

## THE ECONOMIC BENEFITS OF REGULATORY REFORM

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## INTRODUCTION

The process of regulatory reform has gained some momentum over the past decades. Starting with comprehensive regulatory reform efforts in the United States and the United Kingdom, it has moved beyond these countries to more recent measures in New Zealand, Australia and Japan. Within Europe, regulatory reform has been stimulated by the process of European integration, and many countries are now opening up markets that were, until recently, reserved for public monopolies.

Regulatory reform aims at reducing the distortionary impacts of regulations, while achieving the policy goals at which the original regulations were aimed. Traditionally, regulations were often introduced to deal with – sometimes perceived – market failures (Høj, Kato and Pilat, 1996).<sup>1</sup> The current process of reform is driven by a reassessment of the pervasiveness of these market failures and of the capacity of governments to correct such failures via regulations: changes in technology and experience have called into doubt the existence of natural monopolies in many sectors, and there is growing recognition that government failure may be as capable of creating inefficiencies as is market failure.

Inappropriate regulations can impose substantial costs and inefficiencies on firms, sectors and the economy as a whole. These costs can arise in four ways. First, firms can have less incentive to economise on resources. This can take the form of over-investment in capital or employing excess labour, or of inefficient internal organisation of production. Second, a lack of competition can result in excess rents accruing to capital or labour, or both, implying that profits and/or wages are higher than they would be under competitive conditions. Third, regulations on service and product type can prevent firms from taking advantage of economies of scale, and especially scope in networking. Finally, there is increasing evidence that lack of competition tends to provide little incentive for firms to pursue technological innovations in production or in creating new goods and services, and especially can make firms less willing to adapt the quality and mix of goods and services delivered to changing consumer needs. In sum, the direct results of inappropriate regulation in a particular sector are likely to be higher costs, higher prices, misallocation of resources, a lack of product innovation and poor service quality.

This paper assesses the potential impact of regulatory reforms in five heavily regulated service sectors (electricity, air and road transport, telecommunications and distribution) on within-sector and economy-wide performance in five countries (the United States, Japan, Germany, France and the United Kingdom). The paper first briefly discusses the methodology employed in the paper. Next it examines the regulatory structure in each of the sectors, the experience with regulatory reforms to date and the potential impact of regulatory reform on within-sector economic performance. It then assesses the economy-wide effects of these potential within-sector effects. Finally, the paper examines potential transition costs and how they may be contained.

## **ANALYSING THE POTENTIAL IMPACTS OF REGULATORY REFORM: METHODOLOGY**

The sectors covered in the paper were chosen because of their importance as employers or suppliers of inputs, or because of the experience with regulatory reform in these sectors. Together, they account for almost 20 per cent of business sector GDP and employment (Table 1). The countries were chosen because they account for a large proportion of the OECD economy, and because they provide a large diversity of regulatory experience. The analysis in the paper consists of two stages.

In the first stage, the potential effects – in terms of productivity, profits, wage premia and employment – of regulatory reform are assessed for each individual sector. The quantification of these effects depends partly on benchmarking. Cross-country and cross-sectoral differences in productivity, prices, wages and profit margins are assumed to be partly related to regulatory barriers, which implies that such differences can be reduced if appropriate regulatory reforms are introduced. The benchmarking has been applied in the same way across countries. This implies that a common base year (usually in the mid-1990s) is used to assess the potential gains in each sector and that the size of the potential effects is related to the degree of regulatory reform in the country concerned.<sup>2</sup> Where possible, the estimates of potential gains are based on national studies. These are available for a number of countries and sectors, and help to judge the validity of the estimates derived from benchmarking.<sup>3</sup>

If regulatory reform were to affect productivity, profits, wage premia and employment, it would lead to a fall in the cost level of the industry. Input-output tables for each country are used to estimate the fall in costs.<sup>4</sup> Gains in labour and capital productivity would lead to a corresponding fall in labour and capital costs; higher competition could reduce wage premia and bring average sectoral wages closer to competitive conditions; a fall in profit margins would reduce the operating surplus of the sector; and a fall in the costs of intermediate goods would also

Table 1. **Weight of sectors in business sector GDP and employment**

	In per cent				
	United States	Japan	Germany	France	United Kingdom
<b>Electricity</b>					
Business sector GDP	2.4	1.9	2.2	2.0	1.4
Business sector employment	0.5	0.3	0.9	0.9	0.8
<b>Airlines</b>					
Business sector GDP	0.9	0.2	1.0	0.4	1.7
Business sector employment	0.7	0.1	1.1	0.3	0.4
<b>Road freight transport</b>					
Business sector GDP	1.6	2.1	2.0	1.2	1.4
Business sector employment	1.9	2.9	2.2	1.4	1.5
<b>Telecommunications</b>					
Business sector GDP	2.5	1.1	1.7	1.7	2.3
Business sector employment	0.9	0.6	1.4	1.2	1.2
<b>Distribution</b>					
Business sector GDP	- <sup>1</sup>	11.3	12.7	15.4	12.2
Business sector employment	- <sup>1</sup>	18.5	16.1	15.1	18.2
<b>All sectors</b>					
Business sector GDP	7.4	16.6	19.5	20.7	19.0
Business sector employment	4.0	22.3	21.6	18.9	22.0

Note: The US distribution sector is not covered in the current study, as few regulations could be identified that would affect performance in the sector.

Source: OECD calculations based on national sources.

affect total costs of the industry. The input-output framework allows a comparison between the initial total costs of the industry, and the total costs following regulatory reform. The percentage difference is the fall in unit costs, which equals the fall in the price level of the industry. An illustrative example of these calculations is provided in the Annex.

On the basis of a common price elasticity for each industry,<sup>5</sup> the fall in prices would translate into increased output of the industry. The combined effects of increased labour productivity and the demand-driven increase in output translate into a first estimate of the change in sectoral employment due to regulatory reform. However, in some sectors, notably the telecommunications sector, past experience suggests that regulatory reform could lead to substantial innovative gains, in the form of new products and services being offered. Innovative gains are necessarily more speculative than other potential gains of regulatory reform, but are – to the extent possible – based on the experience of countries that have already reformed regulations in the sectors concerned. Such gains typically exceed the demand-driven increase in output due to price changes, as they refer

to new products that are not included in the old bundle of goods for which price elasticities have been estimated. Potential innovative gains thus lead to an additional increase in output, which would also affect the estimated change in sectoral employment.

In the second stage, the sectoral effects are aggregated on the basis of the relative size of the affected sectors, in terms of GDP and employment (Table 1). Large sectoral productivity gains or employment losses may have negligible impacts on economy-wide productivity or employment if the sectors considered are very small, and *vice versa*. This aggregation leads to a first static estimate of the economy-wide effects. Subsequently, dynamic and macroeconomic interactions are investigated through a set of simulations based on a simple macroeconomic model. The long-run macroeconomic effects depend on the working of the whole economic system and in particular on the ability of the economy to adjust to economic shocks.

## **REGULATORY REFORM AT THE SECTORAL LEVEL**

### **Electricity**

Although the electricity sector accounts for less than 1 per cent of total employment and 2 per cent of GDP on average (Table 1), the sector is strategically important as a supplier of a key input to other sectors. Before-tax electricity prices differ substantially across the OECD area (Table 2). This is partly the result of favourable resource endowments in some countries (*e.g.* abundant hydro-power), but may also be due to differences in input costs or productive efficiency. For instance, input prices of combustible fuels are much higher in Japan and Germany than in other OECD countries (Table 2). In the case of Germany, this was, until recently, related to expensive coal from the protected domestic coal industry (IEA, 1996). High input prices in Japan are also related to a subsidised coal industry. Capacity utilisation and labour productivity also appear to differ substantially among countries (Table 2). The wide range in prices and productivity in this sector suggests that there is substantial scope for improvement in many countries.

### ***Regulations and regulatory reforms***

The electricity sector is still heavily regulated in most OECD countries. It remains a public sector monopoly in several countries and private generation by industry for own use has typically been strictly controlled. Many electricity producers also face regulations concerning choice of inputs, whether and where to add new capacity, size and type of new capacity, and selling prices to different types of consumers. Technical progress, and the realisation that it is transmission

Table 2. **Potential impacts of regulatory reform in electricity**

	United States	Japan	Germany	France	United Kingdom
<b>A. Economic indicators:</b>					
<b>Profit margins:</b>					
Estimated mark-up ratio, 1980-92 <sup>1</sup>	1.34	1.58	1.39	1.50	1.34
<b>Costs and prices, 1992 and 1995</b>					
<i>(US\$ mill.)<sup>2</sup></i>					
Prices to households, 1992	83.0	134.3	107.4	102.7	123.0
Prices to industry, 1992	49.0	94.3	65.9	48.0	71.0
Marginal cost (5% discount rate), 1992	35.3-51.3	63.0	67.4-80.1	32.8	46.8-51.6
Marginal cost (10% discount rate), 1992	50.0-66.3	79.6	80.1-93.6	45.2	58.1-66.1
Prices to households, 1995	84.0	140.0	112.0	98.0	112.0
Prices to industry, 1995	47.0	96.0	64.0	45.0	67.0
Index of input prices, 1995 (USA = 100) <sup>3</sup>	100.0	266.8	306.0	n.a.	146.2
<b>Productivity, 1993:</b>					
Gigawatthour per person employed, 1993	8.2	6.3	2.2	3.8	2.5
Reserve plant margin, 1993 <sup>4</sup>	21.6	32.5	36.0	42.3	17.2
<b>B. Assumed impacts of reform</b>					
<b>(% change):</b>					
Labour productivity	10	20	100	30	50
Capital costs	-10	-25	-25	-30	-15
Wages	-5	-2	0	0	0
Profits	-5	-20	0	-10	-10
Prices of material inputs	0	0	0	0	-7.5
Fuel input prices	0	-10	0	0	0
Innovation (effect on output)	0	0	0	0	0
<b>C. Final impacts of reform</b>					
<b>(% change):</b>					
Output prices <sup>5</sup>	-5	-12	-15	-12	-11
Sectoral output, price-induced <sup>6</sup>	3	6	7	6	5
Sectoral employment	-7	-12	-46	-19	-30

1. Estimated mark-ups in electricity, gas and water. See Oliveira Martins, *et al.* (1997).

2. Long-run marginal costs are approximated by estimated incremental average costs of electricity generation, derived from engineering studies. It is assumed that all electricity sold to industry is from baseload generation. Moreover, baseload electricity is assumed to come from coal-fired power stations, with the exception of France, where it is assumed to come from nuclear power. Prices are converted at PPPs and adjusted for taxes.

3. Index of input prices of coal, natural gas and oil (adjusted for taxes), weighted by installed capacity based on these inputs in each country.

4. Calculated as (total installed capacity - peak demand)/peak demand.

5. Derived from the input-output structure of the electricity sector in each country.

6. Based on a common price elasticity of demand of -0.5.

7. Employment effect incorporates impacts of labour productivity growth, price-induced output growth and innovation.

Sources: Mark-ups from Oliveira Martins, Scarpetta and Pilat (1997); Estimated marginal costs from IEA (1993), *Projected Costs of Generating Electricity - Update 1992*, Paris; Reserve plant margins and index of input prices based on IEA (1996b), *Electricity Information - 1995*, Paris; Assumed impacts of regulatory reform from country assessments in main text and OECD (1997). Final impacts calculated as stated in footnotes 5-7.

rather than generation or supply (the selling of electricity to final consumers and the provision of consumer services), that constitutes a natural monopoly, have modified regulatory policies towards the industry (IEA, 1996; 1996a; OECD, 1997a).

Since the early 1980s, several countries have eased entry restrictions and introduced elements of competition in the determination of electricity prices (IEA, 1996). The most radical changes have involved the establishment of competition in both power generation and electricity distribution and supply. This so-called "competitive pool" model, which requires vertical separation of the electricity system, was adopted in the United Kingdom and Norway. An efficient alternative to this model is the so-called "grid access" model, which has been implemented in New Zealand and Finland. This model requires that the dominant vertically-integrated company must allow other generators to use its transmission grid on a non-discriminatory basis. More modest reforms in the United States and in Japan have so far permitted some competition between different generators and recent regulatory reforms in the United States are likely to strengthen competition at the wholesale and retail level in the future. The gradual opening of electricity markets in the European Union will introduce competition into many hitherto monopolised sectors, although it will remain limited in many countries.

Experience across the OECD suggests that end users have gained from reform through lower average prices for electric power and, in many cases, increased opportunities to shift usage to off-peak periods and receive better service (OECD, 1997a). The experience suggests that a successful programme of regulatory reform typically incorporates measures to substantially ease entry and operational controls in generation (such as regulations on fuel use). Restructuring of the industry has sometimes been required in order to prevent the domination of the market by a single or a few producers. Efficiency gains have resulted from the introduction of competition in generation and supply, with corporatisation and privatisation providing additional gains.

Regulatory reform in the United Kingdom has been accompanied by a sharp reduction in costs, resulting from higher efficiency and lower input costs. The restructuring of the industry was accompanied by a sharp fall in employment (of about 50 per cent), leading to a leap in labour productivity, whereas capital productivity increased significantly as old low-efficiency coal-based plants were scrapped. Input costs have also fallen significantly as government-imposed restrictions on the use of gas to generate electricity have been lifted. This has led to a sharp fall in the price of British coal (25 per cent in the 1988-94 period). However, these cost savings have not translated into substantial price reductions, as prices fell by only 10 per cent in the 1990-95 period (OECD, 1997a). The sharp increase in profits may only be transitional, but could also indicate that the existing small number of producers are enjoying monopoly rents, which would point to problems with regulatory policy in the industry.

### ***The potential impacts of regulatory reform***

The impacts of regulatory reform could be substantial. The estimates presented in Table 2 suggest that prices in the electricity industry are well out of line with long-run marginal costs, suggesting scope for reducing profit margins with regulatory reforms. Electricity prices for industrial customers seem to be close to a proxy for long-run marginal costs in the United States and Germany, somewhat higher in France and the United Kingdom, and significantly higher in Japan. Although it is difficult to assess the potential for reducing profit margins in the electricity sector, the scope for lower margins seems highest in Japan, and least in the United States and Germany.

Regulatory reforms can lead to improved productivity once electricity generation becomes subject to domestic and international competition and once demanding price caps are imposed. There is substantial variation across the five countries with respect to labour and capital productivity. Labour productivity in Germany and the United Kingdom, measured as Gwh per person, was only 25 per cent of that in the United States in 1993. Labour productivity in France was only 50 per cent of that in the United States, while Japan's productivity level in electricity was about 75 per cent of that in the United States.<sup>6</sup> Estimates by the US Federal Energy Regulatory Commission suggest that productivity could also improve in the United States following further regulatory reform (OECD, 1997). Indicators of capital productivity, measured as the deviation of reserve plant margin from an assumed optimal level of 20 per cent, suggest that the capital stock was used relatively efficiently in the United States and the United Kingdom. However, it was out of line with required reserve plant margins in Japan, Germany and France. Estimates of capital productivity by McKinsey (1996) also found a significant gap between the United States on the one hand and Japan and Germany on the other.

Abolition of regulations on input use should contribute to significantly lower costs in Japan, as subsidies on domestic coal production distort prices. The termination of long-term coal contracts in the United Kingdom, as of 1 April 1998, may help to reduce price levels for households considerably. Industry analysts have estimated that the termination of coal contracts alone could reduce prices by 10 per cent (*Financial Times*, 4/12/1996). Further cost savings in the wake of deregulation can be expected from somewhat more competitive wages in the United States and Japan, as wages seem inflated by product market rents (Krueger and Summers, 1988; Tachibanaki and Ohta, 1992). Wages in the electricity sector in Europe do not seem to be out of line with wages in other sectors, but employees may receive additional rewards in other ways (such as advantageous pension arrangements).

Against the background of the considerable scope for productivity increases and the assumed reduction in profits, the estimated falls in electricity prices range from 5 per cent in the United States to 15 per cent in Germany as a result of further regulatory reform (Table 2). The price reductions in Japan are close to estimates by a national study (Kibune, 1995), whereas that for the United Kingdom is close to assessments by the industry regulator. These price reductions do not assume that efficiency gaps *vis-à-vis* the leader are closed in the process, as there may be valid reasons why efficiency differs across countries (e.g. different technology and mix of primary energy to generate electricity).

On the basis of a common long-run price elasticity of demand of 0.5 (Kibune, 1995; Shimpo and Nishizaki, 1996), the assumed reduction in costs and mark-ups could result in an increase of electricity production by up to 8 per cent in Germany. The price-induced increase in output is not likely to be accompanied by strong employment gains. Some employment gains could occur in supporting services, however, as the labour productivity increase in the sector may partly result from contracting out of services by the main producers. In countries with substantial scope for efficiency gains (Germany, France and the United Kingdom), rationalisation efforts may lead to permanently lower employment in the industry.

### **Airlines**

Air transport normally accounts for less than 0.5 per cent of total employment in OECD countries, and its contribution to GDP is about the same (Table 1). Although the sector is quite small, it plays an important role in providing transport services to an increasingly global market (OECD, 1997*b*). Prices and costs differ substantially among OECD countries (Table 3; EC, 1994). This is partly related to differences in stage length (long flights have lower costs per revenue passenger kilometre), but also reflects genuine differences in efficiency. Price and cost levels in competitive markets such as the United States and the United Kingdom appear relatively low compared with those in the more regulated markets of other OECD countries. Some of these cost differences may be related to the quality of service. For instance, US airlines have relatively few cabin attendants compared with most European airline companies.

### **Regulations and regulatory reform**

The airline industry remains heavily regulated in many countries. Regulations have traditionally differed between domestic and international services. In the domestic industry, virtually all Member countries had restricted entry into the industry and/or made entry into certain routes subject to licensing in the 1970s. Rates were often subject to approval by the authorities and the quality of service,

Table 3. **Potential impacts of regulatory reform in airlines**

	United States <sup>1</sup>	Japan	Germany	France	United Kingdom
	Actual	Potential impacts			
<b>A. Economic indicators, 1993:</b>					
<b>Costs and prices (in US\$)</b>					
Average cost per available seat kilometre	0.06	0.12	0.13	0.16	0.07
Average price per revenue passenger kilometre	0.09	0.18	0.21	0.23	0.10
Operating expense per available ton kilometre	0.45	0.84	0.71	0.88	0.54
<b>Productivity and service quality</b>					
Revenue passenger kilometre per employee	1 808	n.a.	1 444	998	1 810
Average stage length (kilometre)	1 240	1 274	1 155	1 193	1 361
Cabin crew relative to flight crew	1.8	2.2	2.6	2.2	n.a.
Load factor passengers	0.64	0.64	0.61	0.67	0.73
<b>B. Assumed impacts of reform (% change):</b>					
Labour productivity	48	30	15	25	5
Capital costs	68	10	10	5	0
Wages	-5	-15	-5	-5	0
Profits	5	0	0	0	-10
Input prices	0	0	0	0	0
Fuel input prices	0	-10	0	0	0
Innovation (effect on output)	0	5	5	5	0
<b>C. Final impacts of reform (% change):</b>					
Output prices <sup>2</sup>	-20	-10	-6	-6	-3
Sectoral output, price-induced <sup>3</sup>	59	15	9	9	4
Sectoral employment, incl. innovative effects <sup>4</sup>	8	-8	-1	-8	-1

1. Impacts for the United States refer to actual impacts over the period 1978-93, whereas the impacts for Japan, Germany, France and the United Kingdom refer to potential impacts of (further) regulatory reform.

2. Derived from the input-output structure of the airline industry in each country.

3. Based on a common price elasticity of demand of -1.5.

4. Employment effect incorporates impacts of labour productivity growth, price-induced output growth and innovation.

Sources: Part A based on OECD calculations based on data provided by the Institute of Air Transport (ITA), Paris; Assumed impacts of reform from country assessments in main text and OECD (1997); Final impacts as stated in footnotes 2-4.

such as the frequency of flights on a given route, was often subject to government control. Non-scheduled (charter) services, which are quite important in Europe, provided some degree of flexibility, as licensing requirements and price controls were generally less stringent in this segment of the market. Entry in international

air transport was governed by bilateral agreements between national authorities, typically on a reciprocal basis. Public ownership was pervasive in the industry, notably in Europe, where airlines were seen as representatives of national prestige, and several European flagship carriers have received extensive financial support from their governments.

Regulatory reform in the airline industry may not result in a sufficient increase in competition if a small number of incumbents have a virtual monopoly of landing and take-off slots, especially at favoured time slots during the day, as this can be used to prevent competitors from accessing airports. A monopoly of slots is, however, not intrinsic to the industry. Enhanced competition in markets where the dominant airline has a near monopoly on landing and take-off slots may require provisions to ease the access of new entrants, particularly if there is common ownership of the airport and the incumbent carrier. A continued interest of competition policy authorities in the evolution of competition in this sector seems warranted.

The deregulation of the airline industry in the OECD area started with the liberalisation of the US industry through the 1978 Airline Deregulation Act, which abolished regulations on routes and fares. The airline industry in the United Kingdom was gradually liberalised in the course of the 1980s, entry no longer being controlled and prices no longer needing approval. Within Europe, competition has increased in the 1980s on selected routes, but entry was conditioned by bilateral agreements between national governments. Since 1991, several EU-wide liberalisation packages have enhanced competition in the industry within Europe. The completion of the internal market in the EU by 1 April 1997 is likely to increase competition further, in both domestic and international air transport. This will permit any airline company licensed in any EU country to service domestic routes outside its own domestic boundaries (cabotage).

The experience with regulatory reform in the sector in the United States is broadly positive (Morrison and Winston, 1995), with the total welfare gains estimated at \$18.4 billion at 1993 prices (0.3 per cent of GDP). Prices fell relative to the average price level by one-third between 1976 and 1993, with almost 60 per cent of the decline being attributed to deregulation. Price differentiation has increased as well. Labour productivity, measured as passenger miles per employee, increased by 120 per cent over the 1975-93 period. Load factors have also risen, pointing to increased capital productivity. The organisation of production in hub-and-spokes has allowed airlines to take advantage of economies of density.

Profits increased initially in the wake of deregulation, but plummeted in the first half of the 1990s, partly owing to over-investment during the initial phase of deregulation. Wages have fallen slightly in relative terms. Output of airline services has increased much faster than economy-wide output because of lower

prices and higher frequency of flights. Passenger miles increased by 200 per cent between 1975 and 1993, and passenger revenues by 93 per cent (in constant dollars). Employment in the industry increased from about 300 thousand persons in 1976 to almost 540 thousand in 1993.

Even though the allocation of airport slots was not dealt with, the privatisation and deregulation of the airline industry in the United Kingdom over the 1980s also appears to have had broadly positive effects (Yarrow, 1995). Fares of British Airways on domestic and international routes fell by about 25 per cent in the 1985-90 period. Average productivity grew by about 3 per cent annually between 1985 and 1991, but by 11 per cent on an annual basis between 1991 and 1994. Capacity utilisation also improved, with the scheduled passenger load factor going up from about 0.60 in 1985 to almost 0.70 in 1994. Output expanded sharply after deregulation, the available number of ton kilometres more than doubling between 1985 and 1994. The growth in output was accompanied by an increase in employment of 50 per cent, offsetting the decline in employment prior to privatisation.

The liberalisation of bilateral agreements in Europe, where followed by significant entry, is estimated to have resulted in a substantial reduction of relative prices – particularly of leisure travellers – and an increase in service frequencies (Abbott and Thompson, 1991). Nevertheless, substantial cost and productivity differences remain in Europe (Encaoua, 1991; Table 3).

### ***The potential impacts of regulatory reform***

Of the countries covered here, the largest scope for regulatory reform appears to exist in Japan, Germany and France (Table 3). Costs and prices in these countries are substantially higher than in the United States and the United Kingdom. There also appears to be scope for further reform in the UK airline industry, as competition is hindered by BA's control of many access slots to Heathrow airport. Moreover, there are concerns that recent alliances between European and North American carriers may be anti-competitive, particularly on certain routes, and this is currently being examined by the European Commission.

Apart from charter airlines and a limited number of regular airlines (including British Airways), the airline industry currently appears to be a relatively low-profit activity. Regulatory reform is therefore not likely to permanently reduce profit margins below current levels in most countries, and a normal return to capital in this industry might actually require some increase in profit rates. A more contestable airline market in the United Kingdom could put some pressure on British Airways' profit margins, however.

Regulatory reform may bring cost levels in the more regulated countries closer to those in the United States or the United Kingdom:

- In Japan, there appears to be scope to substantially lower fuel, capital and labour costs. High fuel costs are partly due to restrictions on the use of imported oil products. Capital costs could be lowered by improved load factors, current low load factors partly reflecting that competition is mostly concentrated on service (Yamauchi and Murakami, 1995). High labour costs are the result of low labour productivity and high wage premia, the latter being related to restrictions on hiring foreign flight and cabin crews (EPA, 1995). Together, these cost savings could amount to almost 10 per cent of total costs.
- In Germany, substantial wage premia have been identified for flight personnel (Neven and Röller, 1995). In addition, overall labour productivity of the main German airline, Lufthansa, fell short of US labour productivity by 35 per cent, while the gap with British Airways was around 25 per cent. On the assumption that labour costs, due to high wage premia, would be reduced by 5 per cent and labour productivity could be increased by 15 per cent, costs could fall substantially and prices could fall by about 6 per cent.
- In France, 1993 average costs per available seat kilometre were about twice as high as in the United States and the United Kingdom. Labour productivity, measured as revenue-passenger kilometres per employed person in the two major carriers was only half or less of that in the United States in 1993, although significant growth has occurred in recent years. However, capacity utilisation and capital productivity appear relatively high in France. Wages are also comparatively high, French pilots earning about a fifth more than their counterparts in the United States (Merlin, 1994).
- Some scope for further deregulation also exists in the United Kingdom, where access to airport slots – particularly at Heathrow airport – continues to remain an important barrier to competition. A further (small) increase in productivity and lower profits could lead to a price fall of some 3 per cent.

For Japan, Germany and France, the impact of regulatory reform on airline prices would be quite substantial. The estimated price elasticity of demand for airline services is high, and is assumed to be around 1.5 for the countries considered here. Price reductions could therefore lead to a substantial increase in traffic, depending on the size of the price reduction. If innovative effects of regulatory reform, such as expanded services and new products are included, the estimated output increases range from 14 per cent in Germany and France, to almost 20 per cent in Japan. The potential effects for the United Kingdom are more limited.

Given the substantial scope for productivity improvements in Japan, Germany and France, regulatory reform of the airline industry in these countries is likely to be accompanied by some employment losses in the short run, particularly in Japan and France. In the long run, sales will increase and employment may grow, partly due to new entrants, although whether this will compensate for the initial loss is uncertain. Building on the experience of the United States and the United Kingdom, it appears likely that regulatory reform may increase service frequency. However, both in Europe and Japan, these effects are likely to be smaller than in the United States, given the greater restrictions related to the availability of air space and landing slots.

### **Road transport**

The sector employs 2 to 3 per cent of the labour force in most OECD countries and accounts for about 1.5 to 2 per cent of GDP (Table 1). Road freight traffic (measured by ton kilometres) has grown faster than GDP, partly at the expense of less flexible rail freight, and partly because real costs of road freight have tended to fall as trucks have increased in capacity and become more mechanically efficient. Road freight transport is in principle a competitive industry. Entry costs are low, and the possibilities of economies of scale and scope are quite limited. In addition, and by contrast with utilities, the “distribution network” (*i.e.* roads) is generally owned collectively and available free of charge or at low cost.

### **Regulations and regulatory reform**

On straightforward competition grounds, therefore, there are no strong *a priori* grounds for regulation. However, road freight transport was among the most heavily regulated sectors in the OECD area until the late 1970s. Entry into the industry was strictly regulated, entry into certain routes was subject to licensing, cabotage rights were limited and freight rates were subject to approval by the authorities (OECD, 1990). The economic regulation of the sector was initially based on two grounds.<sup>7</sup> Firstly, in most countries road freight was mainly competing with regulated state railways. Unfettered competition would have undermined the role of the railways in providing universal service and their ability to cross-subsidise unprofitable routes. Moreover, it could have threatened the financial performance of the railways, which would ultimately show up in government accounts. Secondly, there were fears that an unregulated freight sector might lead to destructive competition (OECD, 1990).

Over the past three decades most OECD countries have liberalised the domestic freight sector, although many countries limit entry by imposing financial requirements or requirements on the minimum size of new entrants.

Considerable progress has been made to ease regulations concerning international freight transportation. Thus, within the European community, entry to freight services is now allowed mainly on qualitative criteria, although a quantitative safeguard clause remains in place in case of an extreme crisis in the market (EC, 1995). Cabotage is also slowly being liberalised, with complete liberalisation planned by mid-1998.

The effects of regulatory reform in road transport have generally been positive, in particular with regards to freight services (OECD, 1990; Høj *et al.*, 1996). Following deregulation, freight rates have generally fallen, services expanded and the efficiency of service providers increased substantially. Destructive competition appears not to have emerged in countries that have reformed regulations in this sector. In general, the fragmented nature of the sector and easy entry conditions have limited the emergence of market power.

### ***The potential impacts of regulatory reform***

Of the countries covered here, the largest potential for reform appears to exist in Japan (Table 4). Entry to the sector remains somewhat more regulated than in other countries and productivity appears to be the lowest among the five countries covered here. Relatively low productivity levels in the Germany, United Kingdom and France *vis-à-vis* the United States – and some small European countries (OECD, 1997) – suggest that regulations may also limit competition in these countries.

There is little information about profits in this industry. Profits are therefore taken to remain unchanged in all countries. There is little evidence that the freight sector in Japan or the European countries is characterised by supernormal wages, but it does seem to be characterised by low labour productivity in all four countries. In Japan, this may be related to the fact that a large segment of the sector performs functions related to just-in-time delivery, which tends to be a low-productivity activity, while restrictions on cabotage in other prefectural districts may also play an important role (Yamauchi, 1995; OECD, 1996). In Japan, cost reductions could come from increased efficiency and higher capital utilisation, although an inadequate infrastructure may limit the potential productivity gains. Lower costs in the European countries should also come from increased efficiency and higher capital utilisation. Some of this should result from further European integration, as this will strengthen competition and result in a consolidation of activity in the sector.<sup>8</sup>

For all four countries, the fall in costs and increased productivity should allow prices to fall, ranging from 2 per cent in the United Kingdom, to 9 per cent in Japan (Table 4). The price elasticity of demand for road freight services is generally quite low (estimates for Japan indicate around -0.2), suggesting that output

Table 4. **Potential impacts of regulatory reform in road transport**

	United States <sup>1</sup>	Japan	Germany	France	United Kingdom
	Actual	Potential impacts			
<b>A. Economic indicators, 1992:</b>					
<b>Productivity and utilisation:</b>					
Labour productivity (mill. ton km/person employed):	1.01	0.19	0.36	0.47	0.49
Capacity utilisation (1 000 ton km/truck)	21.2	31.6	89.5	29.9	47.4
Network utilisation/congestion (ton km/network km)	0.21	1.56	0.27	0.13	0.32
Network density (network km/square km)	0.60	0.48	1.79	1.67	1.62
<b>B. Assumed impacts of reform (% change):</b>					
Labour productivity	16	15	20	15	10
Capital productivity	50	25	0	25	10
Wages	-10	0	0	0	0
Profits	-10	0	0	0	0
Input prices	0	0	0	0	0
Fuel input prices	0	0	0	0	0
Innovation (effect on output)	0	0	0	0	0
<b>C. Final impacts of reform (% change):</b>					
Output prices <sup>2</sup>	-14	-9	-5	-5	-2
Sectoral output, price-induced <sup>3</sup>	7	2	1	1	0
Sectoral employment <sup>4</sup>	-8	-11	-16	-12	-9

1. Impact for the United States refers to actual impact of regulatory reform, others are potential impacts of (further) regulatory reform.
2. Derived from the input-output structure of the road freight industry in each country.
3. Based on a common price elasticity of demand of -0.2.
4. Employment effect incorporates impacts of labour productivity growth, price-induced output growth and innovation.

Sources: Part A from ECMT, *Statistical Trends in Transport, 1965-1992*, Paris, for European countries; United States and Japan from national sources; Assumed impacts of reform from country assessments in main text and OECD (1997); Final impacts as stated in footnotes 2-4.

will expand only marginally. Employment may fall, as efficiency gains are not likely to be compensated by the small expansion in output.

## Telecommunications

The telecommunication sector typically accounts for less than one per cent of total employment in the economy, while its revenues are equal to 1.5 to 3 per cent of GDP (Table 1). Prices of telecommunication services and productivity of telecommunications operators differ substantially across countries (Table 5). Countries with competitive telecommunications markets (e.g. the United States,

Table 5. **Potential impacts of regulatory reform in telecommunications**

	United States	Japan	Germany	France	United Kingdom
<b>A. Economic indicators:</b>					
<b>Profit margins (1995):<sup>1</sup></b>					
Based on gross operating income	17.2	8.8	28.0	18.5	21.5
Based on net income	10.6	3.5	8.0	6.2	13.8
<b>Labour productivity:</b>					
Revenues per employee, 1995 (OECD = 100)	114	143	81	74	99
Index, <sup>2</sup> 1994 (USA = 100)	100	96	72	n.a.	n.a.
<b>Capital productivity:</b>					
Revenues per mainline, 1995 (OECD = 100)	120	98	86	64	98
Call minutes per unit of capital service, 1994 (USA = 100)	100	46	38	n.a.	n.a.
<b>B. Assumed impacts of reform (% change):</b>					
Labour productivity	10	15	30	40	20
Capital productivity	10	40	40	50	20
Wages	0	0	0	0	0
Profits	-15	0	-15	-10	-25
Costs of material inputs	0	0	-10	-10	0
Innovation (effect on output)	10	15	30	30	15
<b>C. Final impacts of reform (% change):</b>					
Output prices <sup>3</sup>	-6	-16	-23	-30	-13
Sectoral output, price-induced <sup>4</sup>	3	8	11	15	6
Sectoral employment, incl. innovative gains <sup>5</sup>	3	8	11	7	2

1. Margins are based on operating income over total revenue. For the United States they refer to the average for 11 major companies, but estimates of net income exclude ATT. In the other countries they refer to the dominant company only.
2. Based on access lines per full-time employee (85%) and call minutes per full-time employee (15%).
3. Derived from the input-output structure of the telecommunications sector in each country.
4. Based on a common price elasticity of demand of -0.5.
5. Employment effect incorporates impacts of labour productivity growth, price-induced output growth and innovation.

Source: Part A from OECD (1997c), *Communications Outlook 1997* and from McKinsey (1996); assumed impacts of regulatory reform from country assessments in main text and from OECD (1997); Final impacts as outlined in footnotes 3-5.

Japan and Australia) appear to have relatively high productivity, but prices in these countries are not necessarily the lowest in the OECD (OECD, 1997c). A number of countries (e.g. Denmark and Norway) characterised by public monopolies have among the lowest price levels in the OECD. However, capacity utilisation (measured as revenue per mainline) appears substantially higher in countries with competitive telecommunications markets (OECD, 1997c).

### **Regulations and regulatory reform**

The telecommunications industry was historically characterised by high sunk costs and substantial economies of scale, related to network construction, and most governments therefore regarded the market as being a natural monopoly, justifying public ownership and/or strict regulation. Regulation was also often justified by the need to provide universal access to telecommunications services. Technological change has effectively removed the monopoly character of many segments of the telecommunications market (Høj *et al.*, 1996).

The traditional mode of regulation in telecommunications, involving statutory barriers to entry and price regulations, has given way to new regulatory structures in most Member countries since the early 1980s (OECD, 1997*c*). Regulatory reforms in Member countries have progressed at a different pace in the traditional segment of the telecommunication market, fixed-network-based voice telephony, which remains by far the most important part of the overall market. Entry to the cellular telecommunication market, which accounts for 3-24 per cent of total revenues in telecommunication (OECD, 1997*c*), is subject to licensing and most governments have permitted some competition in the market. Prices in this market segment are generally not regulated by the government. Most Member countries have fully liberalised the markets for equipment and value-added services (*e.g.* voice mail).

Of the five countries being reviewed here, entry restrictions were eased substantially in the United States, the United Kingdom and Japan, while core telecommunication activities remain the exclusive right of a public monopoly in Germany and France. In the United States and Japan, reforms were accompanied by restructuring and/or divestiture. In all cases, regulations have called for equal access to local networks, and interconnection charges have been subject to a cap. Regulatory reforms are underway throughout the OECD region. EU legislation is likely to stimulate competition in voice telephony in Europe, national markets becoming more fully contestable by 1 January 1998. The recently approved Telecommunication Act is also likely to result in a much tougher competitive environment in the United States. In Japan, the Ministry of Post and Telecommunications has indicated its intention to break up NTT. Until recently, little progress had been made at a multilateral level in reducing barriers to international trade in telecommunications. However, on 15 February 1997, WTO reached an agreement on new multilateral rules for trade and investment in basic telecommunications services. The agreement will take effect as of 1 January 1998, and covers 69 countries, that together represent about 95 per cent of the world telecommunications market.

Relative to the general (retail or consumer) price index, telecommunication prices have fallen by more than 60 per cent in both the United Kingdom (as required by the RPI-x regulation) and Japan since the industries were privatised.

It is unclear to what extent this is due to changes in the regulatory regime or to technological progress in the industry, as prices also fell substantially in the heavily regulated markets in France and Germany. In the United States, prices of interstate long distance services fell sharply following the 1984 reform. Prices of intra-state services fell much less, and the prices of local service appears to have increased. There has therefore been little net impact on the overall price level of telecommunications services.

Deregulation has been followed by a sharp increase in efficiency in the United States, the United Kingdom and Japan, and there is some evidence that labour productivity grew faster in countries with less regulation. Studies estimate that TFP in telecommunication may have grown at an annual rate of 3.8 per cent in Japan over the 1983-91 period (Nambu, Tsubouchi and Kurosawa, 1995), while an annual growth rate of 7.4 per cent has been estimated for the United Kingdom in the 1989-94 period (Bishop and Green, 1995). Labour productivity growth in the United Kingdom was quite sluggish in the immediate aftermath of privatisation, but labour efficiency leapt once entry into the market was liberalised (labour productivity doubled in the 1991-95 period). Innovations, proxied by patents, appear to have expanded more strongly in countries where the industry was privatised and made subject to competition.

Data problems make it difficult to ascertain the output and employment effects following privatisation and changes in the regulatory framework. This is because new firms in the industry may not be captured in output and employment data, and because communication-related activities (*e.g.* value-added services and private networks) may show up in sectors others than telecommunication (*e.g.* software engineering and broadcasting when cable companies are involved with telephony). Regulatory reform may also be accompanied by the contracting out of services, which would imply that employment would fall by less than the observed fall in employment at the main telecommunications operators. The experience of Japan, which maintains comprehensive employment accounts for telecommunication activities, suggests that while employment levels have plummeted according to the standard classification, this has been broadly offset by employment gains in other related activities. The steep increase in private networks in the United States since the early 1980s also suggests significant employment creation in that area. A recent EC report on the liberalisation of telecommunications in Europe estimated a strong fall in PTO employment up to 2005, but projected an increase in overall employment in the telecommunications industry over this period (EC, 1997).

### ***The potential impacts of regulatory reform***

There are no systematic data available about short-run marginal costs in telecommunication systems and thus no reliable estimates of general profit mark-ups over marginal costs. The pricing structure is estimated to be inefficient

in the industry, with rental charges too low and prices too high, especially for long-distance and international calls. While this points to vast cross-subsidisation, it is unclear whether it results in economic rents. However, most telecommunication companies are very profitable at present, and there is a general perception that this is due to a protected environment. As a proxy for the potential for reducing profits, it is assumed that a "normal" gross margin is 10 per cent of revenue, and a "normal" net margin 5 per cent of revenue, suggesting a substantial scope for reduced margins in the United States, Germany and the United Kingdom.

The efficiency by which labour and capital is employed in the five countries under study varies considerably (Table 5). Labour productivity, measured by revenue per employee, was the highest in Japan in 1995, more than 50 per cent higher than in Germany and France, 40 per cent higher than in the United Kingdom, with a smaller gap in performance with the United States. The picture is somewhat different if a more detailed study by McKinsey (1996) is used to gauge the level of productivity, labour productivity in Japan being slightly behind that of the United States and the European countries lagging behind. Capital productivity, measured as revenue per mainline, in Japan, Germany and the United Kingdom was substantially behind that in the United States, with France trailing even further. Alternative measures of capital productivity, reported in McKinsey (1996), suggest larger differences between the United States on the one hand, and Germany and Japan on the other.

Reflecting the large gap between labour and capital productivity in the United States and that in some of the other countries, considerable cost compression would seem to be feasible outside the United States, in particular for Germany and France. In Japan, the scope for labour productivity improvements is only slightly higher than in the United States, but capital productivity could improve more substantially. However, the assumptions do not imply a complete catch-up with the United States. A shift to greater competition in the United States should encourage efficiency there.

There is little evidence that input costs would fall considerably in the wake of deregulation or the introduction of more demanding price caps. Wage premia are low in the United States and in Japan, while little is known about such premia in Europe. The cost of capital equipment and intermediate goods might fall, particularly in Germany and France, as national champions may no longer develop all new technology themselves, but buy existing products in the world market (McKinsey, 1996). The experience in the United States on this point suggests that substantial gains may be possible.

Using a common price elasticity of demand of 0.5 per cent for all the five countries, the assumed fall in telecommunication prices can be expected to increase output in the industry by between 6 and 14 per cent in the European

countries and by around 8 per cent in Japan. Recent studies for the United States have projected enormous GDP and employment gains from the further liberalisation of telecommunications markets (OECD, 1997*c*). In this respect, the current estimates are rather conservative.

However, price-induced expansion of output is likely to be only part of the output effects of regulatory reform in the industry, as substantial gains can be expected from new products. Thus, regulatory reforms can be expected to increase cellular telephony, private networks, value-added services, etc. Some of these activities will not be recorded as telecommunication activities. The magnitude of any innovation-induced output gains is subject to considerable uncertainty, but the evidence from Japan (see above) suggests that such activity gains can be substantial. Here it is assumed that such gains are greatest in the still protected markets in France and Germany (around 30 per cent), while they are more modest in the other countries (10 to 15 per cent) where a more competitive environment has already permitted the introduction of new products. Given these assumptions concerning innovation-driven output gains, reforms could increase employment levels somewhat despite strong productivity increases. A recent study for the European Commission broadly supports these results (EC, 1997).

## **Distribution**

The distribution sector is by far the largest of the sectors being discussed here. It accounts for between 11 and 15 per cent of business sector GDP and for around 20 per cent of business sector employment (Table 1). It is a major employer of low-skilled workers and employment in the sector includes a large share of part-time and female labour. The performance of the distribution sector is quite difficult to compare across countries. This is partly due to the fact that the “output” of the sector is the intermediation between producers and consumers, which is difficult to measure. Price comparisons cannot easily be made. Nevertheless, the available indicators all show a considerable variation in productivity performance across the OECD area (Table 6; Pilat, 1997).

## **Regulations and regulatory reform**

A substantial number of regulations affect the competitive environment of the distribution sector (Høj *et al.*, 1996). Zoning laws limit the establishment of new outlets to certain areas, while in a few countries, notably Belgium, France, Italy and Japan, national legislation on large-scale outlets slows down – and sometimes blocks – the establishment of such stores. In addition, a lack of competition in the distribution sector can also arise from vertical restraints. Furthermore, there are substantial differences across the OECD in the permitted opening hours of shops.<sup>9</sup>

Table 6. **Potential impacts of regulatory reform in distribution**

	United States	Japan	Germany	France	United Kingdom
<b>A. Economic indicators:</b>					
<b>Profits and wages:</b>					
Estimated mark-ups, 1980-92	1.28	1.25	1.39	1.52	1.37
Gross margin in retail trade, 1986	31.0	27.1	34.2	29.6	27.6
Total gross margin on retail sales, 1986	49.7	57.6	58.9	55.3	55.6
Estimated wage premia in retail trade, 1980s	-28.1	-7.2	3.7	n.a.	n.a.
<b>Productivity, 1990/1992:</b>					
Distribution GDP per person (USA = 100)	100	60	78	97	59
Retail sales per employee (USA = 100)	100	71	101	95	78
Employment per retail outlet	6.6	4.2	4.4	3.8	6.5
Labour productivity in general merchandise retailing, 1992	100	50	90	87	82
Capital productivity in general merchandise retailing, 1992	100	65	110	n.a.	91
<b>B. Assumed impacts of reform (% change):</b>					
Labour productivity	0	15	2	5	5
Capital productivity	0	25	0	10	5
Wages	0	0	0	0	0
Profits	0	-5	-5	-5	-5
Costs of material inputs	0	-5	0	0	0
Innovation (effect on output)	0	6	3	3	3
<b>C. Final impacts of reform (% change):</b>					
Output prices <sup>1</sup>	0	-10	-2	-3	-2
Sectoral output, price-induced <sup>2</sup>	0	5	1	2	1
Sectoral employment <sup>3</sup>	0	-3	1	-1	-1

1. Derived from the input-output structure of the distribution sector in each country.  
2. Based on a common price elasticity of demand of -0.5.  
3. Employment effect incorporates impacts of labour productivity growth, price-induced output growth and innovation.

Sources: Mark-ups from Oliveira Martins, Scarpetta and Pilat (1997); gross margins from Maruyama (1993); wage premia from OECD (1995a); productivity estimates from Høj, Kato and Pilat (1996) and McKinsey (1992, 1995, 1996); Assumed impacts of reform from country assessments in main text and OECD (1997); Final impacts as outlined in footnotes 1-3.

The differences in regulatory regimes in the distribution sector across the OECD are less pronounced than they are in most of the sectors discussed earlier. In principle, the sector is competitive and individual companies have little market power. There are, however, some economies of scale, partly related to the ability of large chains to acquire their products at a lower price. This has led to a relatively high degree of concentration in some segments of the market, notably food distribution. The sector is also characterised by some economies of density and agglomeration. Regulatory reform in the sector has mainly focused on the

liberalisation of restrictions on large-scale outlets (*e.g.* France, Japan) and on the liberalisation of shop opening hours (*e.g.* Japan, Germany, France and the United Kingdom).

Studies on the impact of restrictions on large-scale outlets on the performance of the retail sector appear to reach a similar set of (qualitative) conclusions (OECD, 1992; OECD, 1995; Pilat, 1997):

- The restrictions have substantially retarded structural change in the retail sector, particularly in food retailing, and have often also limited the efficiency of those large-scale stores that were allowed to establish.
- They have tended to favour existing stores and sometimes provided them with substantial rents. Large stores that have been allowed to establish have benefited in particular, as they were confronted with only limited competition.
- Restrictions on large stores have reduced the potential gains to consumer welfare from larger outlets, in particular by limiting the expansion of consumer choice.
- Regulations on large stores may have reduced innovative effects (OECD, 1997*d*) and slowed down the development of modern retail formats (McKinsey, 1997). Large retailers have often taken the lead in developing and implementing new technologies, such as scanning and integrated inventory management.

Restrictions on large stores therefore appear to have had some costly side effects. Protecting small shops to save employment may not be needed. The developments over the past decades suggest that small specialised shops continue to have an important place in advanced retail systems, particularly outside the mass food market. In addition, small stores are increasingly finding ways to remain competitive relative to large stores, for instance by engaging in co-operative arrangements, such as franchising. Many find their own specialised “niche” in the retail market. However, small supermarkets and general food stores are likely to disappear due to competition from larger outlets.

Modern retail systems remain quite labour-intensive, particularly as they become more service-oriented. Thus, the US distribution sector, arguably among the most advanced in the world, has continued to show rapid employment growth over the past 15 years. In addition, the liberalisation of the LSRS law in Japan over the past 5 years appears not to have led to significant employment losses, but have in fact led to employment gains. Nevertheless, the liberalisation of restrictions of large stores could lead to a significant restructuring of the sector.

The other goal at which restrictions on large stores were aimed, urban and environmental protection, is also an important policy goal, but one that could possibly be achieved in a different way. In principle, concerns arising from

non-economic goals could be integrated in local and regional planning. If a special (national) legislation exists, separate from local and urban planning rules, it is likely to be used, often with the explicit aim to reduce competition in the distribution sector (OECD, 1992). Giving established retailers a say in the actual implementation of such legislation, as is the case in a few countries, makes this even more likely.

The regulation of shop opening hours has recently been on the political agenda in several OECD countries, particularly in Europe. Over the past few years, Germany and several other European countries (*e.g.* Austria, Denmark and the Netherlands) all liberalised regulations on shop opening hours. The pressure to provide greater flexibility in opening hours mainly arises from a view that short opening hours reduce consumer welfare and are in conflict with a general demand for more flexible working hour arrangements. In some cases, for instance Austria, an increase in cross-border shopping, due to more liberal hours in other countries, has also spurred deregulation.

The initial regulation of opening hours was mostly intended to create a common – sometimes religious – pause day (often Sunday) and to prevent employees from working excessive hours. Even though they were not explicitly designed for this purpose, regulations on opening hours tend to favour small stores over large ones. Small stores tend to have greater difficulties in expanding opening hours, due to the need to employ a certain “threshold” labour at all times (Nootboom, 1983). In addition, short opening hours reduce the return on investment by larger retailers, as they tend to have higher investment in real estate and inventories than small shops (EC, 1996*a*). Large shops are also more dependent on hired labour. Longer opening hours thus reduce the proportion of fixed overhead costs in the total cost structure of retailers.

Currently, regulations on opening hours differ substantially across the OECD area (EC, 1996*a*). In a number of countries, opening hours are completely free, although local authorities (states or municipalities) can often introduce some restrictions. In other countries, opening and closing hours are tightly regulated and limits are imposed on the total weekly opening hours of shops. The absence of legal restrictions in some countries does not necessarily imply that shops are also open for a significantly longer period. However, the absence of restrictions in these countries generally implies more flexibility and greater variability in opening hours, as it enables stores to align their opening hours with the wishes of their consumers, thereby enhancing consumer welfare.

The experience with regulatory change in Japan is broadly positive. The liberalisation of the Large-Scale Retail Store (LSRS) law has led to an increase in the number of large and more efficient stores. The number of stores employing more than 20 persons increased by 22 per cent between 1991 and 1994, while the average store size during this period increased by 18 per cent. Labour

productivity – as measured by sales per person employed – increased between 1990 and 1995, whereas employment increased as well. Combined with a number of other developments in the retail sector (OECD, 1995), the liberalisation of the LSRS law has contributed to falling prices, increased variability in prices between different stores and reduced costs of the retail sector. The Japanese Economic Planning Agency (EPA, 1996) has estimated that the deregulation of the LSRS law over the past years has created annual new demand of 4.68 trillion Yen (or about 1 per cent of total GDP).

### ***The potential impacts of regulatory reform***

The distribution sector is generally regarded as a competitive industry, with little scope for companies to exercise market power. However, some segments of the sector may earn excessive profits, arising from anti-competitive conduct or protective regulations. Total gross margins are substantially higher in Japan and Germany than in the United States, and France and the United Kingdom also have high margins (Table 6). In Japan, very high operating margins have been identified particularly for department stores, that make up about 10 per cent of total retail trade (OECD, 1995). Halving these margins by increased competition could reduce total profits of the industry by about 5 per cent. In France, relaxing restrictions on large store openings and on the organisation of pharmaceutical chains could contribute to lower margins. Margins in Germany and the United Kingdom also appear excessive, suggesting some scope for a reduction in profits.

Regulatory reform could have substantial effects in several of the countries covered here. A further liberalisation of the LSRS law in Japan and its future abolition would contribute to an expansion of the number of large and efficient stores, leading to a substantial increase in productivity of the sector. A potential 15 per cent increase in labour productivity would do little to reduce the gap with the United States, but would bring productivity in Japan more in line with that in Germany and France. More efficient procurement patterns, as currently used by discount stores, and simplified distribution chains in Japan could reduce overall input costs substantially. A stronger competition policy could contribute to these developments.

The overall impact of a further liberalisation of the LSRS law in Japan would be a further reduction of distribution prices, by up to 2 per cent annually over a 5-year period. Given the experience with liberalisation so far, sales would be expected to increase substantially. Assuming a common long-run price elasticity of 0.5, sales would expand by about 5 per cent. Based on the experience with the previous liberalisation of the LSRS law, a further increase of large stores in Japan would most likely not affect employment very much. Overall productivity would increase from a move from small to large stores, but large stores often require more shifts of workers, whereas employment would also expand from higher output and innovative gains (see below).

National studies (IFO, 1995) suggest that a deregulation of shop opening hours in Germany could lead to 40 per cent of all retailers to expand their opening times, whereas about 20 per cent of consumers claim that they would expand their spending. This could lead to an increase of turnover in retailing by about 2-3 per cent over a three year period. Gains in sales would be concentrated on large-scale outlets, whereas smaller stores could expect to see sales decline by 1-2 per cent. Full-time employment would increase by about 1.3 per cent (about 30 000 persons), whereas total employment could increase by 2 per cent. The employment increases result primarily from the need for more staff, and particularly part-time staff, to cover extra opening hours. The assumptions made here (Table 6) are roughly in line with this analysis.

Although the French and UK distribution sectors are less regulated, changes to the regulatory framework could also affect economic outcomes in these countries. In France, regulatory reform of the ban on the construction of hypermarkets, an easing of the remaining restrictions on Sunday opening and more vigilant and sensitive competition policy could help to reduce price levels of distribution products by about 3 per cent. Assuming a long-run price elasticity of 0.5, sales could expand by almost 2 per cent. After accounting for some potential gains from innovation, sectoral employment might fall slightly in the short run. Lower profits and higher labour and capital productivity in the United Kingdom could help to reduce price levels by about 2 per cent and increase output by 1 per cent. The employment effects of reform in this sector are likely to be negative, but innovative effects, as have emerged in other countries following deregulation, could almost offset the negative impact.

It is likely that product variety has been constrained in countries with regulated distribution systems (Baily, 1993; McKinsey, 1997). Furthermore, consumers have been confronted with additional costs, as their ability to purchase goods when (and sometimes where) they wanted to has been constrained. Furthermore, regulatory restrictions may have prevented structural change in the industry and have slowed down the move towards high-productivity and high value added stores (McKinsey, 1992; 1997). However, it is difficult to assess what the effects of regulatory reform would be on these processes and what the quantitative contribution to growth would be. The current analysis assumes substantial potential innovative gains in Japan, and some in the European countries.

## **THE ECONOMY-WIDE BENEFITS OF REFORM**

### **First-round effects**

The direct impact of the combined within-sector effects on the various macroeconomic variables in each of the five countries under review is summarised in Table 7, where each within sector effect is weighted by the sector's

Table 7. **Aggregate effects of sectoral deregulation, business sector**

First-round effects, percentage change relative to baseline

	United States	Japan	Germany	France	United Kingdom
Labour productivity	0.5	2.6	3.5	2.3	2.0
Capital productivity	0.5	4.3	1.3	3.3	1.4
Total factor productivity	0.5	3.0	2.8	2.7	1.8
Wages	0.0	0.0	-0.1	0.0	0.0
GDP price level:	-0.3	-2.1	-1.3	-1.4	-1.2
- Due to lower profit margins	-0.1	-0.2	-0.1	-0.2	-0.2
Total output:					
- Due to lower output prices	0.1	0.8	0.6	0.7	0.5
- Including innovative gains at the sectoral level	0.4	1.7	1.5	1.7	1.2
Business sector employment					
- Including innovative gains at the sectoral level	0.0	-1.0	-0.4	-0.4	-0.5
- Excluding innovative gains at the sectoral level	-0.1	-2.1	-1.2	-1.1	-1.2

Source: Based on tables 2-6. The table shows the combined effect of the sectoral effects in tables 2-6, where the sectoral effects are weighted by the sector's share in business sector GDP or employment (from Table 1) to derive the effect for the total business sector. Price effects are based on the input-output structure of the countries concerned. More detail is available in OECD (1997).

share in business GDP or employment (Table 1). The salient features of the aggregate effects on the business sector are as follows (relative to baseline values):

- Labour productivity increases substantially, ranging from 0.5 per cent in the United States to 2 to 3½ per cent in the other countries considered;
- Capital productivity increases by 0.5 per cent in the United States, about 1½ per cent in Germany and the United Kingdom, 3 per cent in France and 4 per cent in Japan;
- Stronger competition will hardly affect wages at the aggregate level, because wage premia are estimated to be low in the more important reformed sectors;
- Profit margins are estimated to fall modestly, reducing the implicit business GDP price level by 0.1 to 0.2 percentage points;
- The GDP price deflator could fall by as much as 2 per cent in Japan, and 1½ per cent in France and Germany, as a result of falling costs and profits;

- Output, due to lower prices and possible innovative gains, could increase substantially, ranging from 0.4 per cent in the United States to more than 1.5 per cent in Japan and France.
- Business sector employment could fall modestly in the short term – with the exception of the United States – ranging from ½ per cent in Germany, France and the United Kingdom to about 1 per cent in Japan.

The distribution sector makes the greatest contribution to both labour productivity gains and employment losses in Japan, because of its weight in business sector GDP and employment. However, the telecommunication and electricity sectors make substantial contributions in the European countries despite their small size, reflecting strong within-sector effects. By contrast, deregulation in the airline industry has only a modest impact despite sizeable within-sector effects (OECD, 1997).

### **The macroeconomic impacts**

The economy-wide impact of regulatory reform at the sectoral level is strongly dependent on the functioning of product, labour and capital markets. Insofar as the structure of the economy varies across countries, the macroeconomic impact of similar regulatory reform programmes can differ from one country to another. In order to assess the overall macroeconomic effects it is necessary to employ empirical models which incorporate the principal interrelationships between the various markets in the economy. General equilibrium models are sometimes regarded as the best vehicle to gauge the macroeconomic effects, as they explicitly incorporate the interrelationships between economic agents and sectors. However, such models can only provide estimates of the long-run effects, and in particular say nothing about the transition path (which may be a crucial determinant of the political feasibility of reform).

The strategy adopted here is to employ small macroeconomic country models to assess the economy-wide consequences of the combined within-sector effects estimated above.<sup>10</sup> The models have the same basic structure as the OECD's INTERLINK model (Turner *et al.*, 1993). In addition to traditional demand factors, the models embody a consistent supply-side framework, including a production function for the aggregate business sector and corresponding factor demand and price relationships. Together with the assumed wage determination process, these supply factors imply an equilibrium unemployment rate consistent with stable inflation (or "NAIRU"). The model is broadly neo-classical in terms of equilibrium properties, but the presence of real and nominal price and wage rigidities implies that transitory shocks can have long-lasting effects.

To analyse the economy-wide effects, the individual country models are subject to a number of "shocks", based on the combined within-sector effects: a) the index of labour efficiency is artificially boosted to account for the estimated

increase in labour and capital productivity, *b*) aggregate employment is reduced to account for the initial employment loss from restructuring, *c*) prices are lowered to represent the reduction in profit margins, and *d*) overall wage levels are lowered to account for the reduction in wage premia in the affected sectors.<sup>11</sup> In line with experience with regulatory reform programmes in the past, these structural changes are phased in slowly at a constant rate.<sup>12</sup> In each case, it is assumed that the real long-term interest rate remains unchanged, which in turn implies that the user cost of capital is held constant in real terms.

The simulated macroeconomic effects of regulatory reforms on key performance indicators are shown in Table 8. The long-run effects can be summarised as follows:

- The level of real GDP increases substantially, ranging from 1 per cent in the United States to 5 to 5½ per cent in Japan, Germany and France.
- Real wages increase significantly, though by less than the increase in real GDP.

Table 8. **Long-run results of country-specific model simulations**

Long-run change from baseline, in per cent

	United States	Japan	Germany	France	United Kingdom
<b>Productivity shock only:</b>					
GDP	0.7	3.9	4.1	4.0	2.7
Unemployment	0.0	0.0	0.0	0.0	0.0
<b>Price shock only:</b>					
GDP	0.2	0.1	0.4	0.6	0.3
Unemployment	0.0	0.0	-0.2	-0.3	-0.1
<b>Employment shock only:</b>					
GDP	n.a.	1.6	0.4	0.2	0.5
Unemployment	n.a.	0.0	0.2	0.3	0.1
<b>Wage shock only:</b>					
GDP	0.0	0.0	0.1	0.0	n.a.
Unemployment	0.0	0.0	0.0	0.0	n.a.
<b>All shocks:</b>					
GDP	0.9	5.6	4.9	4.8	3.5
Unemployment	0.0	0.0	0.0	0.0	0.0
Employment	0.0	0.0	0.0	0.0	0.0
Real wages	0.8	3.4	4.1	4.0	2.5
Price level	-6.6	-11.1	-9.8	-12.8	-5.8

Source: Modelling simulations incorporate shocks to productivity, profits, wages and employment shown in Table 7, and are based on INTERLINK macquettes as discussed in Turner, *et al.* (1993).

- Inflation is unaffected in the long-run, but the aggregate price level is lower by between 6 per cent (United Kingdom) and 12 per cent (France).<sup>13</sup>

Employment and unemployment effects depend critically on the reaction of wage demands to changes in productivity: when the whole of the productivity gains feed directly into higher wage demands, employment and unemployment are hardly affected in the long run. If, however, only part of the productivity gains gets reflected in wage demands, *e.g.* because of less scope for workers to appropriate product market rents in a more competitive environment, there could be an appreciable reduction in unemployment.

The bulk of the increase in real GDP for the five countries under review can be attributed to the increase in the within-sector efficiency of labour and capital, and the difference in the GDP effect across countries arises essentially because of the different scope for stimulating efficiency via regulatory reforms. The mechanisms by which a permanent improvement in efficiency stimulates GDP are well known. Increased efficiency directly adds to the productive potential of the economy, which in the first instance puts downward pressure on prices. This in turn stimulates domestic demand via higher real wages (due initially to nominal wage rigidity and later to productivity gains feeding into real wages), and improved competitiveness stimulates foreign demand. This increase in aggregate demand prompts business to increase their demand for capital, which is not offset by a higher real user cost of capital on the assumption that real long-term interest rates remain constant, and this further adds to the productive potential of the economy.<sup>14</sup>

The long-term effects of the reform-induced employment, price and wage shocks in isolation on GDP and unemployment are also presented in Table 8. The principal results are:

- The negative employment shock increases unemployment by 0.2 to 0.3 percentage points in the continental European countries, while a similar shock would have much less impact on unemployment in the United Kingdom. Unemployment in the long term would be virtually unaffected in Japan. These cross-country differences mirror the different degree of flexibility of real wages with respect to unemployment across countries: the high degree of flexibility in Japan largely offsetting any shock to labour demand, while the flexibility in other countries would do so only partially. Despite stable or slightly increased unemployment, the simulations suggest that the negative employment shock alone would increase GDP in Japan, Germany and the United Kingdom, while output would be virtually unchanged in France. This is due to the reduction in overmanning, which increases the elasticity of output with respect to capital, and thus boosts the capital stock.

- The reduction in profit margins in the continental European countries permits a drop in structural unemployment of 0.2 percentage points without risking an acceleration in inflation. Due to the higher degree of wage flexibility the impact is again much smaller in the United Kingdom despite a comparable shock and the effects are negligible in the non-European countries. The shocks increase GDP by 0.3 to 0.6 percentage points in the European countries, while GDP in the United States and Japan changes only little.
- The wage shock has practically no macroeconomic effects in any of the countries, with the exception of some small GDP gains for Germany, reflecting the minuscule estimated within-sector effects.

The small combined effects of these three shocks are therefore partly due to offsetting effects, which are individually quite large in the case of the employment and price shocks. To the extent that the within-sector price and wage effects are underestimated in the previous section, the economy-wide output and unemployment effects would be correspondingly more beneficial.

The assessment in the current paper is not out of line with other studies of regulatory reform. Long-term benefits of 5 to 6 per cent of GDP translate into 0.4 to 0.5 annual GDP gains over a 10-year period, which is consistent with the estimated benefits in studies for Japan, Germany, Australia and the Netherlands (EPA, 1996; Lipschitz *et al.*, 1989; Industry Commission, 1995; Van Bergeijk and Haffner, 1996). However, the estimates for the United States are substantially lower than those for the other countries, mainly due to two factors. First, the principal regulatory reforms in the United States (in airlines, railways, trucking, telecommunications and cable television) covered less than 5 per cent of 1987 economy-wide GDP. Second, in most sectors the United States is, and was even in the mid-1970s, a much less regulated economy than many of the other OECD countries, suggesting a relatively small scope for gains from regulatory reform.

The current paper covers regulatory reform in 5 sectors of the economy, together making up almost 20 per cent of GDP in the 5 countries considered (Table 1).<sup>15</sup> This is a substantially larger proportion of GDP than has been covered by the majority of the studies quoted above. In addition, regulatory reform could affect various other areas in the economy apart from those studied here, and include other types of regulations, such as administrative regulations (OECD, 1997). The potential gains of regulatory reform might therefore be larger than those estimated in the current study.

Conversely, the potential gains of regulatory reform might be overstated in the current study, if much of the productivity and price gaps between countries are not – even indirectly – to an important extent the result of inappropriate regulation. This is an important point. There are, however, three factors that

strongly indicate that inappropriate regulations have adverse effects. First, the experience with regulatory reform in the past, in many sectors and several countries, has demonstrated that a move towards more appropriate regulatory structures can lead to rapid productivity gains and a fall in prices. Actual productivity gains due to regulatory reform in airlines and road transport in the United States, and in electricity, air transport and telecommunications in the United Kingdom, exceed most estimates of potential gains in the current study. Second, our estimates of potential gains are quite close to those by – often more detailed – national studies. Third, even where regulations are not a direct determinant of productivity differences, regulatory structures can affect the competitive environment and the choices made by firms concerning optimal input-output combinations (Pilat, 1997a). In addition, there are several possible effects of regulatory reform that are difficult to quantify, and that could lead to the over- or understatement of potential gains.

## CONCLUDING REMARKS

In spite of the growing evidence on the benefits of reform, the process of regulatory reform remains gradual in most economies. Pressure by vested interests can slow down reforms, and governments often require time to build sufficient support for proposed policy changes. In addition, regulatory reform may sometimes require a rebalancing with other policy objectives. In most cases, however, the issue is not whether or not to regulate, but *how* to regulate. Many regulations are aimed at market failures or social considerations. In these cases, reforms should look for those regulatory structures that introduce the least distortions in the economy, while achieving the policy goals at which the original regulations were aimed.

Regulatory reform is not without costs, however. The most important of these is probably the possible loss in employment over the short term. Regulatory reform may particularly entail such short-term transition costs in sectors and countries with a high level of inefficiency. This impact will be moderated to the extent that lower prices or innovative effects increase demand for goods and services produced in the sector itself, and to the extent that spill-over effects lead to faster growth in other sectors. However, short-term employment losses are inevitable in many sectors. In the longer term employment recovers, as the improved performance of a sector feeds through in the rest of the economy. The impact of regulatory reforms on employment and unemployment in the medium and long term are closely related to the ability of the labour market – and the economy as a whole – to adjust to changing economic conditions and to reallocate labour from declining to growing sectors of the economy.

The OECD *Jobs Study* (OECD, 1994) set out a broad programme of action designed to improve the ability of the labour market to adjust, as well as to increase the capacity of the economy to create knowledge and to innovate. Recent evidence suggests that the strategy **can** help to improve labour market performance (OECD, 1997e). A more flexible labour market should help to reduce the potential costs of regulatory reforms and make it less likely that such reforms have adverse employment consequences in the long or short run. However, even with a well-functioning labour market, some displaced workers will not be able to find new employment at the wages that they had previously been earning, often because their skills and competences are no longer in great demand. Older and low-skilled workers are particularly likely to be affected. Appropriate training measures, as advocated in the OECD Jobs Study, may help to some extent, but many displaced workers could be affected by either a substantial loss in earnings, once re-employed, or protracted unemployment.

Displaced workers are the most important category of people that may lose from regulatory reform. They are not the only losers, however. Regulatory reform in network industries could lead to significant costs from obsolete capital equipment (“stranded” costs). Some mitigation of such costs may be needed to be fair to investors.

Other concerns have often been raised as regards the effects of economic deregulation, particularly in the areas of environment and safety. It should be emphasised that the reform of economic regulations does not imply that such social regulations should be abandoned. The experience with regulatory reform in the transport sector, both road and air, suggests that safety has not deteriorated as a result of economic deregulation. Nevertheless, safety remains an important problem in both industries and appropriate policies may be required to improve safety over the longer run. There are likely to be some environmental effects of economic deregulation, however, as lower prices are likely to encourage higher demand for polluting goods and services, particularly in energy and transport. Environmental policy will be required to deal with these effects, although a competitive and less distorted market may be a more efficient mechanism for the implementation of environmental policy than a regulated market. A range of effective, sometimes market-based, policies is available to deal with environmental effects (OECD, 1997f).

Another important issue that has been raised is that of universal service obligation, *i.e.* the provision of telecommunication, public transport or energy services at a reasonable price to remote areas and to poorer households. Critics have argued that the removal of this obligation in a competitive market would lead to a deterioration of consumer welfare, particularly in remote areas, as competitive firms would stop providing services to unprofitable areas. In practice, governments have acknowledged this concern and have often found ways to

ensure universal service obligation. For instance, some countries provide targeted subsidies funded by a special levy to consumers facing high costs (*e.g.* the United States in its telecommunications market), whereas others (*e.g.* New Zealand) have placed the burden on the incumbent carrier. This concern can thus be addressed, although it is important that it be done in a transparent way.

In conclusion, experiences across the OECD suggest that regulatory reform can contribute substantially to improvements in economic performance. The present paper provides estimates of the potential impacts of reform for five sectors, and the effects of such reform for the economy as a whole in five OECD countries. These estimates suggest a potential for significant gains, particularly in the more heavily regulated economies of Japan, Germany and France. The effects of reform remain difficult to assess, however. This is particularly the case for the dynamic gains, such as the impact of regulatory reform on innovation, and the effect of reform in one sector on the performance of other sectors.

Furthermore, the existence of transition costs should not become a reason to delay or block reform. But the costs of reform – that often fall on a small group – should be contrasted with the benefits of reform that are often more diffuse. Even when the benefits clearly outweigh the costs, which they do in most cases, governments should acknowledge the costs of reform in the policy process, and appropriate policies should be considered to mitigate such costs (OECD, 1997*g*).

## NOTES

1. This paper deals with the reform of economic regulations in a sector, *i.e.* restrictions on entry, pricing and service. It does not deal with social regulations, *e.g.* environmental, health and safety regulations.
2. In a few sectors, including electricity and telecommunications, OECD experience can be usefully compared with – and benchmarked on – that in the United States. However, even though US performance in these industries appears superior to that in other OECD economies, national studies suggest a considerable potential for further gains in the United States if further reform measures are implemented. This suggests that in these sectors, US estimates of potential gains can be considered a lower bound for other OECD countries.
3. More detail is available in OECD (1997).
4. The input-output tables are derived from national sources and are sufficiently detailed to distinguish the five sectors discussed in the current study.
5. Due to a lack of information, the same industry-specific price elasticities are used for the five countries. Estimates suggests, however, that they may differ substantially across countries.
6. Recent productivity gains in some countries, and particularly the United Kingdom, have narrowed some of these productivity differences. A 1995 estimate of UK productivity would put its level at about 3.2 gigawatt-hour per person, suggesting a remaining gap with most other countries.
7. There are also non-economic reasons for regulation of the industry, such as safety and the environment.
8. A recent EC study (EC, 1996) suggests that prices of cross-border transport have already fallen as the result of European integration, by up to 8 per cent for Germany and 6 per cent for France.
9. In many countries, local authorities can deviate from national legislation on opening hours. Actual maximum opening hours may therefore differ substantially within each country.
10. Macroeconomic models have been employed to evaluate the macroeconomic effects of deregulation in Australia, see Industry Commission (1995). They were also used by the European Commission to evaluate the macroeconomic effects of the 1992 Programme, see Emerson *et al.* (1988).

11. To respect the consistency of the supply block framework in the face of employment and price shocks, it is necessary to make adjustments to other parts of the models than the directly affected equations. For example, an employment shock will directly affect the employment equation, but also the price, capital demand and normal output equations. A price shock will also have implications for the normal output equations.
12. The modelling is based on a 10-year phase-in period.
13. The modelling scenarios assume neutral monetary policy. In practice, monetary authorities in several OECD Member countries have an explicit inflation target, often framed as an upper and lower bound to the permissible inflation rate. In such an environment the deflationary effects of regulatory reforms would automatically entail an easing of monetary policy if the inflation reduction would push price increases below the target floor. The monetary policy assumptions also imply that the cost of capital remains constant.
14. An increase in the real user cost of capital could fully offset the demand-driven increase in the capital stock, and would in this case limit the GDP effect to the increase in economy-wide TFP.
15. With the exception of the United States, as the study for the United States does not cover the distribution sector, while the gains from further regulatory reform in airlines and road transport were considered to be negligible.

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## METHODOLOGICAL ISSUES

Estimates of the within-sector impacts of regulatory reform are partly based on benchmarking, *i.e.* the comparison of economic performance in a specific sector across countries. There are many reasons why performance in a sector can differ between countries (Pilat, 1997a). Favourable resource endowments in some countries may allow a high share of hydro-power in electricity production, contributing to low costs and high productivity. Short stage lengths and greater congestion may reduce the efficiency of European airlines compared with US airlines. Furthermore, a substantial part of the differences in productivity in the distribution sector appears related to structural characteristics such as population density, land prices and car use.

Part of the differences in performance appear related to regulation, however. Countries that have reformed regulatory structures in the five service sectors discussed in this paper have experienced considerable productivity gains, while countries with less regulation outperform countries with more regulation in several sectors, including electricity, airlines and telecommunications (Høj, Kato and Pilat, 1996). The paper takes only part of the difference in performance as being the result of regulation and does not assume full catch-up with the “leader” in a specific industry.

To estimate the impact of regulatory reform on the price and cost level of an industry, the paper uses an input-output framework. It assesses the impact of existing regulations on the costs of intermediate inputs – regulations might force firms to use domestic inputs – labour, capital and profits. An illustrative example of these calculations, based on the estimated effects of (further) regulatory reform in Japan’s electricity industry, is provided in Table A1.

It suggests that the costs of electricity production could fall by almost 3 per cent if coal subsidies were phased out – thus reducing fuel costs. In addition, higher labour productivity and lower wage premia could reduce labour costs substantially and total electricity costs by 1 per cent. Greater competition could also help to reduce profit margins, lowering electricity costs by 3 per cent. Finally, increased capital productivity could help to reduce electricity costs by almost 5 per cent. The combination of these effects could lower the total costs of electricity generation in Japan by almost 12 per cent.

Table A1. **Example of the calculation of potential impacts**<sup>1</sup>

Cost components of electricity production	Cost structure of the industry (in per cent) <sup>2</sup>	Estimated potential impacts of regulatory reform	Cost reduction (in per cent of total costs)
<b>Costs of intermediate inputs:</b>			
- Fuel inputs	29.4	-10%	-2.9
- Other intermediate inputs	17.9	0%	0.0
All intermediate inputs	47.3	-6%	-2.9
<b>Costs of factor inputs:</b>			
- Labour costs:	8.4		
(Due to higher productivity) <sup>3</sup>		10%	-0.8
(Due to more competitive wages)		-2%	-0.2
- Profits	15.1	-20%	-3.0
- Capital costs	19.7	-25%	-4.9
- Indirect taxes, less subsidies	9.5	0%	0.0
All factor inputs (equals value added)	52.7	-17%	-8.9
<b>Total costs</b> (equals total output)	100.0	-12%	-11.8

1. The example is based on the estimated effects of (further) regulatory reform in the Japanese electricity supply industry.
2. The cost structure is derived from the 1985 Input-Output Table of the Japanese economy.
3. An increase in labour productivity is assumed to reduce the employment required to produce a fixed amount of output. The cost reduction is thus derived as:  $1/(1 + a) * LC$ , where  $a$  is the labour productivity increase and  $LC$  equals labour costs.

Source: OECD Secretariat calculations.