

## The Portuguese Economy in the Irish Mirror, 1960–2004

Pedro Lains

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**Abstract** The deepening of economic and financial integration in the European Union has led to different responses in the group of ‘cohesion’ countries. Ireland and Portugal stand out as the two extreme examples, as Ireland caught-up to the forerunners after the launching of EMU, in 1992, whereas Portugal lost ground. This paper looks at structural shifts in order to explain different economic performances within Europe. We conclude that Portugal’s labour productivity lag was the outcome of a less favourable structure of employment; that differences in the structure of employment are not clustered in specific industries; and that such structural differences are associated with different factor endowments, namely physical and human capital. Portugal has a rising competitiveness problem in international markets as real wages have increased faster than labour productivity in the 1990s. That has to be changed by policy measures, by the market through higher levels of unemployment, or by a combination of both.

**Keywords** Economic growth · Structural change · Shift-share analysis · Portugal · Ireland · European integration

**JEL classification** F15 · F43 · N14 · O4 · O52

### 1 Introduction

During the period from 1960 to 1973 Portugal caught-up at an unprecedented speed to the levels of income per capita of the European forerunners. Yet catching-up lost momentum after the 1973 oil crisis and since then there were also periods of divergence. Rapid growth in the years to 1973 was accompanied by structural change, marked by the decline of agriculture in GDP and total employment and the

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P. Lains (✉)

Instituto de Ciências Sociais, Universidade de Lisboa, Lisbon, Portugal

e-mail: pedro.lains@ics.ul.pt

increase in the shares of the industrial and service sectors. Within manufacturing and services, there was also considerable structural change. Such change was common to all European economies (Temin 2002), but it was felt more intensively in Portugal, as well as in the rest of the poor periphery, simply because of lower levels of industrialization there. This paper assesses the factors behind the slowing down of growth of GDP and labour and total factor productivity, in Portugal, after 1973.

Ireland, initially also a poorer country in the European periphery, depicts a different story. In fact, the Irish economy *diverged* during the period from 1960 to 1973 and caught-up thereafter. Ireland is also different because of her earlier commitment to higher levels of economic and monetary integration within the European Union, having joined earlier the Common Market, in 1973, the Economic and the Monetary Union, in 1979, and, with Portugal, the Single European Market, in 1992, and the Euro in 1999.<sup>1</sup> The study of Ireland may help identifying alternative paths of growth for the periphery during the more recent period.<sup>2</sup> Was Irish growth after 1973 and particularly in the 1990s accompanied by significant changes in the structure of her economy? Or was it due to increases in productivity in existing or more traditional sectors? We shall see in this paper that the answers to such questions have relevant policy implications. One of such implications is related to labour market regulations which are very different in the two countries.<sup>3</sup>

The impact on national economic structures of changes in international trade and capital flows can be either positive or negative.<sup>4</sup> The deepening of European integration during the 1990s led to an increase in international trade and capital flows, which led to a higher level of geographical specialization and higher productivity growth in the core European countries and Ireland.<sup>5</sup> Recent Irish growth has been associated to the growth of the sectors which use or produce goods with high content of information and communication technologies (ICT) and to the role of foreign direct investment and exports in helping the development of such sectors, as well as of special tax regimes.<sup>6</sup> Why didn't Portugal benefit from the increase in economic and monetary integration during the 1990s? We show in this paper that labour productivity slowdown in Portugal was determined by adverse structural change—or a 'structural cost'—that is, by the increase of employment shares in sectors with low productivity or low productivity growth, contrarily to what happened in Ireland.<sup>7</sup>

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<sup>1</sup> Macedo (2000). See also Blanchard (2006).

<sup>2</sup> Honohan and Walsh (2002).

<sup>3</sup> See Blanchard and Portugal (2001).

<sup>4</sup> Krugman and Venables (1996).

<sup>5</sup> Midelfart et al. (2003).

<sup>6</sup> See Barros (2002), Barry (2003) and Cassidy (2004).

<sup>7</sup> Labour productivity growth in Portugal is matched by that of total factor productivity growth, which also declined after 1973. Lains (2003) provides a growth accounting analysis for twentieth century Portugal which shows a sharp decline in TFP growth after 1973. According to Fare et al (2006, pp. 118–19) wider measurement of efficiency, Portugal increased its level from 1965 to 1990, reaching the European average frontier level then, but it dropped sharply in the years to 1998. The authors relate such trends to Portugal's high level of capital intensity, which may have been inappropriately used in the 1990s (see p. 120).

The role of structural change in explaining economic performance is neglected by growth models based on aggregate production functions.<sup>8</sup> These models are thus less useful for countries at earlier stages of development, where it is expected that structural change has an important role.<sup>9</sup> Moreover, the impact of structural change on growth can be of higher relevance if factor returns across sectors are not in steady-state growth equilibrium due, for example, to institutional bottlenecks or barriers to trade (Grossman and Helpman 1990). Again, that is presumably more significant for less developed economies.

The assessment of the role of structural change has led to fruitful explanations of long-term international differences in factor productivity growth. According to Broadberry (1998), for example, the overtaking of Britain by the Germany, since the 1890s, and by the US, after World War II, was to a large extent due to productivity gains obtained from shifting resources out of agriculture, as well as by sectoral productivity growth in the service sector. Dowrick and Nguyen (1989) also argue that differences in sectoral productivity growth were one of most important factors explaining catching-up, within the OECD economies and during the period from 1950 to 1985, together with the spill-over of technological progress across borders and changes in preferences and thus in the structure of demand.<sup>10</sup>

Differences in economic performance and pace of structural change relate to other factors such as technological progress, changes in corporate organization, investment in physical capital, and the quality of the country's institutional setting. For example, Portugal faced a competitiveness problem in the international markets as real wages increased faster than labour productivity in the 1990s, due in part to rigid labour markets.<sup>11</sup> The measurement of the impact of such factors on the performance of labour productivity provides a complementary analysis to the one we discuss in the present paper.<sup>12</sup>

The paper is structured as follows. Next section sets Portugal's economic performance within the group of 'cohesion countries' in European periphery. Particular attention is given to the comparison with Ireland. Section 3 provides the background information for that comparison, giving a description of economic policies regarding the role of the state and openness towards the Economic and Monetary Union. Section 4 provides an estimate of the impact of structural change on growth in the two countries in the framework of a dynamic shift-share analysis. We conclude there that Ireland, contrarily to Portugal, had a 'structural bonus' in the period since 1979. Section 5 relates the Irish structural bonus to her specialization and concludes that the advantages did not emerge from specific sectors, but rather from a wide range of industries. Section 6 concludes.

<sup>8</sup> See the survey by Temple and Voth (1998).

<sup>9</sup> See Dollar and Wolff (1988), Sundrum (1991), Syrquin (1994), van Ark (1996), Doyle and O'Leary (1999), Fagerberg (2000) and Davies et al (2001). See also Temple (1999) and Levine and Renelt (1992).

<sup>10</sup> For Portugal, see also Godinho and Mamede (2004) and Aguiar and Martins (2005).

<sup>11</sup> For example, due to the 1974 revolutionary legacy, Portugal's labour market is still partially dependent on constitutional legislation, making changes harder to introduce.

<sup>12</sup> See for example Fare et al. (2006).

## 2 Growth trends

Decennial growth rates for Portugal's GDP per capita, since 1960, as well as for the other three countries in the cohesion group, namely, Spain, Greece and Ireland, and for the European Union (EU-14) and the US are shown in Table 1. One relevant conclusion to be drawn from that data is that there is no common pattern for growth cycles in the periphery. In fact, Portugal and the two other southern European countries had very high growth rates of income per capita in the period from 1960 to 1973, between 6.6 and 7.0%/year, whereas Irish growth during the same period was considerably slower, at 3.7%, and below the average of European Union 14 countries. From 1973 to 1980, economic growth in all four peripheral countries slowed down, although in Ireland the fall was relatively smaller. During the decade from 1980 to 1990, economic growth in Portugal gained some speed, whereas in Spain and Ireland growth rates remained at similar levels. Greek economic growth slowed down considerably in the 1990s to 1.2%. During 1990–2004 it was the turn of the Portuguese growth to slow down to 1.8%/year, which is below the rate of growth of the EU-14 group. Contrarily, Irish growth accelerated to 5.8%/year. In terms of relative income per capita levels, Ireland started from a higher income position, in 1960, as compared to the average of the European Union 14 members and it changed little down to 1980, to increase rapidly after 1990. Spanish relative position increased rapidly in 1960–1973 and again after 1980. Contrarily, Portugal and Greece were the two poorest of this group, already in 1960, they leaped forward in the decade to 1973, and their relative positions changed little afterwards. The evolutions of GDP per capita levels and in percent of the average for EU-14 are shown in Figs. 1 and 2.<sup>13</sup>

Table 2 shows the decomposition of output growth in Portugal and Ireland in terms of growth of labour productivity and labour participation rates, since 1979. Labour participation rates evolved differently in the two countries, as before 1986 it declined in Ireland whereas in Portugal it increased at 1.04%/year. After 1986, labour participation rate increased very fast in Ireland and stalled in Portugal. Changes in Irish employment were due to the decline in emigration and a net flow of immigrants which led to the increase in labour supply and average labour participation rates.<sup>14</sup> Labour productivity growth in Ireland grew much faster in Ireland, particularly in the period from 1994 to 2002.

## 3 Two paths into the economic and monetary union

Today, Portugal and Ireland are virtually fully open economies, in the context of the European Union, with few barriers to international trade and capital flows,

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<sup>13</sup> Figure 2 also shows GNP data for Ireland. GDP growth rates overestimate the growth of the Irish economy because of overpricing of foreign owned firms which had an increasing large share of output. See Birnie and Hitchens (1998). See also O'Leary (1997), Honohan and Walsh (2002) and Barry (2003).

<sup>14</sup> See Honohan and Walsh (2002). The impact of net immigration was also felt in the quality of the Irish labour market, as their levels of education and training were above the average of the Irish resident labour force.

**Table 1** Growth of real GDP per capita in the Cohesion Countries, Europe and the USA, 1960–2004 (annual growth rates, percent)

	1960–1973	1973–1980	1980–1990	1990–2004
Portugal	6.64	2.24	3.13	1.83
Greece	6.75	2.58	1.23	2.43
Ireland	3.70	3.19	3.07	5.83
Spain	6.96	2.62	2.74	2.58
EU-14	4.18	2.19	2.02	2.03
USA	2.88	1.95	2.09	1.96

EU-14: Luxembourg excluded

Source: Computed from Groningen Growth and Development Centre, Total Economy Database at <http://www.ggdc.net>

participating in the common currency, and with decreasing levels of regulation and state intervention. The Irish economy is probably more deregulated than the Portuguese, particularly in what the labour market is concerned (Blanchard and Portugal 2001). Ireland is also more open to the extent that she is presently a large receiver of capital imports, including foreign direct investment (Honohan and Walsh 2002; Barry 2003). In the 1950s and early 1960s, the two countries were in a totally different situation, with high barriers to trade and capital imports, high levels of state intervention and market regulation (Ó Grada and O'Rourke 1996; Lains 2003 and 2004). The move away from autarky and state interventionism started at about the same time, namely in the early 1960s. The first steps to opening up borders were almost contemporaneous, but the two countries followed different institutional arrangements, because of their historical, political and geographical idiosyncrasies. At its earlier stage, the gradual reduction of trade barriers was accompanied in both Ireland and Portugal by the increase of state intervention in the economy.<sup>15</sup>

Ireland's most important step towards trade liberalization was the signature in 1965 of the free trade agreement with the UK, which was her main trading partner.<sup>16</sup> The treaty was signed when there was already in place the Industrial Development Authority, established in 1950, which provided grants to promote domestic and foreign investment. This was the start of an 'industrialization-by-invitation strategy'.<sup>17</sup> During the 1960s the size of the Irish government increased significantly, although most of the increase was the consequence of the increase in transfer payments, including social security, welfare, health and education. The share of the state in total investment remained small, around 5% of total gross capital formation throughout the decade.<sup>18</sup> The Irish economy changed little since demise of autarky. In 1973, when Ireland joined the European Communities its economy was still highly protected and unable to explore markets abroad. But joining the Common

<sup>15</sup> This is not unlike what happened with ECSC and EEC, which led to higher levels of trade but also to the implementation of public policies at the European level.

<sup>16</sup> The 1965 trade agreement followed the creation of EFTA, in 1959, by the UK and other six countries, including Portugal, and the French veto for UK accession, in 1961. The EFTA was geared mainly to industrial trade and Ireland was mainly an exporter of agricultural goods.

<sup>17</sup> Gottheil (2003).

<sup>18</sup> See Gottheil (2003), p. 727.

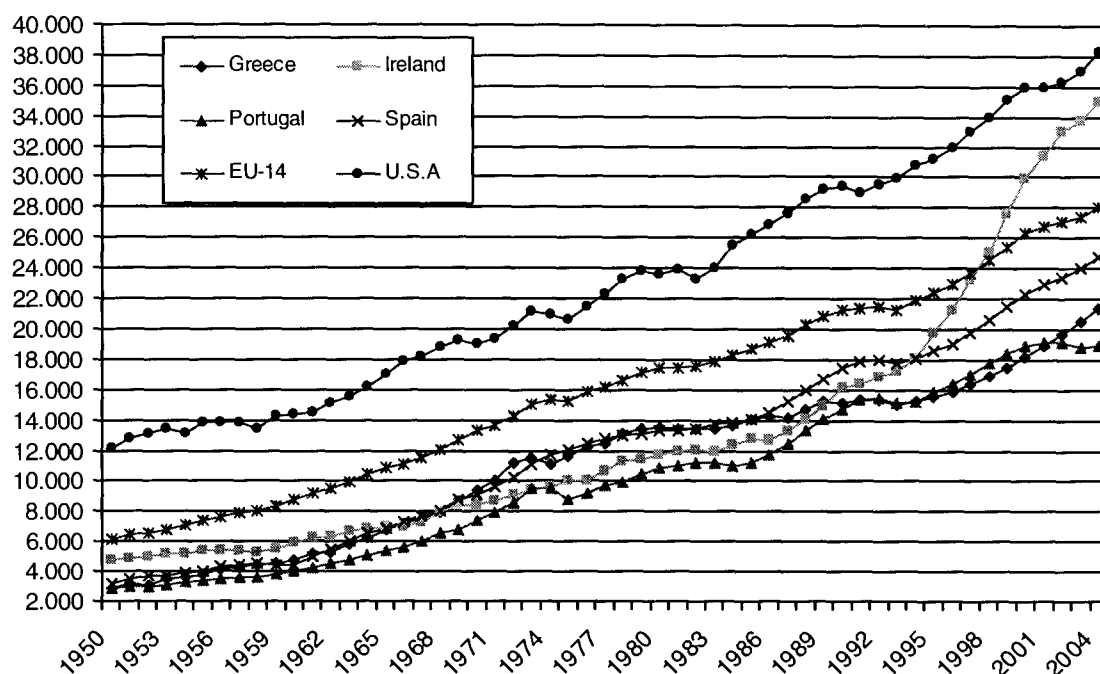


Fig. 1 GDP per capita in Europe and the US, 1950–2004 (US\$, 2002 prices). Source: see Table 1

Market was a definitive blow to Irish long standing protectionist policies. In fact, 4 years later, Ireland abolished all its tariffs with the other member states. Ireland also joined the European Monetary System in 1979. The immediate implications of openness were considerable. Because of tariff removals, according to one account, 44% of firms closed, 88% of which in the textile sector, 50% in chemicals and metal products. In 1986, employment in 'traditional' sectors fell 76% of its 1980 level (72.6% in 1992).<sup>19</sup> Since the early 1990s, capital imports also increased substantially and, together with the existence of comparative advantages in industries with high levels of factor productivity and expanding international demand, accounted for the rapid response of the Irish manufacturing sector. The data on Irish FDI is in fact impressive. In 1973, foreign firms employed 32.3% of total labour force, of which 7.3% were US and 14.6% of the UK. In 1994, foreign firms employed 44% of labour force, of which 23.2% from the US and just 5.8% from the UK. Irish European integration led to the growth of her Atlantic links. But such changes in the structure of firm ownership occurred before the big spurt in Irish growth that took place essentially after 1994.<sup>20</sup>

Portugal joined the free trade club through its accession to European Free Trade Association, in 1959. But, again, the process of opening up was slow and too much accompanied by state intervention. EFTA led to a substantial change in the structure of Portuguese exports which followed the slow change that had been occurring in the manufacturing sector. But, during these early stages, industrial change was led by

<sup>19</sup> See Barry (1996), pp. 727–8.

<sup>20</sup> Gottheil (2003). Rates of profit can be inflated by manipulation of internal pricing by multinationals, order to take advantage of the low corporate profit tax in Ireland. See Honohan and Walsh (2002). In 1981, the tax on foreign earnings profits was raised from zero to 10%, below most western European countries.

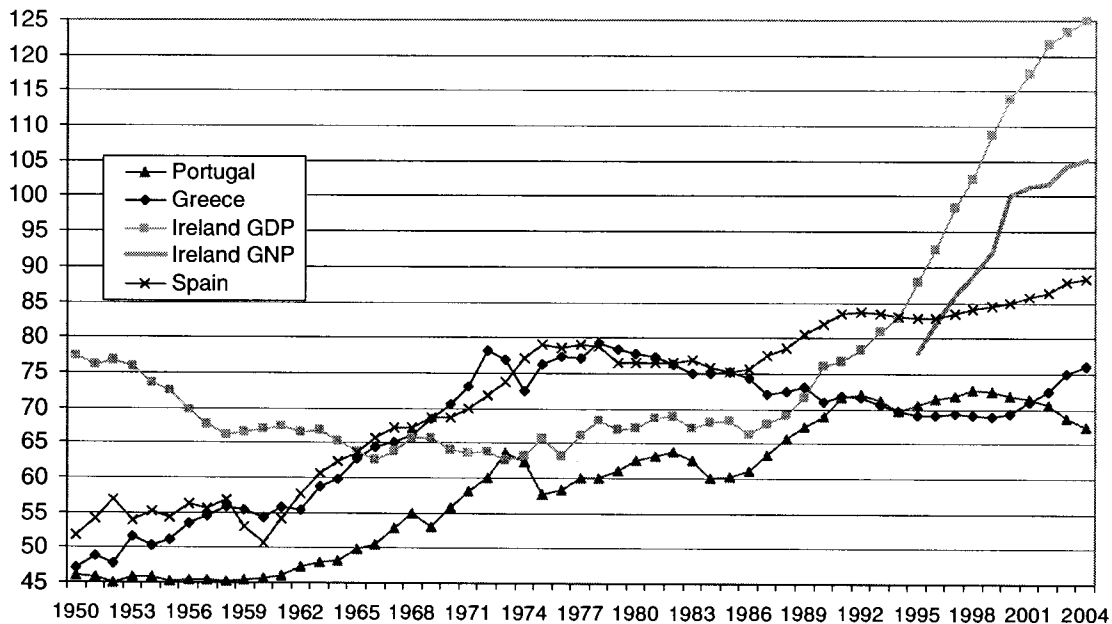


Fig. 2 GDP/GNP per capita as % of EU-14. Source: see Table 1

a 'traditional' sector, namely textiles. Moreover, the Portuguese government got a special treatment from its more industrialized EFTA partners (the UK, Denmark, Norway, Sweden, Switzerland and Austria) and it could continue to protect its industrial sector, under the understanding that many industries were starting. Economic policy—under French type 6-years government 'plans'—was marked by strong state intervention through public investment in infrastructures, namely communications and energy, as well as in industrial branches considered by the government as essential, namely chemicals, cement and metallurgy and metal works.

In 1972, in the prospect of the first enlargement, Portugal signed a trade agreement with the EEC which led to a substantial reduction in her trade barriers.<sup>21</sup> After the first oil shock in 1973 and the political revolution that followed during 1974–1975 the trend towards increasing openness was reversed. A decade of political instability, high inflation, increasing unemployment, distressed public finances and external imbalances ensued. Moreover the expansion of the foreign sector, which had jumped from 20 to 35% of GDP during the decade that followed the EFTA accession, stalled and the economy became increasingly more protected by tariffs and other forms of State intervention. After a long process of negotiations, Portugal joined the EC, in 1986, in 1992 signed the Maastricht treaty and in 1999 joined the European single currency. Portugal also became a large recipient of cohesion funds, which weighted considerably in total investment in social overhead capital and education.

When Portugal joined the EEC in 1986 its manufacturing sector was already markedly different from the situation in 1973, but the process of 'creative

<sup>21</sup> The 1972 agreement led to significant reduction of trade barriers to the extent that the 1985 Accession Treaty with the EC was concerned mostly with reduction of tariffs across the Spanish border—and of course with agriculture, fisheries and the *acquis communautaire*.

**Table 2** GDPpc, labour productivity and participation, 1979–2002 (annual growth rates, percent)

	Portugal			Ireland		
	1979–1986	1986–1994	1994–2002	1979–1986	1986–1994	1994–2002
1. GDP per capita	1.77	3.41	2.66	1.68	4.48	7.50
2. L productivity	0.73	3.61	2.46	3.20	3.60	5.80
3. L participation (2–1)	1.04	0.20	0.20	–1.52	0.88	1.70

$GDP/Pop = GDP/L \times L/Pop$

Sources: Table 1 and computed from *Groningen Growth and Development Centre*, “Total Economy Database” and “60-Industry Database”, at <http://www.ggd.net>

destruction’ was not as intensive as in Ireland.<sup>22</sup> In the years following accession, the Portuguese economy reached high rates of growth and that was due to the expansion of exports, as well the effect of investments in infrastructures which, like Ireland, were partially financed by European structural funds. At the same time, the economy went under structural transformation with the sharp decline of employment in the primary sector, once again made possible by European sources of finance through the Common Agriculture Policy. In these early years investment in education and thus in human capital increased more rapidly than before and for the first time human capital had a higher contribution than physical capital in the aggregate production function. Contrarily to Ireland at a later period, the resumption of growth was not led by the manufacturing sector, as the service sector also expanded rapidly.<sup>23</sup>

In 1992, Portugal entered the Exchange Rate Mechanism in preparation to joining the Euro. Joining the ERM led to a sharp drop in interest rates and expectations of faster growth which ultimately led to a decline in private savings and increase in investment (Blanchard 2006). Yet productivity and export growth remained slow and Portugal entered a period of large current account deficits from the late 1990s on. Competitiveness in the export markets was further aggravated because low unemployment levels led to fast growth of nominal wages and unit labour costs. To avoid a substantial increase in unemployment in the short run, the redressing of the imbalances will need appropriate policy measures (Blanchard 2006).

#### 4 The impact of structural change, 1979–2002

Labour productivity growth can be related to changes in the structure of labour employment and domestic output. We now turn to the quantification of the impact of changes in the structure of labour employment in total labour productivity in Portugal and Ireland. The question we need to address is whether the changes that occurred in the two countries were conducive to higher levels of aggregate labour productivity or not. In other words, we will be looking for the existence of a ‘structural bonus’, that is, gains in productivity obtained by shifts of resources from

<sup>22</sup> See Lains (2004).

<sup>23</sup> See Baer and Leite (2003) and Lains (2003).



industries with lower labour productivity levels or with lower rates of growth of productivity, to industries where levels and growth rates are higher. This is a crucial step for the identification of the sources of labour productivity growth differentials which will be discussed in the next section.

To estimate the contribution of structural change to productivity growth we use a shift-share analysis that breaks down the growth of aggregate productivity into the following components: intra-industry effect, static effect and dynamic effect. The intra-industry effect refers to changes of productivity within each sector. The static component refers to circumstances in which resources shift towards sectors with productivity *levels* above the average. The dynamic component refers to circumstances in which resources shift to sectors with productivity *growth rates* above the average. This is known as the Verdoon effect or the ‘structural bonus’, which associates increases in labour productivity and output through the effects of increasing specialisation.<sup>24</sup> I consider here the modified shift-share analysis developed by Timmer and Szirmai (2000) to take into account the dynamic Verdoon effect. This analysis takes labour productivity ( $LP_t$ ) or output per person employed ( $Y_t/L_t$ ) as the product of sectoral labour productivity levels and the share of labour in each sector ( $S$ ):

$$LP_t - LP_0 = \sum_{i=1}^n Y_{(t,i)} L_{(t,i)} / L_{(t,i)} L_t = \sum_{i=1}^n LP_{(t,i)} S_{(t,i)}$$

The change in labour productivity can be computed as:

$$\begin{aligned} LP_t - LP_0 &= \sum_{i=1}^n (LP_{(t,i)} - LP_{(0,i)}) S_{(0,i)} + \sum_{i=1}^n (S_{(t,i)} - S_{(0,i)}) LP_{(0,i)} \\ &\quad + \sum_{i=1}^n (S_{(t,i)} - S_{(0,i)}) (LP_{(t,i)} - LP_{(0,i)}) \end{aligned} \quad (1)$$

The first term is the change in labour productivity attributed to intra-branch productivity growth, the second term is the static effect of structural change on productivity growth, and the third term is the dynamic effect. The analysis is carried out for three periods since 1979, presented in Table 3.

By far, the major factor behind labour productivity growth in Ireland since 1979 is the effect of productivity changes within each industry. In 1979–1986 the intra-industry effect accounted for 71.2% of that change, it increased to 98.5% in 1986–1994 and then declined to 71.1% in 1994–2002. The static effect which measures the change in the share of industries with above average labour productivity *levels* accounted for 37.2% of the change in 1979–1986, and that effect declined significantly in the two following periods. Instead, the dynamic effect, that is the growth of the share of industries with productivity *growth* above average, started as negative and increased substantially to account for 26.9% of total labour productivity growth in the last period in the table, from 1994 to 2002. Portugal’s performance was markedly different, as the dynamic effect was negative in 1986–1994 and 1994–2002, and impacted negatively in labour

<sup>24</sup> The shift-share analysis here used has several limitations, including the fact that it measures average instead of marginal productivity and that it only takes into account labour inputs. The three components are not necessarily orthogonal either.

**Table 3** Shift-share analysis of labour productivity growth, 1979–2002 (percent)

	Portugal			Ireland		
	1979–1986	1986–1994	1994–2002	1979–1986	1986–1994	1994–2002
Intra-industry effect	65.2	65.1	139.3	71.2	98.5	71.1
Static effect	36.3	88.4	−0.3	37.2	7.8	2.0
Dynamic effect	−1.6	−53.5	−39.1	−8.5	−6.3	26.9

Sources: See text. Computed from Groningen Growth and Development Centre, 60-Industry Database at <http://www.ggdc.net>

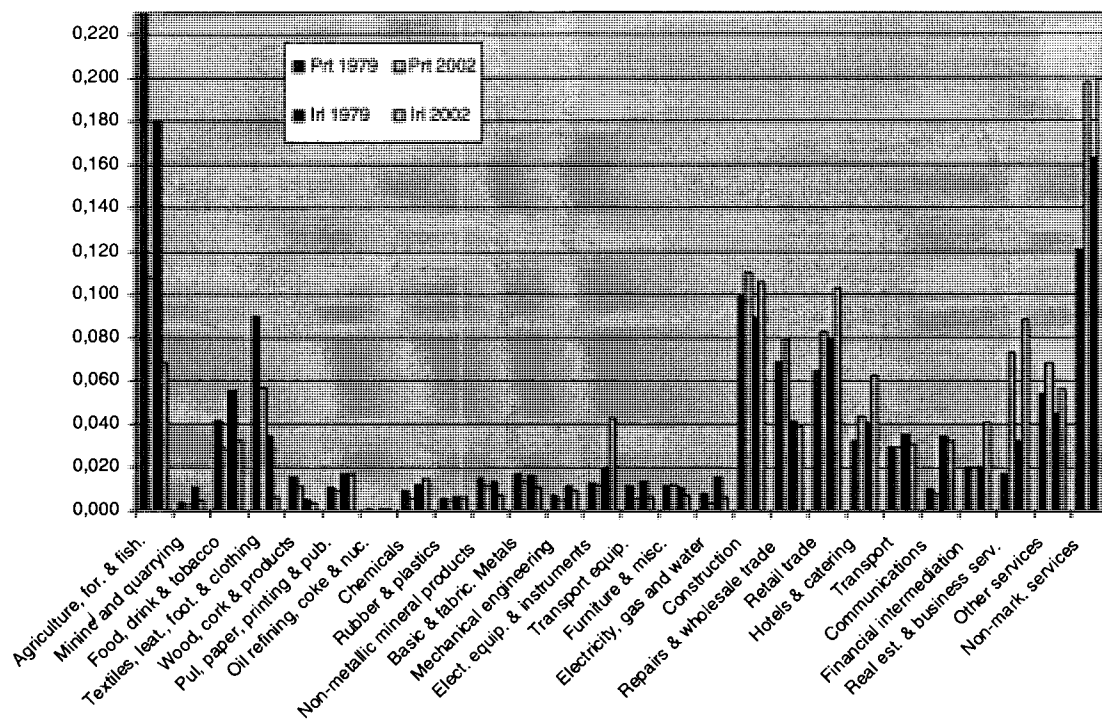
productivity growth by −53.5% in the first period and −39.1% in the second period. In other words, in Portugal labour was leaving the industries, in both manufacturing and services, with above average productivity growth, contrasting to what was happening contemporarily in Ireland.

## 5 Explaining Portugal's low structural bonus

In order to explain why Ireland managed to benefit from the structural bonus whereas Portugal did not, we need to look at structural change in more detail. The literature points to two different types of conclusions which have quite different implications in terms of our perception of the reasons behind the Irish catching-up of the last 15 years. According to Cassidy (2004), the 'Irish pick-up in growth [in the 1990s] was primarily driven by the performance of a small number of foreign dominated high-technology sectors; productivity growth in the more traditional manufacturing sector and the services sector was more modest.' Contrarily, Barros (2002) argues that 'traditional industries have been at least as important as ICT-producing industries for the convergence process within the European Union.' By the same token, we need to understand what drove structural change in Portugal, namely, whether there was a shift towards new sectors or not.<sup>25</sup>

Figure 3 provides a comparison of the distribution of employment in the two economies, in the years of 1979 and 2002. There we may see that, in 1979, both Portugal and Ireland had a large share of labour employed in the primary sector, and that that share strongly declined in the years to 2002, although at a higher speed in Ireland. In fact, Portugal's primary sector declined by half throughout 1979–2002, from 23.0 to 10.8%, whereas in Ireland the decline was about two thirds from 18.1 to 6.8%. The figure also shows a decline in the employment shares of the sector 'Food, drink and tobacco', which had similar weight in the two countries at the end of the period considered. We can also observe a decline in the shares of 'Textiles, leather, footwear and clothing', but Portugal's employment remained more concentrated in these industries than Ireland's, where the sector all but disappeared. There are thus strong similarities in the change of the structure of employment of the two economies in what can be considered traditional sectors, although the process was more intense in Ireland than in Portugal. As we move towards the right hand side of Fig. 3, we may

<sup>25</sup> Fare et al. (2006) look at the impact of efficiency, technology and physical and human capital, on labour productivity in a sample of European countries.



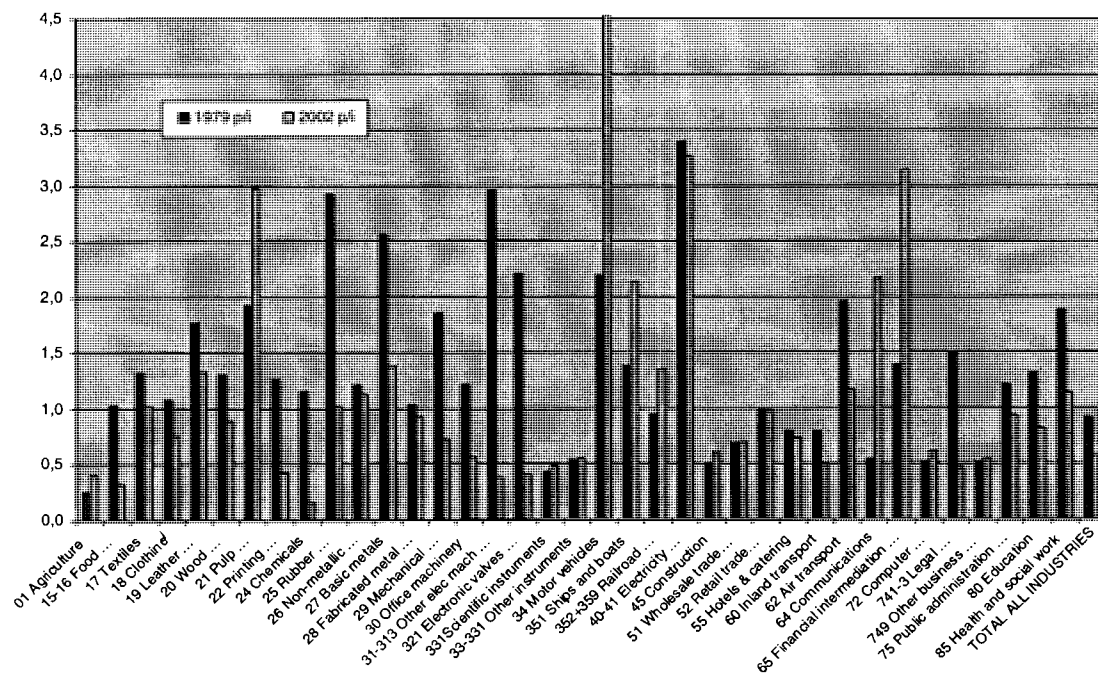
**Fig. 3** The structure of employment in Ireland and Portugal, 1979 and 2002. Source: see Table 3

notice that there are more similarities than differences between the two countries. The shares of the sector ‘Non-market services’, which includes education, health and public administration, is similar in the two countries, although, ‘Public administration’ was higher in Portugal, in 2002, whereas ‘Education’ was relatively similar in the two countries and ‘Health’ was higher in Ireland.

Figure 4 depicts the evolution of relative levels of labour productivity, also in 1979 and 2002, measured in purchasing power parity exchange rates. In 1979, Portugal’s total labour productivity was 91.3% that of Ireland and in 2002 that ratio had declined to 57.9%.<sup>26</sup> The most important conclusion we draw from the relative labour productivity data is that differences are not clustered in specific types of sectors. For example, Portugal had lower labour productivity in ‘Agriculture’, as well as in ‘Scientific instruments’, and ‘Construction’. On the other hand, Portugal had higher levels of labour productivity in industries such as ‘Motor vehicles’, ‘Electricity’, ‘Communications’, and ‘Financial intermediation’. Productivity differential are thus not clustered in industries that could be classified as more modern or using more intensively information and communications technologies.

Figure 5 provides the distribution of labour force according to the ICT taxonomy given by O’Mahony and van Ark (2003) and there we may see some differences between Ireland and Portugal. In fact, the share of ICT producing and using industries in the manufacturing and the service sectors in Ireland totalled 25.4% of labour force in 1979 and 33.5% in 2002. In Portugal that share was slightly below

<sup>26</sup> We use in this comparison the PPP exchange rates implicit in total GDP. It should be taken into account, thought, that Irish GDP is inflated to overpricing of multinationals. That bias is probably larger at the end of the period amounting to about 15% (see above). This implies that the decline in Portugal’s relative labour productivity level is overestimated.



**Fig. 4** Labour productivity: Portugal and Ireland, 1979 and 2002 (PRT/IRL; PPP adjusted). Source: see Table 3

Ireland's in 1979, at 22.1% and remained so in 2002 at 25.4%. Table 4 shows the contribution of each sector to total labour productivity growth and we may see that ICT using and producing industries accounted for 42.3% of labour productivity growth in Ireland in 1994–2002, whereas in Portugal they accounted for just 25.9% in the same period. Table 4 also shows that Ireland outperformed Portugal particularly in the ICT producing manufacturing industries, the contribution of which to labour productivity growth expanded from 9.8% in 1979–1986 to 15.8% in 1994–2002, whereas in Portugal that contribution was just 1.4% in the later period.

The data on the composition of labour force and the contribution to labour productivity growth according to the ICT taxonomy does lead to the conclusion that Ireland's economic performance depended on sectors where information and communication technologies are more important. Yet, Portugal did not fare particularly badly in that respect. In fact, we may see that the ICT using manufactures contributed in a similar way in the two countries in 1994–2002; and similar contributions can be found in the ICT using services. Moreover, the data on Table 4 also show that what was happening in the remaining sectors was of paramount importance. In fact as much as 57.7% of labour productivity growth was due to non-ICT sectors in Ireland, the figure for Portugal being of course much higher, at 74.1%.<sup>27</sup>

Summing up, the Irish and Portuguese labour productivity differed because of the joint effect of lower levels of productivity in certain industrial branches and also

<sup>27</sup> Barros (2002) also finds that the relation between speed of convergence and ICT-intensity is not significant for the cohesion countries during 1971–1992. Sánchez and Duarte (2006) also find that the contribution to structural change and productivity growth in Spain during 1980–1994 derived from a varied range of industries, including 'high technology' industries (i.e. computers, electrical, electronic and optical goods), 'medium-high technology' industries (chemical, machinery and automobiles), 'high-qualification' services (communications, banking, education and health) and other services (commerce, transport and public administration).

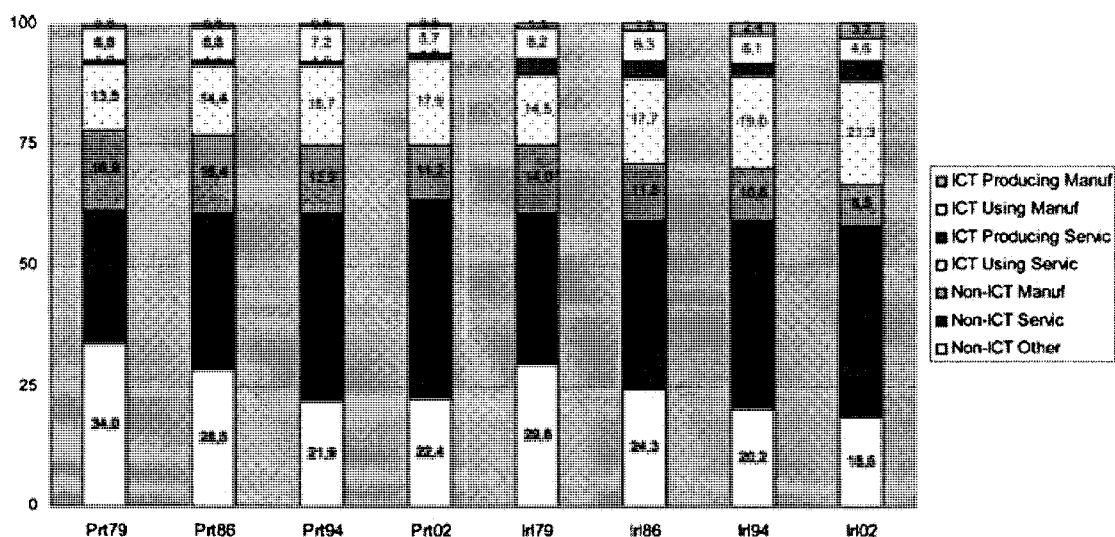


Fig. 5 Ireland and Portugal total economy ICT Taxonomy, 1979–2002 (percent). Source: see Table 3 and text

because of differences in the structures of the two economies. In order to measure the impact of the two different factors, we compare two counterfactual situations. The first is one where we take the structure of the Portuguese economy and the levels of Irish labour productivity; the second situation is one where we take Irish structure and Portuguese levels of productivity. Table 5 shows actual aggregate labour productivity levels in the two countries and the two counterfactuals. In 2002, Irish total labour productivity was 1.725 times that of Portugal. Counterfactual A measures the situation in which we take the structure of Portuguese labour employment and the levels of Irish productivity and that implies a difference towards Portugal's actual level of a factor of just 1.425. On the other hand, if we consider a counterfactual where we take Irish employment structure and Portuguese labour productivity levels, the difference is 1.751. This exercise shows that the main cause of the productivity differential of the two countries is the differences in the structure of employment and not differences in labour productivity levels.<sup>28</sup>

Differences in the structure of employment in the two economies can be explained in terms of endowments of physical and human capital in the two countries. Table 6 shows relative levels of physical and human capital per worker in the two countries in 1980 and 2000. Three relevant conclusions can be drawn from the figures there. The first one is that the levels of both forms of capital were higher in Ireland. The second is that the difference in endowments has declined rapidly in terms of physical capital, from a ratio of 2.24 in 1980 to a ratio of 1.47 in 2000, and less so in terms of human capital, namely, from 1.36 to 1.25 in the same time span. The third relevant conclusion is that the deficit for Portugal in terms of physical capital is *higher* than the one in terms of human capital.<sup>29</sup>

<sup>28</sup> It should be recalled that the analysis does not take into account the interaction between structure and labour productivity levels.

<sup>29</sup> Due to lack of data, it is not possible to relate physical and human capital inputs to productivity at the sectoral level. Fare et al. (2006) conclude that physical capital is the single most important factor explaining labour productivity differentials in the EU-15 zone throughout 1965–1998.

**Table 4** Contribution to labour productivity growth according to ICT Taxonomy, 1979–2002 (percent)

	Portugal			Ireland		
	1979–1986	1986–1994	1994–2002	1979–1986	1986–1994	1994–2002
ICT producing manufacturing	0.6	2.0	1.4	9.8	3.4	15.8
ICT Using manufacturing	6.5	6.2	8.5	7.1	6.3	8.4
ICT producing services	1.3	2.3	1.3	2.9	3.6	2.0
ICT using services	11.6	12.2	14.7	10.1	14.3	16.1
Non-ICT manufacturing	16.4	15.2	16.7	20.1	12.8	11.1
Non-ICT services	24.3	26.9	35.6	26.4	32.3	30.2
Non-ICT other	39.3	35.1	21.9	23.5	27.3	16.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

ICT definition according to O'Mahony and van Ark (2003), p. 49

Source: see Table 3

## 6 Conclusion

The structure of the Irish and Portuguese economies changed dramatically in the period from 1960 to 2004, but that change occurred in quite different ways. In both countries, there was a reduction in the share of the labour force employed in traditional sectors, which was compensated by an increase in the shares of modern sectors. But that transformation was quicker in Ireland than in it was in Portugal. The impact of such structural change on the growth of labour productivity was quantified in this paper: as much as 29% of Ireland's labour productivity growth in the 1990s was due to increasing numbers of people engaged in industries where productivity was increasing rapidly. By contrast, changes in the structure of the Portuguese economy had a *negative* impact on the growth of the country's labour productivity.

Moreover, the shares of ICT-producing and ICT-using industries in the manufacturing and the service sectors expanded faster in Ireland, increasing from

**Table 5** Actual and counterfactual total labour productivity (2002 US\$, PPP adjusted)

	1979	1986	1994	2002
Portugal actual	19,080	24,002	29,140	31,472
Ireland actual	20,910	26,066	34,596	54,299
Counterfactual A	21,515	24,632	32,329	44,838
Counterfactual B	23,733	30,699	32,887	55,110
Ireland actual/Portugal actual	1.096	1.086	1.187	1.725
Counterfactual A/Portugal actual	1.128	1.026	1.109	1.425
Counterfactual B/Portugal actual	1.244	1.279	1.129	1.751

Values adjusted according to the implicit PPP deflator of GDP for Portugal and GNP for Ireland  
*Counterfactual A*: structure of the Portuguese labour employment; levels of Irish labour productivity  
*Counterfactual B*: structure of Irish labour employment; levels of Portuguese labour productivity, adjusted by the PPP exchange rate

Memo: (1) Total labour productivity (Portugal/Ireland): 1979—0.520; 1986—0.509; 1994—0.462; 2002—0.340; (2) GDP (Portugal/Ireland): 1979—0.913; 1986—0.921; 1994—0.842; 2002—0.580; (3) PPP coefficient (2)/(1): 1979—1.754; 1986—1.810; 1994—1.824; 2002—1.704

Sources: See Table 3

**Table 6** Levels of capital per worker in Ireland and Portugal, 1979–2002 (USA=1; and ratios)

	Physical capital		Human capital	
	1980	2000	1980	2000
Ireland	0.83	0.94	0.80	0.85
Portugal	0.37	0.64	0.59	0.68
Ratio Ireland /Portugal	2.24	1.47	1.36	1.25

Source: Freitas (2005), p. 116

25.4 to 33.5%, from 1979 to 2002, whereas in Portugal that share barely changed, in the same period, from 22.1 to 25.4%. ICT related industries accounted for 42.3% of labour productivity growth in Ireland in 1994–2002 and just 25.9% in Portugal, in the same period.

Why did changes in the economic structures of the two economies have such different effects? The answer lies in the structure of the comparative advantages of the two countries: at the start of the period, Portugal had comparative advantages in sectors with lower levels of labour (and thus presumably capital) productivity. The abandonment of tariff protection and the adoption of the Euro implied a higher degree of exposure to international market forces and thus to increases in the output of those lower productivity industries. By contrast, Ireland had comparative advantages in higher labour productivity industries and thus benefited from the higher level of participation in the international economy. The main reason for the better structure found throughout in the Irish economy is related to the fact that its endowments in physical and human capital were higher, as compared to Portugal.

There are some relevant policy implications that we can derive from our conclusions. According to Esteban (2000), if countries (or regions) that lag behind suffer from a ‘uniform productivity gap’, then one should back ‘present EU regional policies based on structural funds essentially geared to improve infrastructures and human capital’, and not specific policies geared to promote ICT-producing industries. Policies directed towards infrastructures and education would help bridge Portugal’s lags in physical and human capital endowments, but one shouldn’t be too optimistic (Boldrin and Canova 2001).

The kind of policies mentioned above was implemented after Portugal’s accession to the European Communities, in 1986, with the financial support from the European Union under the structural funds programme. Importantly, investment in transport infrastructure had a large impact on growth (Pereira and Andraz 2005). Yet the outcome in Portugal was much less impressive than what we observe in Ireland. Foreign direct investment and export growth are more powerful sources of structural change and productivity growth than governmental transfers within the European Union. Financial transfers from the European Union could lead to larger benefits if they lead to an increase in private capital flows to the country but that linkage depends on policies that attract foreign investment. Portugal also has a relatively low degree of flexibility in the labour market which may also hamper higher levels of structural change.

Portugal’s adverse conditions for growth in the more recent period can be related to the structure of its economy and to its institutional framework. Those adverse

conditions can be changed. The Irish experience in the 1970s and the 1980s shows how those changes can be achieved, how they bring gains in the longer term, in terms of increase in labour productivity and welfare, and how lengthy that process of change can be.

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