Product Market Reforms: Macro Linkages and Effects on Growth

A Partial Survey

Giuseppe Nicoletti and Stefano Scarpetta*

* OECD and World Bank. We thank Alain Desdoigts, Cecilia Garcìa-Peñalosa, participants in the CESIFO Venice Summer Institute 2004 on "Institutions and Growth" and an anonymous referee for their useful comments on a previous version of the paper. The opinions expressed are the authors' own and cannot be attributed to the organisations to which they are affiliated.

I. Introduction

Over the past two decades, a large number of theoretical and empirical studies have highlighted the channels through which institutional settings can affect crucial dimensions of economic performance. This paper surveys some of the empirical evidence concerning the link between institutions and performance in OECD countries. Our review is selective in many respects. First, we look at a subset of market institutions – policy and regulations in the product market.[1] This is motivated by the large cross-country variability in policy choices in this area and the magnitude of reforms aimed at promoting competition and productivity growth. Such policy patterns could help explaining both cross-country differences in economic performance and changes in growth trajectories in individual countries. Second, we focus on the effects of policies on the main determinants of aggregate economic growth. This is because the effects of product market reforms on productivity and prices at the industry level have been documented in a number of other studies, but much less is known about their macroeconomic implications. Yet as reforms spread out to an increasing number of industries and involve also changes in general purpose regulations (*e.g.* administrative procedures), their macroeconomic repercussions are likely to be significant.[2] Third, our review draws mainly from empirical work undertaken by the authors over the past few years, though it also reports some of the related results found in the recent literature on institutions and growth. Empirical results are reported in a summary form, concentrating on the implied quantitative implications for macroeconomic outcomes. The reader interested in the regression details may wish to look at the papers referenced in the text.

To illustrate the potential effects of product market reforms on growth, we report estimates of their impact on employment, investment (domestic and foreign) and productivity. Throughout the paper we concentrate on the effects of policies aimed at strengthening private governance (*e.g.* through privatization) and opening up access to markets where competition is economically viable, though the empirical analyses we draw on often also look at the interactions between product market reforms and policy and institutions in other markets, in particular the labour market. Clearly, quantitative assessments heavily depend on modelling choices and sample coverage. Therefore, they should be interpreted with caution, especially in view of the fact that the variables we consider are closely interdependent, and the global effects of reform can hardly be expressed as the sum of the effects estimated for each of them separately. Nonetheless, we believe that the reported results are sufficiently robust to provide at least an indication of the magnitudes involved.

The plan of the chapter is as follows. First, we review the economics of regulation and growth, recalling the main channels through which product market policies can affect investment, productivity and employment. Second, we provide some stylised facts concerning the growth performance in OECD countries over the past two decades as well as developments in regulations that discourage or promote private governance and competition. We look mainly at regulations in non-manufacturing, where restrictions to competition and reforms to alleviate them have been more extensive. To facilitate this task we use summary indicators of product market regulation recently developed at the OECD. Then, we report empirical results exploring the implications of these regulations (and reforms therein) for outcomes in broad economic sectors and the economy. The results suggest that pro-competitive reforms have positive effects not only in product markets -- where they tend to increase investment and productivity – but also in labour markets – where they promote higher levels of employment. Through both these channels, product market reforms can lead to higher growth in GDP per capita.

II. Regulation and the determinants of growth

Recent growth theory and worldwide experience suggest that catch up in real incomes is not mechanical. While convergence in growth rates has been observed among broad groups of countries, convergence in levels of GDP per capita is likely to depend on a number of factors (*e.g.* market imperfections, differences in endowments, agglomeration effects and institutional settings) (see, for instance, Barro and Sala-i-Martin, 1998). There is increasing consensus that product market policies that promote entrepreneurship and competition may contribute to shift the (country-specific) efficiency frontiers, while at the same time increasing labour utilisation.[3] Before examining the evidence, it is useful to recall the main channels through which this may happen.

II.1 Regulation, competition and productivity

Regulatory policies that promote entrepreneurship and competition may stimulate efficiency improvements in various ways (see, for instance, Winston, 1993, and Meyer and Vickers, 1997). For example, competition creates greater opportunities for comparing performance, making it easier for the owners or the market to monitor managers. Competition also raises the "bang per buck" from cost-reducing productivity enhancements (in highly competitive markets, small price differences have big effects on market shares). Moreover, competition is likely to raise the risk of losing market shares at any given level of managerial effort; managers may work harder to avoid this outcome.[4] In parallel, business-friendly regulations make it easier to implement efficiency improvements by reshuffling resources within and across firms.

It should be stressed that theoretical predictions of the effects of greater competition on managers' incentives are often "subtle and ambiguous" (Vickers, 1995). For example, models using *explicit* incentives under information asymmetry do not lead to clear-cut implications (see *e.g.* Holmström, 1982), while intertemporal models using *implicit* (*i.e.* market-based) rewards suggest a positive link between competition and managerial effort if productivity shocks are more correlated across competitors than managerial abilities (Meyer and Vickers, 1997). But, competition could also lead to more slack if managers are highly responsive to monetary incentives (Scharfstein, 1988).

Apart from helping to eliminate X-inefficiencies (Liebenstein, 1966) through one-off improvements in the use of inputs, the effects of policies promoting entrepreneurship and competition on productivity are likely to operate through three main channels:

- *Capital spending.* As shown by Alesina *et al.* (2003), easier access to markets (*e.g.* due to lower barriers to entry) tends to curb rents, expanding activity levels and stimulating capital formation. Moreover, less red tape and lighter regulatory burdens lower the costs of adjusting the capital stock, thereby boosting the capacity of firms to react to changes in fundamentals by expanding their productive capacity. Potentially offsetting factors are, however, the tendency of certain regulations to encourage capital formation – such as Averch-Johnson (1962) effects – or ill-designed de-regulation failing to provide the right incentives to expand capacity in network industries.

- *Technology diffusion*. The opening up of markets and increased competitive pressures provide both opportunities (*e.g.* through imitation) and strong incentives for firms to upgrade their capital stock and adopt new technologies to reach frontier production techniques, mainly due to the threat of losing market shares *vis-à-vis* more advanced competitors, such as new entrants bringing new vintages of technology (Schmidt, 1997; Aghion and Howitt, 1998). In this context, technology diffusion may also be induced by spillovers from increased trade and foreign direct investment resulting from the reduction of border and non-border barriers (see Keller, 2004, for a survey of theory and evidence).

- *Innovation.* The attempt to acquire a competitive edge on rival firms often results in a stronger innovation effort, for instance through increased expenditures on research and development (R&D) and patenting.[5] Moreover, easier entry in (and exit from) innovative markets fosters market testing of new ideas and the process of “creative destruction”. Aghion *et al.* (2001) model the pro-innovation impact of competition by noting that intensified competition may force managers to speed up the adoption of new technologies in order to avoid loss of control rights due to bankruptcy. Even when firms have similar cost structures (the case of “neck and neck” competition) and technological progress is more gradual, stronger competition may induce firms to increase R&D investment (conditional on the level of protection of intellectual property rights) in order to acquire a lead over their rivals. This channel, however, may be ‘bell-shaped’ in the sense that innovation is highest at intermediate levels of competition (see Boone 2000a,b; and Aghion *et al.*, 2002).

The domestic business environment is likely to be particularly important for efficiency in utilities and service industries, where competition from abroad is weaker and a difficult balance has to be struck between regulations and market forces (*e.g.* in network industries) due to market imperfections. Enhancing competition in these industries can provide a "double dividend" because it may increase both the direct contribution of non-manufacturing to overall productivity growth (with the sector representing around 70 per cent of economic activity in most OECD countries) and contribute to overall productivity growth indirectly, via improvements in the productivity of industries that use non-manufacturing products as intermediate inputs (with the latter accounting for between 30 and 50 per cent of gross manufacturing output in many countries).[6]

All in all, there are strong arguments suggesting that increased competitive pressures resulting from product market reform are likely to stimulate productivity. However, offsetting factors and uncertainties inherent in the channels described above indicate that the strength, if not the direction, of the link between product market competition and productivity performance remains an empirical issue.

II.2 Regulation, competition and employment

While the primary (short and long-run) effects of anticompetitive product market regulation are to be expected on output and productivity, regulatory hindrances to competition may also have consequences for employment, both at the firm level and in the aggregate.[7] At the firm level, regulations that create market power reduce the wage elasticity of demand and shift inwards the labour demand schedule (Hicks, 1935). In addition, the existence of rents induced by the lack of competition generally prompts employees to ask for wage premia, especially if they are unionised.[8] *Ceteris paribus*, this induces firms to choose capital-labour ratios higher than in a competitive situation, causing lower employment and additional productive inefficiencies. Recent research has stressed two main ways in which regulations that impact on competition can also affect aggregate employment:

- First, such regulations create fixed costs of entry that generate rents, reducing the number of competing firms and output in the long-run. Thus, when deregulation leads to a decrease in entry costs, it has a positive effect on equilibrium employment, because the number of firms expands, rents decrease and output levels increase.[9] This implication is common to imperfect competition models in which labour markets are characterised by either bargaining (Spector, 2002**;** Blanchard and Giavazzi, 2003) or Mortensen-Pissarides job matching mechanisms (Pissarides, 2001**;** Ebell and Haefke, 2003).[10]

- Second, regulations can lower the intensity of competition between existing firms. Here, the results of deregulation depend on model specifications. Using a simple two-period model in which unemployment arises from the bargaining power of workers, Blanchard and Giavazzi (2003) find no effect on equilibrium unemployment. However, Ebell and Haefke (2003) find effects symmetric to those of a reduction in entry costs in a fully dynamic setting in which unemployment arises from a job-matching framework. Deregulation reduces long-run unemployment because labour-market tightness increases under both deregulation scenarios.[11]

The size of the latter effects, however, is inversely related to the average survival rate of firms (because as survival rates decrease, entry costs need to be amortised more quickly). More generally, the size of the employment effects will depend also on the features of labour market institutions (*e.g.* degree of unionisation and centralisation of bargaining mechanisms) (Nickell, 1999, Ebell and Haefke, 2003). For instance, Amable and Gatti (2001) show that in an efficiency wage model deregulation may have little effect on employment if it leads to increases in the reservation wage of workers related to the increased risk of lay-offs in bad states of the world. In sum, while there is a strong presumption that easing anticompetitive regulations may lead to employment gains (at least in the medium to long-run), whether this effect can contribute to explain observed cross-country differences in labour utilisation has to be checked empirically.

III. Regulation and economic performance in the OECD area

III.1 Growth patterns

We begin our overview of economic growth in the OECD area over the past two decades by presenting a cross-country comparison of GDP per capita and identifying the sources of the observed gaps in living standards with respect to a benchmark country – the United States. This level analysis is complemented by a standard growth accounting decomposition. In both cases, we focus on two key determinants of differences in the levels and growth rates of GDP per capita: labour utilisation and labour productivity.

Real income gaps

Gaps in real income relative to the United States are still large in many OECD countries and, most notably, they have widened since the mid-1980s after three decades of convergence. At the turn of the century, per-capita incomes were between 20 and 30 per cent lower in Japan and the European Union (EU) than in the United States.[12] There were, however, wide differences among EU countries, with GDP per capita in some smaller countries (*e.g.* Ireland and Norway) being at par or above the United States.

The sources of current gaps can be characterised as follows (Figure 1):

- Underutilisation of labour -- reflecting low employment rates (employment divided by the working age population) and hours worked per employed person -- was the main reason for the gaps in GDP per capita in the European Union relative to the United States.[13] Low employment rates were closely related to relatively low labour-force participation rates -- especially amongst women, those above the age of 55 and, in some countries, the youth. Moreover, especially in large continental EU countries, low participation was coupled with relatively high structural unemployment rates.

- In some EU countries – such as Portugal, Greece, Iceland and, to a lesser extent, the United Kingdom – as well as outside the EU, the gaps originated mainly from relatively low labour productivity levels.

[Figure 1. The sources of real income differences, 2002]

Growth developments

The observed gaps in GDP per capita have been significantly influenced by recent cross-country growth patterns. GDP per capita growth in the United States has been faster than in the EU as a whole and, more strikingly so, than in Japan. Within the EU, incomes per capita have lost ground relative to the United States at a particularly fast speed in the large continental countries (Figure 2).

[Figure 2. Growth in the US and in large continental EU economies, 1970-2003]

The main sources of these growth differentials over the past two decades can be summarized as follows:

- In the United States and a few other countries (the United Kingdom, Sweden, Ireland, Australia, Spain and Portugal) faster growth has been sustained by the ability to raise both hours worked and hourly productivity on average for two decades in a row. More importantly, the United States, Australia and Ireland were able to do so while at the same time accelerating significantly growth in productivity since the mid-1990s.

- Thus, until the mid-1990s, movement in labour utilisation has been the main explanation for differences in trend GDP-per-capita growth across countries, with growth in labour utilisation being stronger in the United States and other non-EU countries than in most of the large continental EU economies and Japan.

- Subsequently, the acceleration in labour productivity growth was the prime factor behind the faster growth in GDP per capita in the United States. This was also the case for a number of other non-European countries (such as Canada, Australia and New Zealand).

- By contrast, in many EU countries, the slight improvement in labour utilisation over the 1990s came at the price of a continuing productivity slowdown, so that the rising GDP gaps were due to lower growth in both hours and productivity.[14]

These growth developments suggest that, in a number of OECD countries, resumption of catch up to US GDP per capita levels crucially depends on the ability to reconcile increasing labour utilisation with a strong productivity performance.

Determinants of productivity growth

Labour productivity growth can be decomposed into changes in the capital/labour ratio – a measure of capital deepening – and changes in Multi Factor Productivity (MFP), whose “broad” definition measures the residual growth in output that cannot be attributed to changes in the quantity of labour and capital used in production.[15] The decomposition of labour productivity suggests that in the United States, Canada, Australia and a few smaller EU countries the acceleration in labour productivity over the 1990s was driven by faster broad MFP growth, while the decline in other OECD countries could be related to a drop in broad MFP growth (OECD, 2003). OECD estimates suggest that the close relationship between labour and broad MFP performance continues to characterise growth developments in the most recent period.[16]

Changes in broad MFP growth can be further decomposed into changes in the “quality” of factor inputs – so called embodied technological progress – and a residual factor that accounts for organizational changes and disembodied technological progress. Available information suggests that both improvements in the human capital of workers and shifts to more productive capital assets have contributed to changes in broad MFP.[17] The shift towards information and communication technology (ICT) equipment has been the strongest factor behind the acceleration of productivity growth in some countries. At the beginning of the century, the share of ICT equipment in total investment was higher than in the previous decade in most of the countries for which data are available, and OECD countries’ experience suggests a positive correlation between labour productivity acceleration and the increase in ICT investment over the 1990s (Figure 3).[18] However, such investment was lower in large EU countries and Japan than in the United States. Moreover, EU labour productivity growth was dragged down by a deceleration in the enhancement of the human capital of the workforce, which in turn reflected lower productivity workers being brought back into employment also via tax and other incentives to the hiring of such workers.

[Figure 3. Pick-up in productivity growth and increase in ICT investment]

Summing up

The overview of growth patterns over the past two decades points out that some OECD countries have been able to improve their performance via significant improvements in both labour utilisation and labour productivity while others have lagged behind in either one or both dimensions. As a result, the gaps in GDP per capita of these countries with respect to the United States have widened. In fast growing countries, sustained investment in new technologies – mainly ICT – has been the driving force behind productivity improvements. This engine of growth has largely failed to operate in other countries. To what extent can regulations in product markets and regulatory reforms be held at least partially responsible for these observed differences in growth performance? We turn to this question in the next sections.

III.2 Patterns of product market reform

Product market regulations can curb competitive pressures and hinder (or prevent) entry of new firms in potentially-competitive markets, but they can also favour competition in certain industries by ensuring that market power in natural monopoly segments is not used abusively and by providing the correct incentives to market participants. To promote entrepreneurship and competition, most OECD countries have implemented sweeping regulatory reforms over the past two decades, but they did so at different speed and to a different degree. The main elements of these reforms were: (i) privatisation,

(ii) entry and price liberalisation in potentially competitive domestic markets, (iii) pro-competitive regulation of natural monopoly markets (*e.g.* by regulating access to networks), and (iv) further liberalization of international trade and foreign direct investment.[19]

To gauge the extent of these reforms, we use a set of cross-country quantitative indicators of regulatory reform in particular areas of the economy, industries and in the overall economy. The indicators measure to what extent competition and firm choices are restricted where there are no *a priori* reasons for government interference, or where regulatory goals could plausibly be achieved by less coercive means. Many of the indicators focus on the non-manufacturing sector, which is the most regulated and sheltered part of the economy. In most OECD countries, few explicit barriers to competition remain in markets for manufactured goods.

All indicators take continuous values on a scale from least to most restrictive of private governance and competition and report the situation at the end of the past decade, the latest period for which complete information was available at the time of writing.[20] Box 1 provides a cursory view of the main indicators used in the empirical analyses surveyed below. Here we note that they are not intended to measure how effective regulations are in meeting their stated public policy goals; they merely quantify the “market unfriendliness” of regulations.

Figure 4 focuses on border policies, showing the evolution of tariff and non-tariff barriers (Panel A) and explicit restrictions to foreign direct investment (Panel B). Trade restrictions have generally fallen in the OECD area. Over the 1996-2001 period average tariffs declined in most countries, though the dispersion of bilateral tariff rates remains wide, reflecting tariff discrimination across trading partners. Available information on non-tariff barriers up to 1996 suggests that these barriers have declined as well. However, they were still significant in many OECD countries, and more recent surveys suggest that such barriers have shifted from border restraints to domestic policies restricting access to markets. Foreign direct investment restrictions were also softened significantly over the past two decades, but cross-country differences remain large, with most EU countries showing greater openness than the United States and Japan (largely due to complete liberalisation of capital flows within the EU Single Market).

[Figure 4. Openness to trade and foreign direct investment]

Figure 5 highlights, by means of a summary indicator, the general patterns of reform in non-manufacturing regulation over the 1980-1998 period. The box plot shows the median level of regulation and the dispersion of regulatory approaches across countries in each year.[21] There was some policy convergence over the past two decades in absolute terms, with policies generally becoming friendlier to market mechanisms. However, mainly due to differences in initial conditions and in the pace of reform, regulatory policies diverged in relative terms, with a widening variance of approaches across countries in the most recent period. Paradoxically, the divergence in policies over the 1995-1998 period was widest within the EU, despite efforts by the European Commission to harmonise the business environment in the Single Market.

[Figure 5. Regulatory reform in non-manufacturing]

Box 1**. Indicators of product market regulation**

Barriers to trade

The indicator of non-tariff barriers is a frequency ratio: it corresponds to the proportion of (6-digit) tariff lines to which non-tariff barriers apply. Non-tariff barriers for 1988, 1993 and 1996 have been aggregated into indicators for 2-digit industries using import-weights corresponding to 1998 trade flows across OECD countries. A similar indicator for tariff barriers has been used in empirical analyses. Details are provided in Nicoletti and Scarpetta (2003).

FDI restrictions

Several different types of restrictions are considered: limitations on foreign ownership, screening or notification procedures and operational restrictions. These restrictions are reported for nine sectors, of which seven are services, and then aggregated into a single measure for the economy as a whole. Details can be found in Golub (2003).

Non-manufacturing regulation

The indicator covers regulations and market conditions in seven energy and service industries over the 1975-1998 period: gas, electricity, post, telecoms (mobile and fixed services), passenger air transport, railways (passenger and freight services) and road freight. The coverage of regulatory areas varies across industries. Barriers to entry are reported for all industries; public ownership is reported in all industries except road freight; vertical integration is documented for gas, electricity and railways; market structure is documented for gas, telecommunications and railways; and price controls are reported for road freight. The summary indicator is the simple average of the industry-level indicators. See Nicoletti and Scarpetta (2003) and Alesina *et al.,* (2004) for details.

Economy-wide indicators of product market regulations

These indicators describe the 1998 policy environment in OECD product markets summarising information on 139 general-purpose and industry-specific regulatory provisions restricting domestic market mechanisms (in potentially competitive environments) and international trade and investment. Details on data sources, scoring and aggregation methods are provided in Nicoletti *et al.* (1999).

Cross-country differences in regulation, and hence differences in the implementation of regulatory reform, can also be gauged looking at an economy-wide indicator of regulations, which provides a summary view of the extent to which economic and administrative regulations affect competition and private governance in each country (Figure 6). In 1998, the United Kingdom had both the lighter administrative burdens (*e.g.* start-up costs) and the least restrictive market regulations (*e.g.* barriers to entry, public ownership). It was followed closely by the other common-law countries, although economy-wide and/or industry-specific administrative regulations appeared to be somewhat heavier in some relatively liberal countries such as Ireland and New Zealand. At the opposite end, Italy was the most restrictive among the countries surveyed, with heavy administrative regulations also found in France, Belgium and, to a lesser extent, Japan and Germany. Interestingly, countries with tight economic regulations also had burdensome administrative procedures on business enterprises.

[Figure 6. Overall regulatory approaches across countries, 1998]

IV. The empirical links between product market regulations and performance

There is sufficient variability in approaches to market regulation across countries and over time to expect that some of the channels highlighted in previous sections could help explain differences in growth performances in the OECD area. To check this, we take a bottom up approach and look at the available evidence concerning the effects of regulation on the main determinants of growth: capital formation, multifactor productivity and labour utilisation. Since the purpose of this paper is to summarise this evidence, we report only the main features and results of the analyses, as well as (where possible) some quantitative inferences on the likely impact of regulation on macroeconomic aggregates. In interpreting these results, the reader should bear in mind the illustrative nature of any policy simulation based on aggregate regressions. For details on the empirical approaches characterising each study, the reader may refer to the annex or the original papers.

IV.1 Regulation and investment

There are very few studies looking at the effects of product market policies on aggregate investment. Yet, casual observation suggests that various measures of investment have recently been related to product market developments. For instance, countries with a more restrictive regulatory environment tend to invest less in ICT (Figure 7). Moreover, investment in crucial non-manufacturing industries appears to have been increasing in the "business-friendly" United States and United Kingdom at a faster rate than in "restrictive" large continental EU countries. The patterns of investment vary significantly between the two groups of countries: while in the United States and the United Kingdom investment as a share of the capital stock increased from 3.7 per cent in 1975 to 8.15 per cent in 1998, in the large continental European countries the investment rate decreased by 5 percentage points from 9.4 per cent to 4.4 per cent. Interestingly, the United States and the United

Kingdom strongly liberalized product markets before the nineties, while reforms were almost absent before then in Italy, Germany and France. Moreover, changes in investment trends in each non-manufacturing industry are statistically associated with the timing of reforms.

[Figure 7. Regulation and investment in ICT, 2001]

Here, we summarise two recent studies that look at investment in the non-manufacturing sector (Alesina *et al.,* 2003) and aggregate foreign direct investment (Nicoletti *et al.*, 2003), respectively. Focusing on non-manufacturing industries is relevant because they are major users of ICT and there are large differences across countries in the extent to which these industries contribute to aggregate productivity growth. Moreover, these differences appear to be closely related to the extent of regulation, with most restrictive countries failing to obtain productivity gains (see below). Looking at foreign direct investment (FDI) is also relevant because there is a large theoretical and empirical literature pointing to the role played by foreign affiliates in transferring knowledge and technology to host countries.[22] Therefore, there is a strong presumption that FDI could significantly contribute to productivity growth. However, casual observation suggests that countries and industries where regulations restrict access and make business difficult tend to receive less inward FDI (Figure 8).

[Figure 8. Regulation and FDI]

Investment in non-manufacturing

Alesina *et al*. (2003) look at the effects of regulation on investment in the transport (airlines, road freight and railways), communication (telecommunications and postal services) and utilities (electricity and gas) sectors. They estimate a simple dynamic panel model of investment and regulation, controlling for sector/country fixed effects and common or sector-specific year effects (see Annex for more details). They measure regulation with the time-varying indicator described in the previous section, which captures entry barriers and the extent of public ownership, among other things. They find that regulatory reforms have had a significant positive impact on capital accumulation in these industries. In particular, liberalization of entry in potentially competitive markets has a sizeable effect on long-run investment rates.

Their findings are consistent with the idea that a reduction in barriers to entry is likely to stimulate investment because it leads to a decrease of the markup and, therefore, of the shadow cost associated with capital and output expansion. This effect appears to outbalance potential downward pressures on investment that might have originated from changes in incentives due to the re-design of price regulation (*e.g.* from rate of return to price caps or inappropriate access pricing regimes) or changes in industry structure (*e.g.* vertical separation of networks from service provision). While in principle agency problems and political mandates affecting the behaviour of public managers may lead to over-accumulation of capital, Alesina *et al.* also find that privatisation spurs investment. This suggests that the reduction of barriers to entry for private firms associated with the elimination of state control on business enterprises more than compensates the reduced importance of potential overinvestment problems due to managerial incentives.[23] Interestingly, there is also evidence that the marginal effect of deregulation on investment is greater when the policy reform is large and when changes occur starting from relatively low levels of regulation. In other words, small changes in a heavy regulated environment are not likely to produce much of an effect. The implications of the analysis are clear: regulatory reforms that substantially lower entry barriers are likely to spur investment. The authors show that the empirical results are robust to several sensitivity checks and extensions.

Using these results, it is possible to derive some (highly tentative) quantitative estimates of the potential effects of product market reforms on investment. For instance, a decrease of the indicator of regulation from its third quartile value to its first quartile value would generate according to the estimated model an increase in the investment rate of approximately two percentage points in the long run, which is quite large. Considering that the sectors analysed are highly capital intensive, the increase of investment as a percentage of gross output or value added would be even larger. Another way of gathering a sense of the magnitude of the changes is to make some experiments with actual values of the indices in different time periods in one country or across countries. For instance, the estimated model would predict that the regulatory reforms implemented in the United Kingdom in the transport and communications sector over the period 1984-1998 would raise the investment rate in the long-run by 2.5 percentage points over the same period. The actual increase was 3.0 percentage points. The estimated model would also predict that if Germany and France were to align regulation in non-manufacturing industries with US standards their investment rate would increase by 2.3 percentage points in the long-run. Taking the 1994-1998 period average as a benchmark, this would raise Germany's rate from 5.6 per cent to 7.9 per cent and France's rate from 5.9 per cent to 8.2 per cent, both much closer to the US average level of 9.0 per cent. The same thought experiment would raise Italy's investment rate by 3.3 percentage points, from 6.8 per cent to 10.1 per cent.

Foreign direct investment

There is a large literature looking at the structural determinants of FDI flows from both the point of view of investor and host countries (see, for instance, Markusen and Maskus, 2001a). Surprisingly, however, less attention has been devoted to the role of policies. While the effects of corporate taxation have been extensively studied (see the survey in de Mooij and Ederveen, 2003), very few empirical studies have looked at the influence of other border and, especially, non-border policies. Interest in this issue has increased recently as a "unified approach" to the analysis of trade and the multinational enterprise has gained ground (Markusen and Maskus, 2001b).[24] For instance, Markusen (2002) used this approach to assess the effects of both trade and investment liberalisation on bilateral FDI flows.

Nicoletti *et al.* (2003) is, to our knowledge, the only study looking explicitly at the effects of a broad range of product market policies on FDI, including both investment barriers and domestic regulations.[25] While the reasons to expect a negative effect of FDI restrictions on investment are obvious, the role played by domestic regulations is a priori more ambiguous. Indeed, by raising production costs or entry barriers, domestic regulations can affect FDI in multiple and at times conflicting ways:

- Cost-increasing regulations in the host country can deter FDI by lowering its expected rate of return if the foreign subsidiary is used as a platform for re-exporting final or intermediate goods back home or to other less regulated countries. However, if FDI aims at accessing the local market, cost-increasing regulations in the host country may encourage FDI because the foreign affiliate can take advantage of the production structure of the parent firm, which may be more efficient than in local firms if regulations in the investor country are more pro-competitive.[26]

- Similar conflicting influences can be exerted by regulations that raise entry barriers in host countries. Such entry barriers clearly deter "greenfield" FDI aimed at establishing new firms or creating new production plants. However, by endowing local firms with market power, they can actually encourage inward FDI aimed at acquiring (or merging foreign parents with) existing local firms.

Using some of the policy indicators described in the previous section, Nicoletti *et al.* estimate two distinct FDI models: an empirical specification of the determinants of (aggregate) bilateral outward FDI stocks based on Markusen's "unified approach"; and a reduced form specification of the determinants of total inward FDI stocks (see Annex for more details). In both specifications, FDI stocks are determined by a set of structural factors -- including gravitational ones (such as distance, transaction costs, total market size, etc.) and others reflecting comparative advantage and scale effects (relative factor endowments, relative market size) – and policies in the investor and host countries (participation in free trade areas, tariff and non-tariff barriers, FDI restrictions, labour market arrangements, infrastructure investment and product market regulations). These specifications are estimated on a panel of OECD countries over the past two decades, controlling for a range of unexplained effects (including host-specific, investor-specific, country-pair specific and time effects).

FDI restrictions by the host country are estimated to have a significant negative impact on its bilateral FDI stock with specific partners and, consistently, are also found to significantly depress its total inward FDI position (relative to all its partner countries). Similarly, product-market regulations that curb competition at home are estimated to have a negative and significant effect on FDI, but what is relevant for bilateral FDI positions is the relative stringency of regulations in the host and investor countries. Put simply, the net effect of regulations that curb competition is to make the host country less attractive for international investors located in countries where regulations are less restrictive. This is confirmed by the significantly negative impact of anti-competitive regulations in the host country (relative to the OECD average) on its total FDI inward position.

With the usual caveat, empirical estimates can be used to quantify the long-run impact on inward FDI positions of changes in policies that affect FDI restrictions and product-market regulation.[27] The estimates suggest that bringing FDI restrictions in all OECD countries down to the level of restrictions in the United Kingdom, the least restrictive country according to the indicator used in the empirical analysis, would have a sizeable impact on global integration. The effects of such reforms on FDI inward positions depend on how restrictive each country was before the policy move. Relatively restrictive countries could increase their total FDI inward position (which is typically low in terms of GDP) by between 40 and 80 per cent, but even in countries that are estimated to be already relatively liberal the gains could amount to around 20 per cent of their initial inward position. Overall, such policy reforms could increase OECD-wide inward positions by almost 20 per cent, significantly raising economic integration in the area.

Reducing anti-competitive product-market regulations is also likely to increase significantly FDI inward positions. If all OECD countries were to reduce the level of their product-market regulations to that of the United Kingdom (again the least restrictive country according to the indicator used in the analysis), OECD-wide inward positions would increase by over 10 per cent relative to the initial inward position. Since bilateral FDI outward positions are estimated to depend on the relative stringency of regulation in the home and host countries, relatively restrictive host countries -- such as Greece, Italy and France -- that host FDI from relatively liberal countries could increase their FDI inward positions by as much as 60 to 80 per cent through regulatory reform. Conversely, countries that are relatively liberal would see the relative attractiveness of their product markets either unchanged (such as in the United States, New Zealand and Sweden) or even reduced (such as in the United Kingdom and Australia).

IV.2 Regulation and multifactor productivity

Improvements in MFP play a crucial role in the process of economic growth, and in OECD countries they accounted for between one third and one half of the average business sector GDP growth observed over the past two decades (Bassanini and Scarpetta, 2002). There are basically three ways in which MFP improvements can be achieved: eliminating slack in the use of resources; adopting the most efficient technologies; and increasing innovative effort. As discussed above, by affecting the incentives to innovate and improve efficiency, regulations that promote product market competition (*e.g*. by lifting entry or operational restrictions) can have important effects on innovation, technology diffusion and MFP performance. As an illustration, Figure 9 plots the acceleration in MFP growth in the OECD countries against product market regulations. The figure shows that countries that have extensively reformed their product markets have also experienced an acceleration of MFP over the 1990s, while the productivity slowdown (or stagnation) has continued in other countries.

[Figure 9. Multifactor productivity acceleration and product market regulation]

In Nicoletti and Scarpetta (2003), we move from this aggregate bivariate evidence to a multivariate regression analysis of the driving forces of industry-level MFP growth. We estimate a multifactor productivity equation derived from a production function in which technological progress is a function of country/industry specific factors, as well as a catch-up term that measures the distance from the technological frontier in each industry (see Annex).[28] This framework allows testing for the direct effect of institutions and regulations on estimated productivity, as well as for the indirect influences of these factors *via* the process of technology transfer.[29]

We find that various measures of anticompetitive product market regulation (both economy-wide and industry-specific) significantly curb productivity performance at the industry level.[30] In particular, the long-run costs of anticompetitive regulation, in terms of foregone productivity improvements, are higher in countries that are further away from the technological frontier. This negative effect on productivity catch up may result, for instance, from lower incentives for organisational and technological change in markets where competition is weak due to state interference (*e.g.* entry barriers or price controls), and, in addition, a narrower scope for knowledge spillovers in markets where entry is restricted. The empirical results also suggest that, by increasing competitive pressures, regulatory reform will promote productivity in each individual industry, regardless of its position with respect to the technology frontier. Our findings are consistent with a growing empirical literature that has looked at the links between competition and productivity at the aggregate and especially at the industry and micro levels.[31]

Our empirical results can be used to illustrate the potential productivity gains that would be induced by regulatory reforms. Bearing in mind the limits of such simulations, a product market reform that would align industry-specific regulations with those of the most liberal OECD country is estimated to reduce the MFP gap *vis-à-vis* the leading country by around 10 per cent, in the long run, in high-gap countries such as Greece, and by around 4 to 6 percentage points in several other continental European countries and Japan. Put differently, aligning the overall regulatory stance with that of the most liberal OECD country could increase the annual rate of MFP growth in continental EU countries by between 0.4 and 1.1 per cent over a period of ten years (Table 1).

[Table 1. Change in annual percentage growth of MFP in EU countries implied by the alignment of regulation on OECD best practice over 10 years]

The effect of entry regulations is likely to be particularly important for productivity performance in industries in which technology is rapidly evolving, such as ICT industries or industries characterised by high ICT adoption. In these industries new entrants play an important role in introducing new vintages of technology (see Scarpetta *et al.* 2002). Therefore, product market regulations that minimise the prospective costs faced by new entrants are likely to create favourable conditions for increasing the contribution of ICT to productivity growth. As shown by Gust and Marquez (2002) regulatory burdens are likely to have slowed down the adoption of ICT in restrictive countries. While the relationship between regulation and ICT adoption awaits further empirical research, Figure 10 suggests that in countries which underwent extensive product market reforms it was easier to translate such investment into productivity improvements in crucial ICT-using sectors, thereby increasing their contribution to aggregate productivity growth.

[Figure 10. Regulation and the contribution of ICT-using services to aggregate productivity growth, 1996-2001]

IV.3 Regulation and employment

There is surprisingly little empirical work aimed at assessing the relevance of product market reforms for employment.[32] Yet, product market regulations that are anti-competitive economy-wide and, more specifically, in non-manufacturing industries are negatively correlated with employment rates in the non-farm business sector across OECD countries (Figure 11).[33] As already explained, this may reflect the output-restraining and wage-raising effects of these regulations, which influence negatively labour demand. Specifically, barriers to entry generate economic rents (sometimes shared with workers) that are likely to lower the number of firms and activity levels in the long-run. Thus, the pro-competitive stance of product market regulations in Australia, the United Kingdom and the United States has been accompanied by a relatively high employment rate in the non-farm business sector. On the other hand, relatively stringent regulations in France, Greece, Italy and Norway have coincided with a comparatively low share of the working-age population being employed in the non-farm business sector.

[Figure 11. Product market regulation and employment 1995-2002]

In Nicoletti and Scarpetta (2004) we estimate the impact of regulatory reform on long-run employment performance jointly with the effect of labour market regulations and institutions, such as employment protection, bargaining arrangements and social policies, which are commonly considered to be important determinants of equilibrium employment levels (see, *e.g.* Layard and Nickell, 1998). The multivariate estimation framework is grounded in a standard specification of equilibrium employment in a wage bargaining model (see Annex for details). The empirical results strongly suggest that reforms in *both* labour and product markets are needed to raise significantly long-run employment rates.

Our estimates highlight the importance of labour market policies and wage bargaining arrangements for employment rates in the business sector,[34] but even controlling for these key factors, there is room for product market regulation to explain part of the observed differences in employment rates across countries. In particular, differences in anti-competitive regulation may on average (over the 1980-2002 period) explain about two percentage points of the difference in private non-farm employment rates between countries. This is comparable to the deviation that can be attributed on average to the tax wedge (2½ percentage points) and employment protection and benefit policies (3¼ percentage points). It is also interesting to notice that restrictive product market regulations have stronger negative effects in countries with stringent labour regulations. This is probably because overly protective labour market policies may push workers to seek a higher share of product market rents, further contributing to reduce employment potential in the private sector. These results suggest that there is a complementarity between policies in the two markets.

Econometric estimates can be used to gauge the likely contribution of product market reforms over the past two decades to increasing the non-farm business sector employment rate in the OECD area. In countries where pro-competition policy developments were extensive – such as New Zealand, the United Kingdom, Finland and Australia – product market reforms are estimated to have added between 2 and 3 percentage points to their employment rate over the 1980-2002 period. On the other hand, countries where regulatory reform has made more modest progress have experienced correspondingly smaller employment gains, with Greece, Switzerland and Italy only adding at most 1 percentage point to their employment rate via such reforms.

V. Conclusions

In this paper, we looked at the possible links between product market regulation and growth in the OECD area over the past two decades. The paper documents that differences in labour utilisation, investment in new technologies and MFP growth underpin the observed cross-country divergences in growth. These factors contributed to accelerate growth in the

United States, the United Kingdom, Canada and a few smaller OECD economies, while they held back growth in large continental EU countries and Japan. We cast the cross-country dispersion in growth patterns against product market reforms made over the past two decades showing that, despite efforts in virtually all OECD countries to make regulations more market friendly, the cross-country dispersion in product market approaches has also increased due to differences in the pace and depth of reforms.

Can these diverging patterns of reform contribute to explain the puzzling disparities in growth outcomes? The review of recent empirical analyses suggests that there are several links between product market policies and growth performance. In particular, lower barriers to trade and competition in less regulated countries seem to have increased the level and rate of growth of productivity by stimulating business investment and promoting innovation and technological catch up. Policies that have increased competitive pressures also appear to have been complementary to labour market reforms aimed at increasing long-run employment rates, raising labour utilisation more rapidly in those countries. These policies can explain part of the growth advantage experienced by the United States and other English-speaking and small EU countries over the past two decades. Thus, regulatory reforms in product markets seem to be an essential element of any "agenda for growth". Looking forward, this would appear to apply especially to large continental European countries and Japan, which experienced a persistent productivity slowdown and widening GDP-per-capita gaps *vis à vis* the United States over the past decade.

How reliable and general are these inferences? While overall the regulation-growth linkage seems robust to different model specifications and sample coverage within the OECD area, several caveat should be pointed out. First, more analysis needs to be done to extend these results to non-OECD countries, where the impact of competition-oriented policies on some of the determinants of growth could be different. Second, several missing links remain. For instance, we have produced only indirect evidence of the effects of product market reforms on innovation. More specific analysis of the link between regulation (including intellectual property rights) and aggregate innovative activity is needed. Moreover, there is still very little evidence on the relationship between economic growth and financial market policies, an important aspect of product market reform that has been left out in our survey. Finally, it should be recognised that the channels going from product market policies to performance identified in this paper cannot be considered in isolation, because employment, investment and productivity outcomes are closely related. Integrating these channels would perhaps provide a more nuanced view of the effects of reform on overall economic growth.

Annex: Empirical analyses of regulation and performance

Regulation and domestic investment **(Alesina *et al.*, 2004)**

The empirical investigation of the links between regulations and domestic investment was based on estimation of various versions of an unrestricted dynamic model of investment of the form:

$$(I/K)_{ijt} = \sum_{s=1}^{2}\alpha_s (I/K)_{ijt-s} + \sum_{s=0}^{2}\beta_s REG_{ijt-s} + \gamma_{ij} + \zeta_t + (or\ \zeta_{jt}) + \varepsilon_{ijt}$$

where t represents years, i denotes countries and j sectors; I denotes investment, K the capital stock; REG is the product market regulation index; and the remaining terms capture country/sector specific fixed effects, and common (or sector specific) year dummies. The analysis controlled for endogeneity of regulation (by instrumenting it with lags) and technology changes (through the sector-specific year dummies). The empirical analysis covered three broad non-manufacturing sectors in 12 OECD countries over the 1975-1998 period. The model was estimated with both dynamic fixed effects and generalised method of moments (Arellano and Bond, 1991) techniques. Results are robust to changes in estimation approaches and to a number of other extensions, such as allowing for short-run heterogeneity in responses of investment to regulation, controlling for additional country-specific variables (notably labour market regulation) and country/industry specific variables (e.g. factor prices).

Product Market Policies FDI (Nicoletti et al., 2003)

The bilateral estimations covered 28 OECD countries and partners over the 1980-2000 period and were based on reduced forms relating FDI outward stocks to non-policy-related factors, and the relative costs of trading and investing implied by policies in the home or partner countries (Markusen and Maskus, 2001b, and Egger, 2001). The building blocks are (i) standard variables expressing gravity forces, factor proportions or other economic variables likely to affect FDI (e.g. R&D intensity and exchange rates); (ii) indicators of openness (multilateral and bilateral tariffs; multilateral indicators of non-tariff barriers; dummies for free-trade agreements; and FDI restrictions), domestic product-market regulations and labour-market flexibility; and (iii) indicators of infrastructure supply. Thus, the basic bilateral model was:

$$Y_{ijt} = \sum_x \beta_x X_{ijt} + \sum_c \beta_c C_{it} + \sum_p \beta_p P_{jt} + \alpha_i + \alpha_j + \alpha_t + \alpha_{it} + \alpha_{ij} + \alpha_{jt} + u_{ijt}$$

where Y_{ijt} stands for the logarithm of bilateral FDI outward stocks from country i to partner j at time t (with i=1,2,…,I; j=1,2,…,J; and t=1,2,…,T); X_{ijt} are policy and non-policy related variables that are specific to a given country-partner pair; C_{it} are country-specific variables; and P_{jt} are partner-specific variables. The α-type variables stand for specific effects that control for all combinations of bilateral, country or partner-specific and time varying or time invariant unobserved factors. Since estimating dummies for all these factors is not viable, due to an excessive loss of degrees of freedom and high potential multicollinearity, the so-called “transformed least squares” (TLS) approach

(Erkel-Rousse and Mirza, 2002) was employed, which decomposes the estimation in two equations in which all variables are expressed as deviations from the mean investor or, alternatively, the mean host. This reduced the number of unobserved components to be estimated parametrically while at the same time preserving the desirable properties of the relevant coefficient estimates.

The model for total inward FDI positions accounted for the possibility that the adjustment of actual to desired stocks of FDI is costly and takes time. Therefore, equations for total FDI inward position were of the dynamic partial adjustment kind, with the total FDI inward position in each period also depending on the realised inward position in the previous period (see Cheng and Kwan, 2000). The estimated dynamic panel specification for total FDI inward positions was:

$$\ln Y_{it} = \gamma \ln Y_{it-1} + \sum_{x} \delta_x X_{it} + \sum_{z} \lambda_z Z_{it} + \nu_i + \varepsilon_{it}$$

where the X_{it} are non-policy related variables, the Z_{it} are policy variables, β_x and β_z are parameters to be estimated, ν_i are unobserved country-specific time-invariant effects and ε_{it} is a random disturbance. Estimation was carried out using generalised method of moments (Arellano and Bond, 1991).

Product market regulations and multifactor productivity (Nicoletti and Scarpetta, 2003)

The empirical analysis of MFP growth is centred around a catch-up specification of productivity, whereby, within each industry, the production possibility set is influenced by technological and organisational transfer from the technology-frontier country to other countries. We further extend the conventional model by assuming that each industry's MFP growth depends on country and industry characteristics as well as the state of knowledge in the technology-leader country (country with the highest level of MFP). In particular, an MFP advance in the frontier country is assumed to produce faster MFP growth in follower countries with the size of this impact increasing with each country's distance from the technological leader. Thus the MFP equation is (omitting subscripts for country, industry and time for simplicity):

$$\Delta \ln \text{MFP} = \delta\,(\Delta \ln \text{MFP Leader}) - \sigma\,(\text{Technology gap}) + \beta \text{ Human capital} + \gamma \text{ PMR} + \alpha\,(\text{PMR} * \text{Technology gap}) + \varepsilon$$

where ε is the usual error term, and the equation includes dummies that control for unexplained country-specific, industry specific and time-specific factors. In the equation, "PMR" is the synthetic indicator of product market regulations, which varies over countries, time and/or industries, depending on the specification. Note that δ indicates the standard pace of technological transfer from the leader, σ quantifies the importance of the technological transfer that depends on the size of the technology gap, and β shows how the nation's level of human capital affects its pace of technical progress. Moreover, γ shows the direct impact of regulation on productivity growth and α gauges whether regulation hinders technology transfers from the technological leader.

The empirical analysis covers 23 industries in manufacturing and business services in 18 OECD countries over the period 1984-1998. The model was estimated using a standard panel data fixed effects approach controlling for outliers and heteroskedasticity. Sensitivity analysis showed that the results were robust to recursively dropping country/industry observations.

Regulation and employment rates (Nicoletti and Scarpetta, 2004)

The estimates of the effects of product market regulations on employment rates were based on cross-country/time series panel data regressions for 20 OECD countries over the 1980-2002 period. The estimated model is a reduced form reflecting equilibrium employment in a Layard-Nickell-Jackman (1991) bargaining model. The essential features of the model are an upward sloping wage-setting schedule, based on the assumption that real wages are the results of a bargaining process between employers and employees combined with a downward sloping labour demand schedule. The labour demand schedule is influenced by product market conditions, while the wage-setting schedule is influenced by wage push factors, including labour market policies, the strength of workers in the wage bargaining process and bargaining arrangements. Product market policies enter the picture because they affect the market power of firms and the associated rents, which are important determinants of equilibrium employment.

The dependent variable is the non-farm business employment rate, the component of employment most directly influenced by policy and institutions in labour and product markets. The equation controlled for the public employment rate to test for the hypothesis that the latter may crowd out employment opportunities in the business sector. Denoting the share of public employees in the working-age population (the public employment rate) by egr, other indicators of labour market policies and institutions by x_k (a k * 1 vector of variables), and the indicator of product market regulation by *pmr* the reduced-form equation for the equilibrium non-agricultural business employment rate (ebr) was:

$$ebr_{it} = \mu_0 + \mu_i + t_i + \alpha \cdot egr_{it} + \sum_k \beta_k \cdot x_{kit} + \delta pmr_{it} + \varphi g_{it} + \nu_{it}$$

where i indexes countries, t the years, g_{it} is the output gap included to account for changes in the business cycle, μ_0 is a constant, μ_i is the country-specific effect not accounted for by the available explanatory variables, t_i is the country-specific time trend, and v_{it} is the usual error term.

Principal components analysis was used to group different sets of labour market policies and institutions and regulations so as to minimise the risk that multicollinearity may affect the estimates of the impact of the product market regulation variable. Finally, we also interacted the product market regulation indicator with the indicator of regulations in the labour market to test for complementarity of policies in the two markets.

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1. For studies that have looked at the macroeconomic effects of labour market reforms see e.g. Nickell, 1997; Nickell and Layard, 1998; Elmeskov *et al.*, 1998; Blanchard, 2000.

2. In an early attempt to relate reforms to growth, Koedje and Kremers (1996) noted that policy changes in European product markets have sometimes been deeper than reforms in labour markets.

3. For instance, the effects on growth trajectories of reforms that improve the efficiency in the use of inputs have been recently stressed by Bergoeing *et al.* (2002).

4. These channels are highlighted by Lazear and Rosen (1981), Nalebuff and Stiglitz (1983) and Aghion and Howitt (1998).

5. Klette and Griliches (2000) note that incumbents might be pushed to innovate in order to pre-empt rivals. Cross-country evidence on the effects of regulation on R&D spending is provided by Bassanini and Ernst (2002).

6. The role of intersectoral input-output linkages in transmitting and amplifying the effects of product market reform has been recently stressed by Faini *et al.* (2004).

7. In addition, entry restrictions may constrain the supply of a particular type of capital, entrepreneurial ability (Krueger and Pischke, 1998).

8. Depending on the degree of market regulation and the ownership structure of the firm, these premia can take pecuniary or non-pecuniary forms. See Jean and Nicoletti (2004).

9. The shift in labour demand tends to raise wages while stronger competitive pressures tend to lower prices, raising both real wages and labour supply. Thus, in the new equilibrium both employment and real wages may increase.

10. Ebell and Haefke (2004) show that the effects of deregulation on employment are larger when bargaining mechanisms are endogenised and depend on the amount of rents to be earned by workers and firms.

11. Ebell and Haefke (2004) also show that employment rises more strongly in high technology sectors. Their results are robust to changes in bargaining frameworks.

12. The EU gap worsened even discounting the effect of unification in Germany.

2. The labour utilisation gap in the European Union vis-à-vis the United States reflected an 18 percentage point gap in the employment rate and 8 per cent lower hours worked per job. The gap is even more pronounced in terms of hours worked per employed person because multiple jobs tend to be more frequent in the United States than in Europe.

14. Within Europe, there were starkly contrasting developments: productivity continued to grow fast in Ireland, some Nordic countries and Portugal, while its growth remained disappointing in the Netherlands, Spain and, especially, Switzerland.

15. MFP estimates involve a number of difficult measurement problems. For instance, it is hard to make adjustment for quality and compositional changes in the labour input and, especially, the capital stock. Other potential sources of measurement error are economies of scale and mark-up pricing (see Morrison, 1999)

16. Correlation between the two measures of productivity growth was 0.87 over the 1990s.

17. The workforce throughout the OECD has gradually become better educated, as entering young cohorts have higher educational attainment than the exiting older cohorts.

18. The odd position of Finland, which invested enormously in ICT goods relative to other countries, can be partly explained by its specialisation in ICT-related industries.

19. Another important element of product market reform was liberalisation of international capital flows. However, the empirical analysis surveyed in this paper does not cover the effects of liberalisation in financial markets.

20. The construction of such indicators is an intricate business that is explained in detail in Nicoletti *et al.,* (1999), Nicoletti and Scarpetta (2003), Alesina *et al.,* (2004) and Golub (2003). The complete set of indicators is currently being updated to reflect developments over the 1998-2003 period.

21. The box plot shows, in each year, the median OECD value of the regulatory indicator (the horizontal line in the box), the third and

second quartiles of the cross-country distribution (the area comprised between the edges of each box) and the extreme upper and lower values (the two whiskers extending from the box). Dots identify outlier observations.

22. This literature has been recently surveyed by Keller (2004). Theoretical models point to transfers of technology between parents and subsidiaries of multinationals, learning externalities for the host-country labour force and spillovers related to the provision of high-technology intermediate inputs from the origin country. While the empirical evidence is mixed, recent cross-country and micro studies suggest that these effects are significant (see the survey in Görg and Greenaway, 2002).

23. The role of public enterprises in raising barriers to new entrants and curbing competition is stressed by Sappington and Sidak (2003).

24. This approach merges early analyses, largely replicating gravitational models of trade, with models of the multinational enterprise that stress the joint determination of trade and FDI, economy-wide and firm-level economies of scale and the policy influences upon them.

25. The study also considers the effects of trade barriers on FDI, related to the so-called "tariff-jumping" rationale for horizontal FDI, as well as the effects of infrastructure policies. Here, we focus only on results concerning FDI restrictions and domestic regulations.

26. Cost-increasing regulations in the investor country may also stimulate outward FDI by favouring the delocalisation of production plants in countries with less costly regulations. On the other hand, the costs implied by these regulations may cripple the ability of investor-country firms to internationalise production to the desired level. For instance, there is evidence that certain product market regulations can hinder firm growth and curb R&D spending (Nicoletti *et al.*, 2001; Bassanini and Ernst, 2002). Both factors can constitute a handicap for internationalisation.

27. It is important to notice that, given the specification of some of the policy variables (which entail a comparison between policies of the investor country and the host country), the quantitative effects highlighted in these thought experiments cannot take into account diversion effects (*i.e.* FDI re-directed from one country to another). To the extent that these are important, the simulation results may overestimate the effects of policy changes on the variables of interest.

28. Griffith *et al.* (2000) have, amongst others, used a similar approach. However, their study does not include regulatory variables, nor does it consider industry differences in important covariates (*e.g.* human capital). A number of other studies have looked at productivity convergence using industry/country data.

29. For example, if the adoption of new technologies relies partly on new firms, high entry barriers may reduce the pace of adoption (see *e.g.* Boone, 2000b).

30. For additional evidence of the productivity effects of entry liberalisation at the industry level, see the papers in OECD (2001).

31. For an overview of existing studies, see Scarpetta and Tressel (2002). For cross-country studies that explore the role of competition on productivity using mark-ups and concentration indexes, see Cheung and Garcia Pascual (2001). For studies using firms' market shares, see Nickell (1996), Nickell *et al.* (1997) and Disney *et al.* (2000).

32. The few studies include Nicoletti *et al.* (2001), Boeri *et al.* (2000), Bertrand and Kramarz (2002) and Kugler and Pica (2004).

33. Focus on non-agricultural employment is justified by the large proportion of self-employed in agriculture, who are only marginally affected by the kind of product market regulations considered in this paper.

3. Labour market policy variables and product market regulations explain only 40 per cent of the variation in employment rates across countries; the remaining 60 per cent of the variation is due to labour market institutions, output gaps and unexplained factors.

Table 1. Change in annual percentage growth of MFP in EU countries implied by the alignment of policies to OECD best practices over ten years

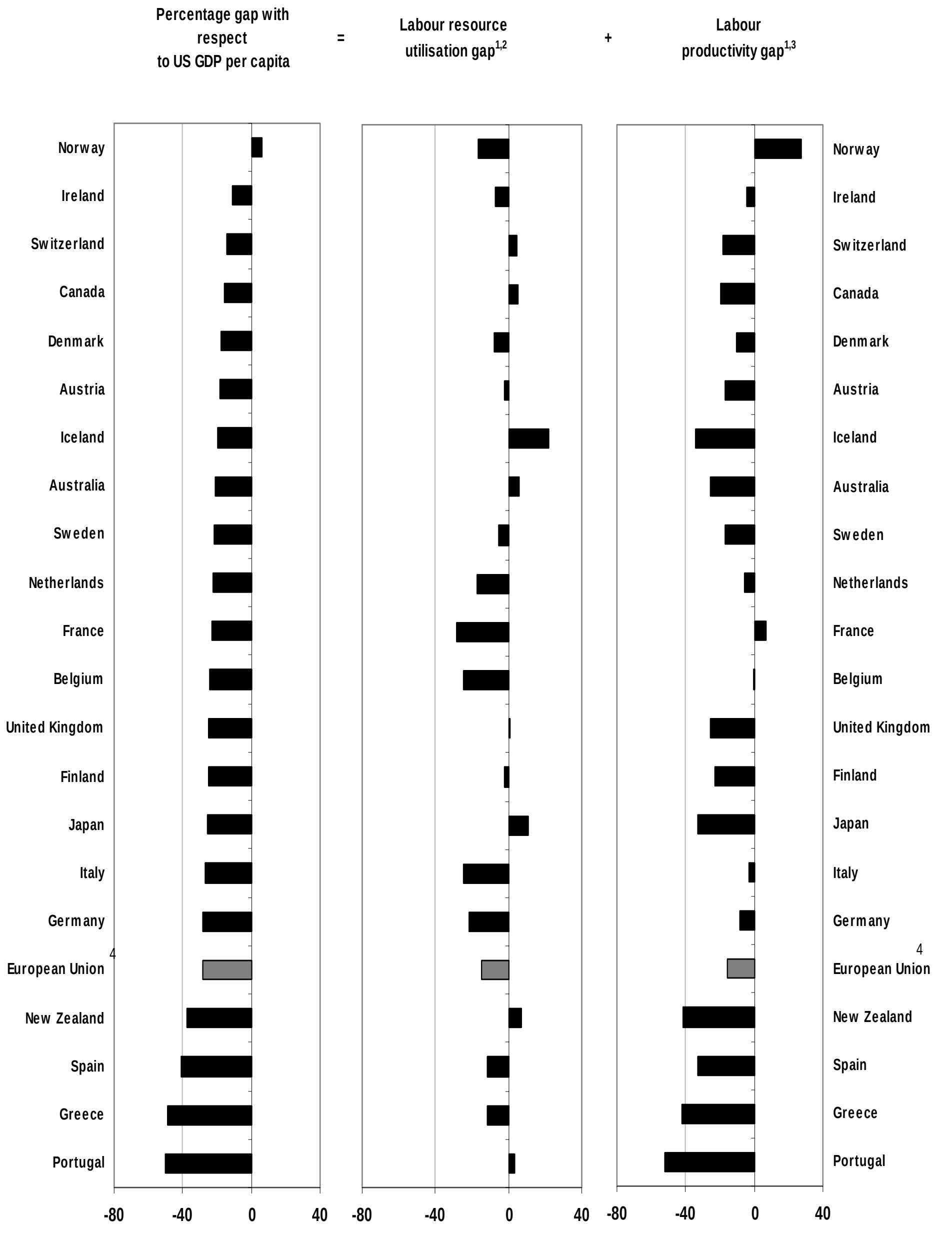
	Contributions of:		
	Overall regulatory reform	Industry-specific reforms	**Total effect**
Austria	0.10	0.32	0.42
Belgium	0.15	0.45	0.60
Denmark	0.10	0.27	0.37
Finland	0.04	0.55	0.59
France	0.19	0.43	0.62
Germany	0.08	0.62	0.70
Greece	0.29	0.83	1.12
Italy	0.22	0.48	0.70
Netherlands	0.11	0.34	0.44
Norway	0.02	0.36	0.38
Portugal	0.23	0.42	0.65
Spain	0.12	0.28	0.41
Sweden	0.01	0.50	0.51
United Kingdom	0.00	0.11	0.11

The simulations are based on the results of a panel regression on 23 industries in 18 OECD countries over the 1984-1998 period.

Source : Nicoletti and Scarpetta (2003).

Figure 1. The sources of real income differences, 2002

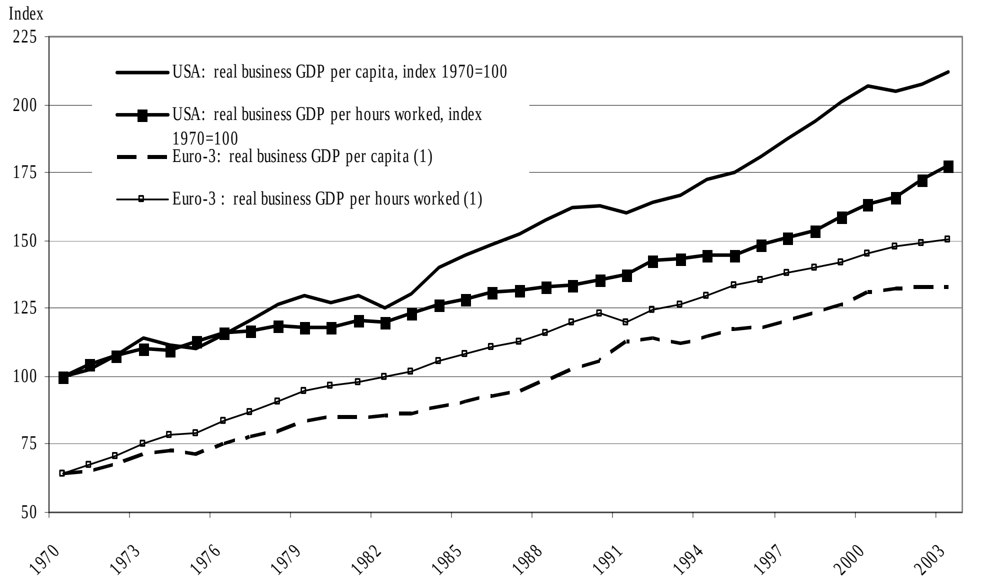
(2000 Purchasing Power Parities)



1. Percentage gap with respect to the United States level.
2. Labour resource utilisation is measured as trend total number of hours worked divided by population. Information on hours worked for Austria, Luxembourg, Poland and Turkey is not available.
3. Labour productivity is measured as trend GDP per hour worked.
4. European Union except Austria and Luxembourg.

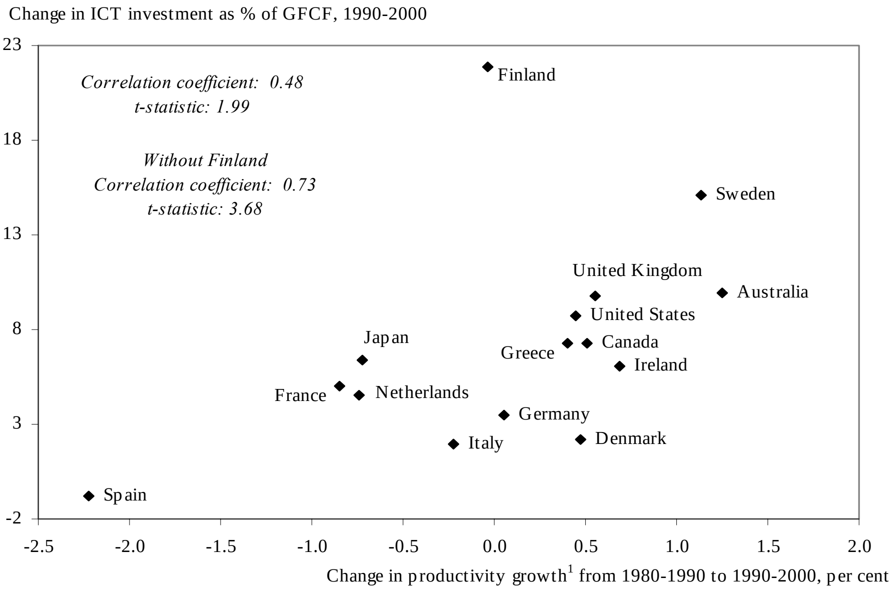
Source: OECD Productivity Database.

Figure 2. Growth in US and large continental EU economies, 1970-2003



1. France, Germany and Italy. Data are indexed by the difference between US real business GDP per capita and the Euro-3 real business per capita in 1970.
Source: OECD Productivity Database.

Figure 3. Pick-up in hourly labour productivity growth and increase in information and communication technology investment

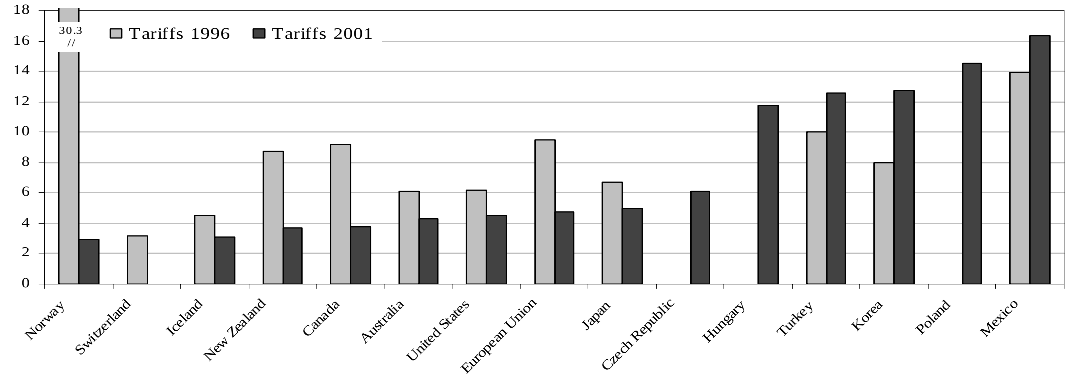


1. Labour productivity is defined as output per hour worked

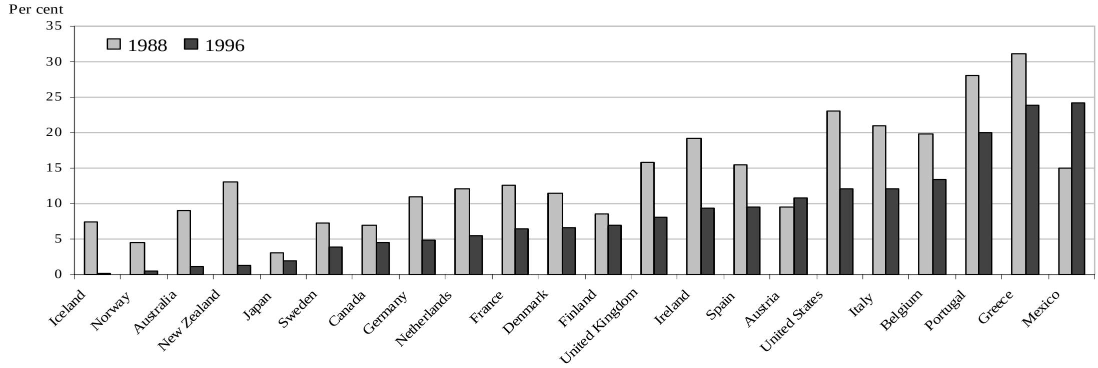
Source: OECD Productivity Database.

Figure 4. Openness to trade and foreign direct investment

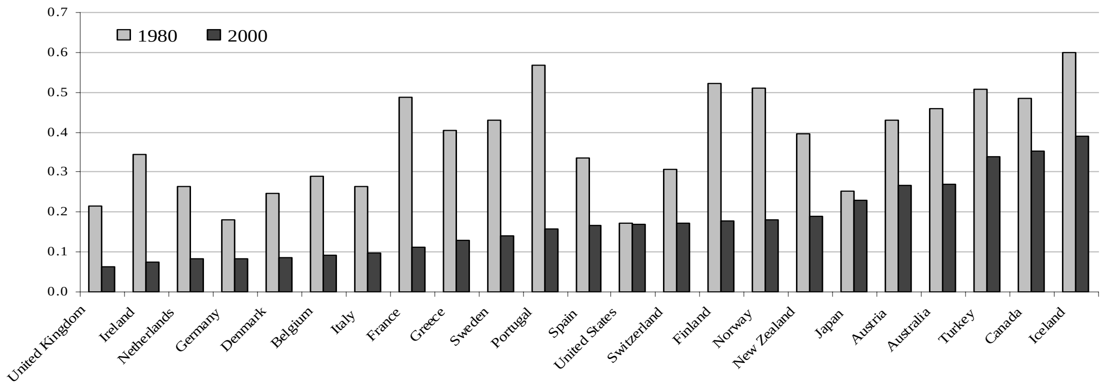
Tariffs in 1996 and 2001[1]



Import coverage of non-tariff barriers[2]



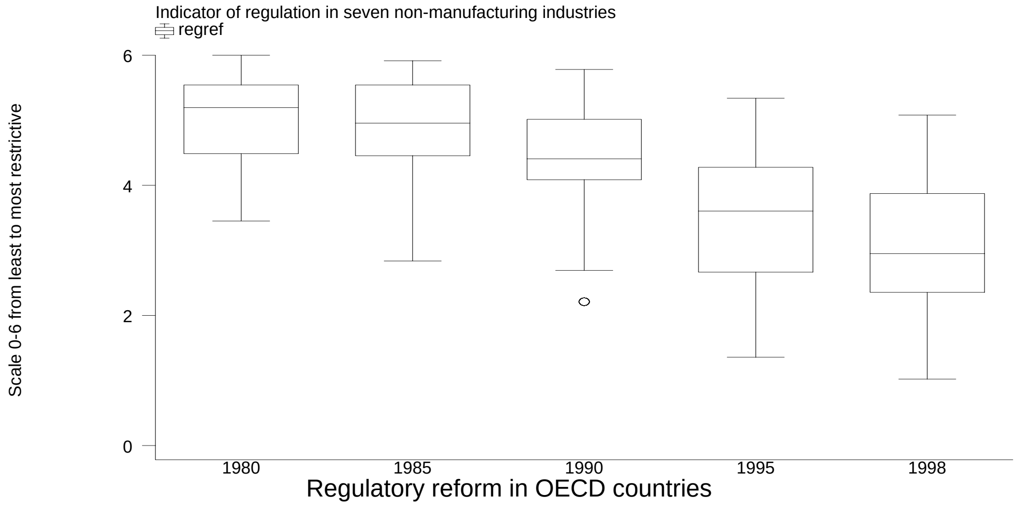
FDI restrictions over time, 1980-2000[3]

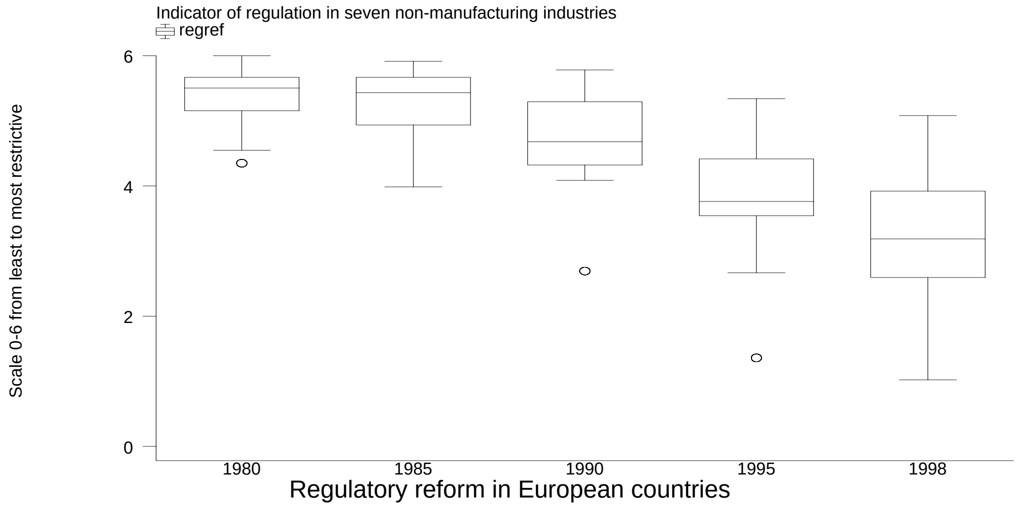


1. Simple average of applied MFN tariff rates.
2. OECD calculations based on UNCTAD data. Aggregation from 2-digit level tariffs to national level using sectoral value-added weights.
3. The indicator ranges from 0 (least restrictive) to 1 (most restrictive). The most recent year for which data are available varies across countries between 1998 and 2000.

Source: WTO online database; UNCTAD TRAINS Database; Golub (2003)

Figure 5. Regulatory reform in non-manufacturing[1,2]



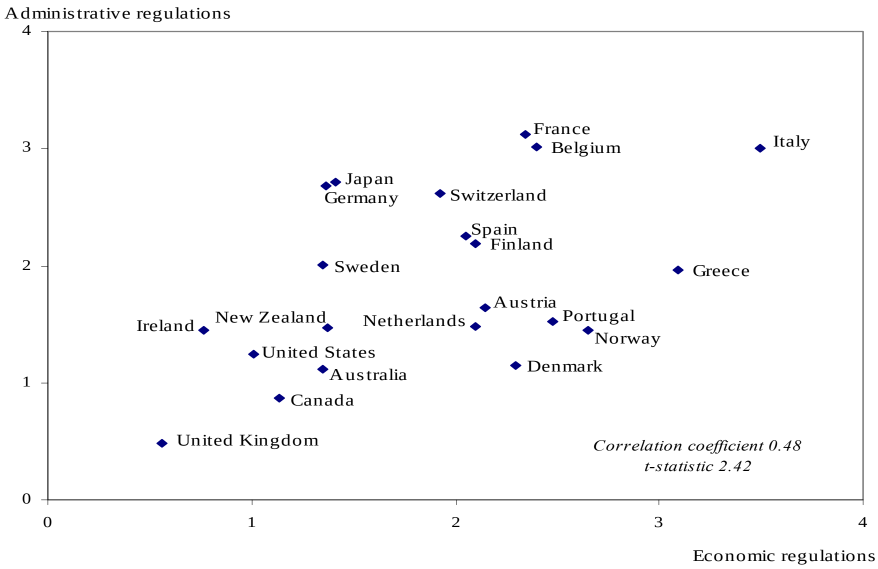


1. The box plot shows, in each year, the median OECD value of the regulatory indicator (the horizontal line in the box), the third and second quartiles of the cross-country distribution (the edges of each box) and the extreme values (the two whiskers extending from the box). Dots identify outlier observations. For consistency, European countries include only EU members since 1980.

2. The indicator summarizes regulation (including barriers to entry, vertical separation, price control and public ownership) in air, rail and road transport; post and telecommunications; and energy (electricity and gas)

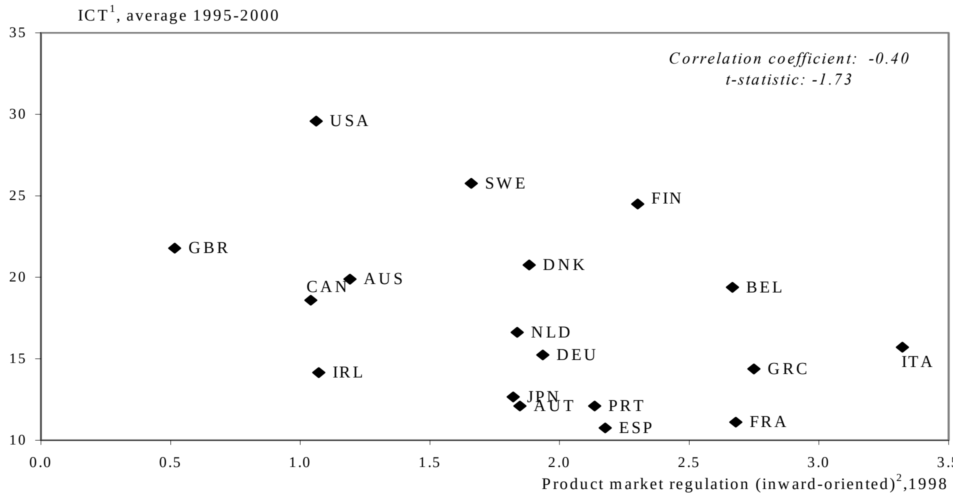
Source: Nicoletti and Scarpetta (2003)

Figure 6. Overall regulatory approaches across countries[1]
Economic and administrative regulation[2]



1. The scale of indicators is 0-6 from least to most restrictive.
2. Administrative regulation includes reporting, information and application procedures and burdens on business start-ups, implied by both economy-wide and sector-specific requirements; economic regulation includes all other domestic regulatory provisions affecting private governance and product-market competition (such as state control and legal barriers to entry in competitive markets).
Source : Nicoletti *et al.* (1999).

Figure 7. Regulation and investment in information and communication technology

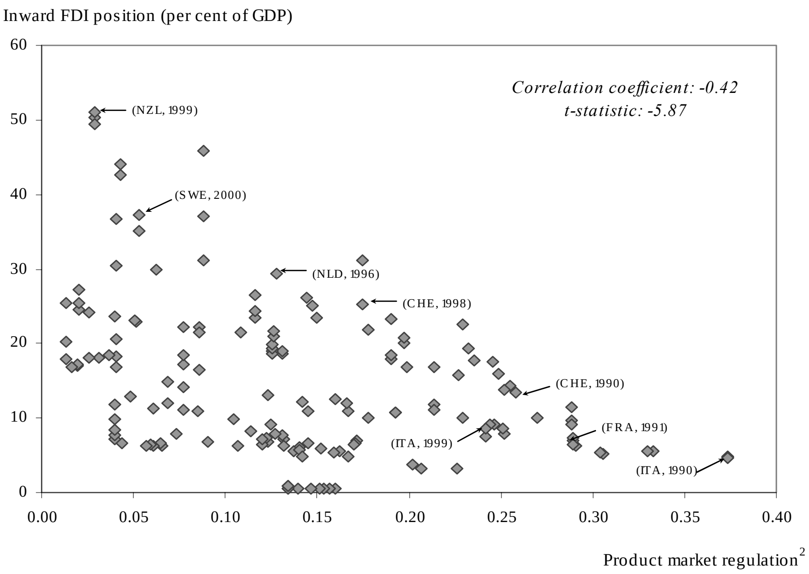


1. ICT investment as a percentage of non-residential gross fixed capital formation.
2. Indicator of economy-wide regulation excluding barriers to international trade and investment.
The indicator ranges from 0 to 6, from least to most restrictive.

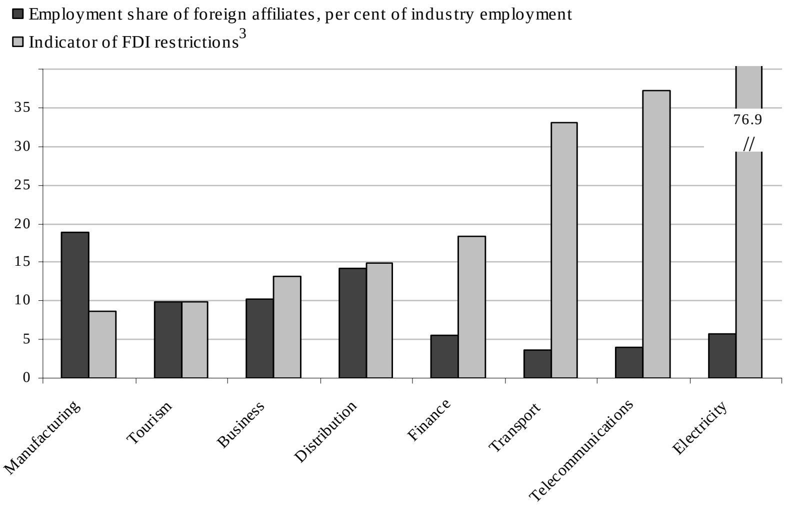
Source: OECD Productivity Database and Nicoletti et al. (1999).

Figure 8. Regulation and foreign direct investment

Inward FDI position and regulation (OECD countries over 1980-1998 period)[1]

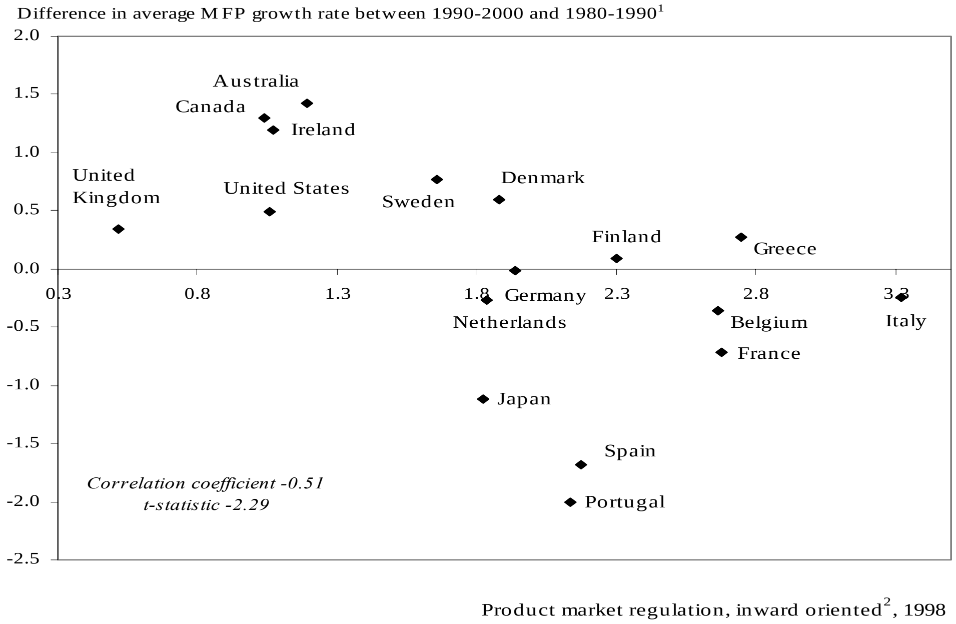


Industry share of foreign affiliates and FDI restrictions (OECD averages in 2000)



1. Each point shows the combination of regulation and FDI in a given country and period. Some of these country/period contributions are shown for illustrative purposes.
2. Product of the indicator of economy-wide regulation in 1998 and the indicator of barriers to entry in seven non-manufacturing industries over the 1980-1998 period. 0-1 scale from least to most restrictive of competition.
3. The indicator ranges from 0 (least restrictive) to 100 (most restrictive).
Summary indicator of restrictions on inward foreign direct investment in nine sectors.
Source: Nicoletti *et al.* (2003)

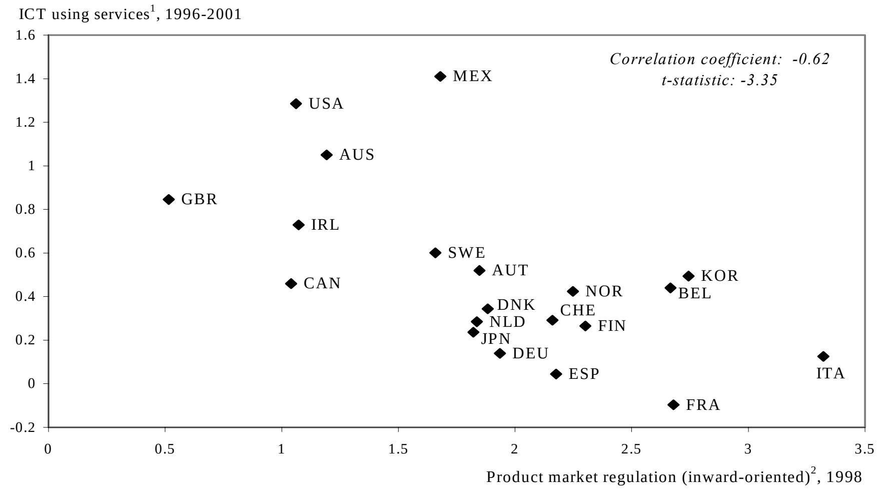
Figure 9. Multifactor productivity acceleration and product market regulation



1. Adjusted for hours worked.
2. Indicator of economy-wide regulation excluding barriers to international trade and investment. The indicator ranges from 0 to 6, from least to most restrictive. See Nicoletti et al. (1999).

Source : OECD Productivity Database.

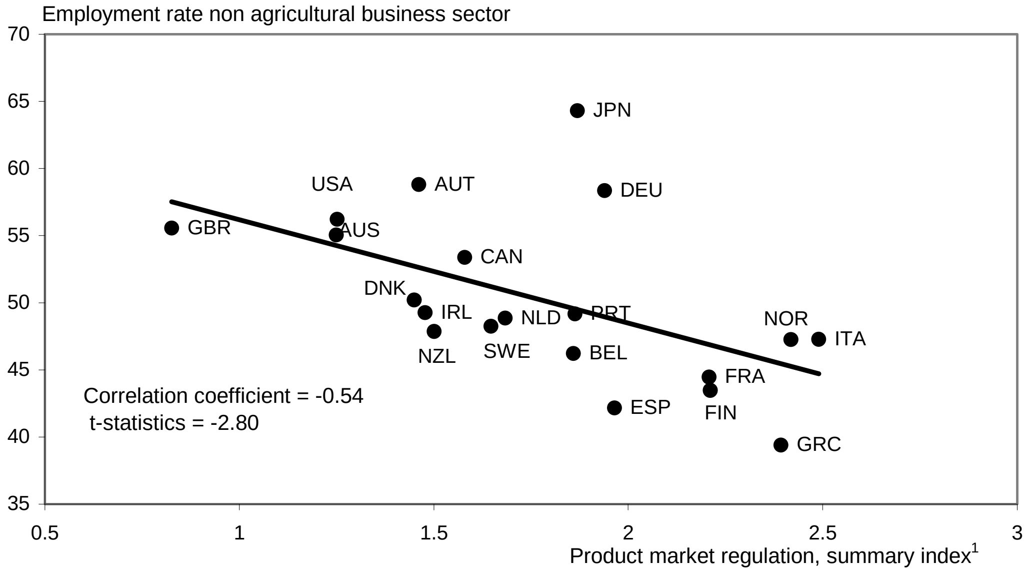
Figure 10. Regulation and the contribution of ICT-using services to aggregate productivity growth.

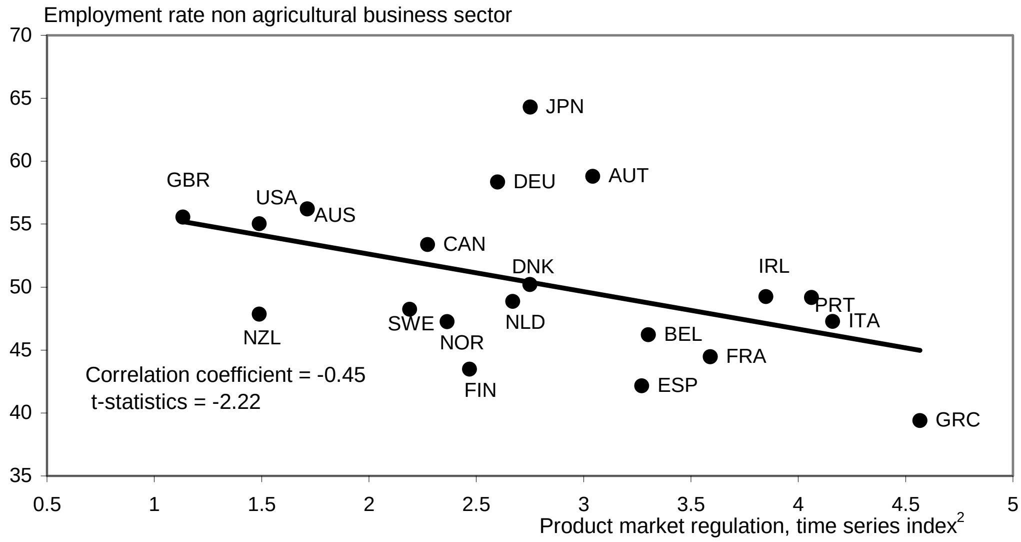


1. Contribution to aggregate labour productivity growth.
2. Indicator of economy-wide regulation excluding barriers to international trade and investment. The indicator ranges from 0 to 6, from least to most restrictive.

Source: OECD Productivity Database and Nicoletti *et al. (1999)*.

Figure 11. Product market regulation and employment, 1995-2002





1. Economy-wide indicator (Nicoletti et al., 1999). 0-6 scale from least to most restrictive
2. Average of regulation in seven non-manufacturing industries (Nicoletti and Scarpetta, 2003). 0-6 scale from least to most restrictive.

Source: Nicoletti and Scarpetta (2004)