other . . . . . . . . . . . . . . . . . . . . . . | 0.2 | 0.6 | 2.4 |
| Total. . . . . . . . . . . . . . . . . . . . . . | 16.7 | 22.0 | 27.1 |

Sources: OECD (1998a) and Banco de Portugal.

Table 7

**GFCF BY INSTITUTIONAL SECTOR**

1986-95 average, as a percentage of GDP

|  | Ireland | Spain | Portugal |
|---|---|---|---|
| General government . . | 2.3 | 3.9 | 3.6 |
| Private sector . . . . . . . . | 14.4 | 18.1 | 23.5 |
| Total . . . . . . . . . . . . . . . | 16.7 | 22.0 | 27.1 |

Sources: OECD (1998a) and Banco de Portugal.

Table 8

**FOREIGN DIRECT INVESTMENT**

As a percentage of GDP

|  | 1975-84 | 1985-94 | 1995-98 | Average |
|---|---|---|---|---|
| Million US dollars: |  |  |  |  |
| Ireland . . . . . . . . . . . . . . | 220.1 | 577.5 | 2515.8 | 751.6 |
| Spain . . . . . . . . . . . . . . . | 1272.1 | 8269.5 | 7400.8 | 5209.1 |
| Portugal . . . . . . . . . . . . | 119.6 | 1337.2 | 1592.3 | 872.4 |
|  |  |  |  |  |
| Percentage of GDP: |  |  |  |  |
| Ireland . . . . . . . . . . . . . . | 1.5 | 1.3 | 3.5 | 1.7 |
| Spain . . . . . . . . . . . . . . . | 0.8 | 2.0 | 1.3 | 1.4 |
| Portugal . . . . . . . . . . . . | 0.5 | 2.0 | 1.5 | 1.3 |

Source: Calculations derived from IMF - International Financial Statistics data.

Table 9

**INCENTIVES TO FOREIGN INVESTMENT**

Rank of 46 countries

|  | Ireland | Spain | Portugal |
|---|---|---|---|
| Incentives to foreign investment . . . . . . . . . . . . . . . . | 1 | 10 | 6 |
| Memo: |  |  |  |
| Image of the country abroad . . | 9 | 27 | 31 |

Source: The World Competitiveness Yearbook, 1997. Figures indicate, for each item, the rank of each country in a group of 46 countries.

instance Ireland showed a higher propensity to invest in machinery than the Iberian countries[16]. Despite the aggregation level, it is nonetheless curious to observe that Ireland has invested less per unit of output, not only in aggregate terms, but also in each specified category.

Table 7 displays the breakdown of GFCF by institutional agent. Considering that investment in Ireland was lower in both categories, at least at

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(16) De Long and Summers (1991), for instance, give a high explanatory power to investment in equipment as a promoter of growth.

Table 10

**SECTORAL BREAKDOWN OF FOREIGN DIRECT INVESTMENT**

1990-1997 average

|  | Ireland | Spain | Portugal |
|---|---|---|---|
| Industry . . . . . . . . . . . . . . . . . . . . . . | 92.9 | 45.3 | 18.7 |
| of which: |  |  |  |
| Chemical, petroleum and plastic products . . . . . . . . . . . | 16.2 | 11.7 | n.a. |
| Metal products and machinery . | 58.3 | 0.0 | n.d. |
| Trade and repairs . . . . . . . . . . . . . . | 0.0 | 10.3 | 15.0 |
| Financial activities . . . . . . . . . . . . . . | 0.0 | 21.8 | 29.5 |
| Real estate and business activities . | 0.0 | 18.1 | 24.6 |
| Other . . . . . . . . . . . . . . . . . . . . . . . . | 7.1 | 4.5 | 12.2 |
| Total . . . . . . . . . . . . . . . . . . . . . . . . | 100.0 | 100.0 | 100.0 |

Source: OECD (1998c). In Portugal and Spain the weight of the real estate sector corresponds to the 1993-97 average.

first sight, the possible difference in quality cannot be imputable to an excessively prominent role played by the government.

A factor that has been considered to be behind the Irish economic success is the high level of foreign direct investment. Table 8 shows that in recent years (1995-98) there was an acceleration of foreign investment in Ireland which contrasts with some stagnation or even decline in the Iberian countries. However, data for the whole sample are not conclusive: both Portugal and Spain have also been successful in attracting foreign investment, possibly due to the competitiveness of the incentives granted (table 9).

At the sectoral level, however, there are significant differences. Table 10 shows that 93 per cent of Foreign Direct Investment made from 1990 to 1997 in Ireland was intended for the manufacturing sector, in particular, for machinery and metal products industries (58 per cent), and for the chemical industry (16 per cent). Over the same period, foreign direct investment in Portugal and Spain was distributed by a much wider range of sectors[17].

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(17) Due to differences in accounting standards these data have to be interpreted with caution. In Portugal, the item "business activities" includes asset management activities, and therefore some foreign investment in industry may be recorded in this item. However, differences in levels are sufficiently high to support the above conclusion.

Table 11

**COMPOSITION OF GFCF BY SECTOR OF ACTIVITY**

| | Ireland | | Portugal | |
| --- | --- | --- | --- | --- |
| | 1986-90 | 1991-94 | 1986-90 | 1991-95 |
| Agriculture and fishing. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 10.1 | 8.8 | 5.5 | 2.9 |
| Manufacturing . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 19.4 | 17.8 | 21.6 | 14.2 |
| of which: | | | | |
| Textile, clothing and footwear . . . . . . . . . . . . . . . . . . . . . | 0.9 | 0.4 | 5.6 | 2.5 |
| Chemicals, plastic  products and rubber. . . . . . . . . . . . | 3.6 | 5.0 | 1.6 | 1.7 |
| Metal products, machinery and equipment . . . . . . . . . | 4.9 | 5.9 | 2.9 | 3.0 |
| Electricity, gas and water . . . . . . . . . . . . . . . . . . . . . . . . . . | 4.1 | 4.8 | 1.7 | 1.3 |
| Construction. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 2.3 | 1.9 | 4.7 | 4.8 |
| Wholesale and retail trade, hotels and restaurants . . . . . . . | 7.1 | 6.1 | 6.7 | 8.0 |
| Transport and communications  . . . . . . . . . . . . . . . . . . . . . . | 13.2 | 14.5 | 10.4 | 7.3 |
| Financial institutions. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 4.8 | 3.0 | 2.9 | 3.4 |
| Real estate and business services  . . . . . . . . . . . . . . . . . . . . | 24.7 | 29.1 | 33.1 | 40.7 |
| Personal, community and government services. . . . . . . . . . | 14.2 | 14.0 | 13.3 | 17.4 |
| Gross Fixed Capital Formation . . . . . . . . . . . . . . . . . . . . . . . | 100.0 | 100.0 | 100.0 | 100.0 |

Source: OECD (1999b). The item "Manufacturing" includes mining industries and the item "Community, social and personal services" includes services rendered by non-profit institutions serving households.

Table 11 compares the sectoral breakdown of GFCF in Ireland and Portugal (Spain is not analysed because no comparable data are available). Notwithstanding the aggregation level, it is possible to detect a higher concentration of investment in manufacturing in Ireland (where chemical, metal and machinery industries increased their share in total investment) and also in transport and communications, unlike Portugal, where the real estate sector and some services increased their shares. In Ireland, the manufacturing sector and the distribution, transport and communications sector jointly account for around half of the output and have been the most buoyant sectors of the economy, with average growth rates of 12.5 per cent and 9.7 per cent per year in 1991-98 respectively (IMF, 1999).

According to some authors (such as Barry, 1996, Leddin and Walsh, 1997, and the European Commission, 1996), the high industrial concentration of foreign investment in Ireland is the reflection of a strategic industrial policy started in the 1960s, intended to attract foreign investment, not at random, but specifically to a selected group of export-oriented industries[18][19]. The result of this strategy was a deep change in the production pattern in Ireland, involving the replacement of national domestically-oriented companies by multinational export-oriented companies[20].

Table 12

**EXPORTS IN VOLUME**

As a  percentage of GDP

| | 1964-73 | 1974-83 | 1984-93 | 1994-98 |
| --- | --- | --- | --- | --- |
| Ireland . . . . . . | 26.2 | 35.2 | 57.7 | 86.3 |
| Spain . . . . . . . | 10.0 | 14.5 | 20.6 | 32.2 |
| Portugal. . . . . | 25.0 | 19.4 | 31.1 | 40.6 |

Source: OECD (1999b).

[18] In Ireland, the profit tax applicable to manufactures and some other non-industrial tradable sectors was lowered to 10 per cent in 1981. Tax revenues increased  from 1.6 per cent of GDP in 1974-83 to 3.4 per cent in 1994-98, due to the increase of the tax base (in Portugal they increased from 1.6 per cent to 3.1 per cent). In 1999 the profit tax applicable to the other sectors was reduced from 32 per cent to 28 per cent. Within the scope of a commitment undertaken with the European Union in 1998, a single tax rate of 12.5 per cent is due to be implemented by 2003.

[19] Obviously, exogenous factors such as the recent expansion in the US and the cultural affiliation between the two countries help to explain the recent investment boom in Ireland. According to the OECD (1998c), in 1990-97 approximately 70 per cent of foreign investment in Ireland was from the United States.

[20] According to the OECD (1999a), current industrial production of foreign companies represents 30 per cent of GDP in Ireland. According to Barry (1986), from 1982 to 1992, labour productivity grew more rapidly in the "modern" sectors than in the "traditional" ones, as wages evolved in a harmonised manner. According to the author, this may have caused a Dutch disease, affecting the sectors where wages rose faster than productivity, thus leading to an increase in average productivity.

Table 13

## QUALITY OF PHYSICAL, HUMAN AND INSTITUTIONAL INFRASTRUCTURES
### Rank of 46 countries

|  | Ireland | Spain | Portugal |
|---|---|---|---|
| **Physical infrastructures** | | | |
| Density of roads . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 15 | 22 | 19 |
| Density of railroads . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 16 | 22 | 20 |
| International telephone costs (USD . . . . . . . . . . . . . . . . . . . . . | 9 | 10 | 19 |
| Electricity costs for industrial clients (USD) . . . . . . . . . . . . . | 22 | 31 | 40 |
| | | | |
| **Human resources** | | | |
| Illiteracy . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 28 | 39 |
| Availability of skilled labour . . . . . . . . . . . . . . . . . . . . . . . . . . | 6 | 11 | 35 |
| Availability of qualified engineers . . . . . . . . . . . . . . . . . . . . . | 9 | 6 | 28 |
| Availability of qualified managers . . . . . . . . . . . . . . . . . . . . . | 4 | 17 | 40 |
| Worker motivation . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 17 | 36 | 43 |
| Entrepreneur ship of managers . . . . . . . . . . . . . . . . . . . . . . . . | 19 | 33 | 43 |
| International experience of managers . . . . . . . . . . . . . . . . . . . | 6 | 34 | 41 |
| Quality of educational system . . . . . . . . . . . . . . . . . . . . . . . . . | 2 | 17 | 38 |
| Secondary school enrolment . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 4 | 33 |
| Higher education enrolment . . . . . . . . . . . . . . . . . . . . . . . . . . | 23 | 13 | 31 |
| | | | |
| **Political system and institutions** | | | |
| Political system . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 16 | 6 | 18 |
| Transparency of the government . . . . . . . . . . . . . . . . . . . . . . | 18 | 19 | 21 |
| Legal system . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 12 | 16 | 17 |
| Confidence in Justice . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 13 | 31 | 28 |
| Bureaucracy . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 11 | 21 | 39 |
| Unlawful practices (e.g. corruption) . . . . . . . . . . . . . . . . . . . | 10 | 21 | 23 |
| Prudential regulations . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 19 | 22 | 16 |
| Competition laws . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 11 | 14 | 32 |
| Flexibility of labour regulations . . . . . . . . . . . . . . . . . . . . . . . | 14 | 36 | 29 |
| Protection of intellectual property . . . . . . . . . . . . . . . . . . . . . | 10 | 20 | 33 |

Source: The World Competitiveness Yearbook, 1997. Figures indicate, for each item, the rank of each country in a group of 46 countries.

At a disaggregated level, the IMF (1999) identifies five key subsectors — software, computers, pharmaceutical products, organic chemicals and soft drinks, which in 1991-96 represented only 8 per cent of employment but contributed to 80 per cent of the growth of labour productivity in industry. According to the same source, in 1996 around 95 per cent of the added value in these key sectors was generated by foreign companies (against 54 per cent in the industrial sector as a whole). The high labour productivity in these sectors is largely explained by the need to remunerate intangible assets of multinationals and research expenditure made abroad and has been translated into an increasing divergence between domestic output and national income (table 2)[21].

The question is to find out to what extent the type of investment made in Ireland has been more favourable to an increase in aggregate efficiency.

According to the European Commission (1996), as the domestic outsourcing by multinationals has been low, the demand-side effects of foreign investment have been smaller than expected. But even if this were the case on the demand side, there must have been inevitable significant dynamic effects on the supply side:

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[21] Obviously, the need to remunerate non-resident factors makes multinational investments very sensitive to the profit taxation system. On the other hand, the value of production itself and hence the labour productivity measures may be largely overestimated due to "transfer pricing". In fact, as taxation is lower in Ireland, multinational companies tend to concentrate the taxable income in this country, thus overestimating the local value added. Hence, the figures referred to above should be interpreted with some caution.

— On the one hand, specialisation in specific segments generates agglomeration benefits and learning effects at the industry level.

— On the other hand, foreign investment may have contributed to the sustained rise in the productivity of local workers, through both the accumulation of know-how and technological spillovers, thus contributing to a higher aggregate efficiency [22].

According to the IMF (1999), in 1991-96 the annual growth of total productivity reached 9.5 per cent in the five key sectors and 2.8 per cent in the remaining sectors. Despite the difference in level, both figures are high by international standards.

### 4.2 The quality of infrastructures

Besides affecting the quality of foreign investment, good physical, human and institutional infrastructures bring about higher productive efficiency at the aggregate level and thus higher economic growth. Table 13 shows the rank of Ireland, Spain and Portugal with regard to a set of indicators, reflecting the quality of physical, human and institutional infrastructures.

Table 13 reveals clearly the higher quality of human resources in Ireland. High investment in education[23] and a very young population have given rise to a large number of skilled (and flexible in terms of contracts) individuals in the labour market, resulting in a fast increase in the average quality of the human capital employed.

In Portugal, both employees and managers exhibit extremely low levels of competence. The shortage of quality human resources conditions the setting up of high technology companies and is an important barrier to the process of economic convergence. A lower average quality of human resources will be associated, not only with lower wages on average, but also with lower wages at the individual level: due to the external effects, each worker will tend to reveal lower productivity

than if inserted in a group with a higher educational level.

With regard to institutions, there are neither significant differences between the economic systems of the three countries, nor different attitudes from the major political parties on fundamental issues such as the property rights or the European integration. However, the gap between Portugal and Ireland is rather symptomatic in areas such as efficiency of the judicial system, bureaucracy level, competition laws, flexibility of labour market regulations and protection of intellectual property [24]

### 5. CONCLUDING REMARKS

The following main conclusions can be drawn from this paper:

— The fast growth of the Irish economy in the 1990s can be seen as the sum of a transitory component and a long-term component.

— The transitory component is the adjustment from a state of high unemployment to a state of low unemployment. This transition is likely to have been induced by the decline in direct taxation.

— In the course of the past 40 years, Ireland grew faster than Portugal and Spain, without having invested more per unit of output. Over 50 per cent of the economic growth in Ireland is due either to an increase in the quality of inputs or to a higher efficiency in production.

— The concentration of foreign investment in a small number of industrial sectors may have had a positive impact on total factor productivity. Although the absolute level of this investment has not been sufficient to increase the capital-labour ratio at the aggregate level (due to low investment levels observed in the local labour-intensive industries), the resulting externalities have probably contributed to an increase in efficiency at the aggregate level.

— The sectoral focus of foreign investment was influenced by the strategic policy followed by the Irish authorities. Portugal and Spain have also been successful in attracting foreign investment, but to a wider range of industries.

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(22) Some evidence has recently been presented by O'Malley (1998), but the debate on the existence of significant technological spillovers remains open.

(23) According to Mankiw, Romer and Weil (1992), Ireland was the OECD country that made the largest investment in secondary education in the 1960-1985 period.

— Possibly the major advantage of Ireland vis-à-vis the Iberian countries is the fact that this country has better physical and institutional infrastructures and human resources. This advantage favours the setting-up of high technology companies and contributes per se to a higher level of aggregate efficiency. Ireland is thus likely to maintain higher income and a stronger pace of economic growth in the future.

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