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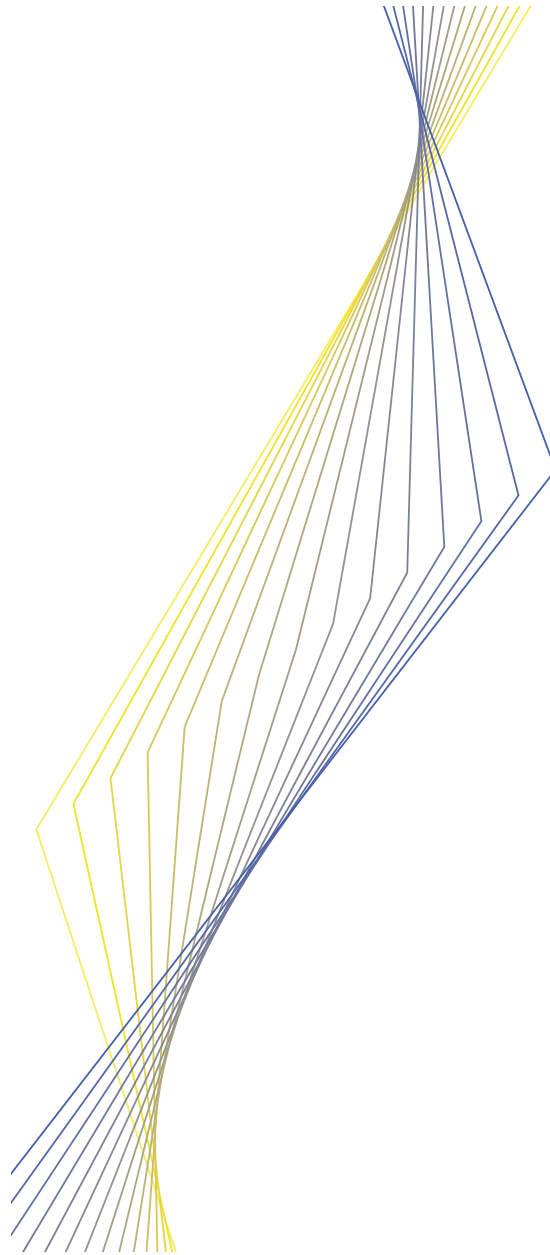


**PRICE EFFECTS
OF REGULATORY REFORM
IN SELECTED
NETWORK INDUSTRIES**

March 2001



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Contents

Executive summary	4
1 Introduction	7
2 Price effects of regulatory reform in network industries and possible implications for monetary policy	7
3 The legal framework for the liberalisation of selected network industries in the EU	10
4 Changes in the structure of selected EU network industries	14
5 Price developments in selected network industries since 1996	17
6 Problems of measuring consumer price developments in network industries	24
Annexes	29
References	38

Executive summary

Over the past couple of years, the European Union (EU) has embarked on an ambitious regulatory reform programme covering telecommunications, energy (electricity and gas), transport (urban, air and rail) and water. The aim of this report – prepared by the Monetary Policy Committee of the European System of Central Banks (ESCB)¹ – is to analyse the economic impact of this programme for the euro area, focusing in particular on price developments and the potential repercussions for monetary policy.

The extent to which network industries have already been liberalised in the euro area differs significantly between the various sectors and countries. The telecommunications and electricity sectors are currently attracting the most attention, and this report also focuses on these two industries. The opening-up of the gas sector only began very recently, which has resulted in a more limited coverage of this industry. Regulatory reforms in other network industries are still being discussed at the EU level and are not covered by this report.

According to the deregulation timetables adopted by the Council of Ministers, the liberalisation of the telecommunications sector in the euro area has made significant progress. For the electricity and gas industries, however, these timetables allow for a gradual opening-up of the market over a period of up to ten years. Furthermore, the regulatory framework for electricity and gas does not require a complete opening-up of the market. In particular, there is no legal obligation for Member States to introduce a free market for the supply of electricity and gas to households.

Turning to *structural changes in the selected network industries*, the privatisation process in the telecommunications sector has been quite extensive, although in some countries the majority shares of the incumbent telecommunications firms (i.e. those that formerly held the dominant position) are still state-owned. The opening-up of the market has not yet altered the dominant position of

the incumbent in the fixed-line business. In the electricity sector, progress with regard to market entry and privatisation has so far been even more limited than in the telecommunications sector.

Regulatory reforms of network industries have considerable general economic benefits. They are likely to result in permanently lower price levels within the network industries themselves and are also likely to have a temporary downward effect on inflation for the euro area economy as a whole. With regard to telecommunications in particular, regulatory reform as well as technological progress (which may also be accelerated by the former) are likely to ease the introduction of Information and Communication Technology (ICT) and, notably, the internet into the economy. This in turn could raise productivity. Furthermore, if markets were to become more efficient as a result of regulatory reforms and price adjustments were to be carried out more swiftly, the adjustment costs associated with monetary policy measures may be reduced. This would facilitate the conduct of the stability-oriented monetary policy of the European Central Bank (ECB). The need for more comprehensive regulatory reforms throughout the euro area is therefore stressed.

Reforms in the *telecommunications sector* have resulted in substantial decreases in consumer prices for telecom products since 1998, amounting to 9.9% of the euro area telecommunications sub-index of the Harmonised Index of Consumer Prices (HICP). Further progress with regard to the implementation of the regulatory reforms in the telecommunications sector should result in further price decreases as well as greater price convergence between the different euro area Member States.

¹ For the purposes of this report, the Monetary Policy Committee comprised experts from the European Central Bank and the national central banks of the euro area.

Between 1999 and 2000 *electricity prices* fell in almost all Member States, resulting in a reduction of the euro area electricity HICP sub-index by 1.3%. The recent price decreases are largely due to the impact of public regulators, i.e. their downward adjustment of price caps. This falling trend in electricity prices is likely to continue over the next years. Since the liberalisation of European *gas markets* is less advanced, it is unlikely that regulatory reform in this sector is already reflected in the HICP. Indirect tax effects and changes in oil and gas prices will continue to have a very considerable impact on price developments, possibly concealing the price effects stemming from the successful implementation of regulatory reforms in the electricity and gas markets. In future, the creation of single European electricity and gas markets and the emergence of cross-border competition may reduce the substantial current price differences between Member States, provided that the remaining legal and technical barriers in these sectors can be overcome.

Between 1999 and 2000 the combined price decreases in the telecommunications and electricity sectors directly reduced overall euro area HICP inflation by 0.1 percentage point. However, there appear to be a number of *measurement problems* with regard to consumer price developments in network industries. Time-lags in the inclusion of new products and suppliers and outdated weights are likely to result in an under-reporting of price decreases in telecommunications in most Member States, although a quantitative estimate of the likely reporting bias is not possible on the basis of the available information. There appear to be fewer difficulties with regard to the electricity and gas sub-indices, although measurement problems may increase as the regulatory reform process results in more significant changes in the market structure. Seen for the selected network industries in isolation, the possible effect of measurement problems on the total HICP is limited by the fact that telecommunications, electricity and gas

account for around 5-6% of the total euro area HICP. The ESCB supports the ongoing efforts by Eurostat and national statistical agencies to identify possible measurement problems and to improve the current reporting practices.

Regulatory reforms that succeed in increasing competition in previously sheltered network industries are most likely to have a *downward effect on prices* in these sectors. This downward effect on prices is likely to continue until the network industries have reached a new “steady state” with a lower price level. The period during which this dampening effect on inflation continues is likely to correspond with the length of the regulatory reform process itself plus the required adjustment period for the industries and households concerned. In view of the lengthy reform processes currently under way in the euro area, an estimated transitional period of around ten years does not appear to be exaggerated. The current timetables for opening up the EU electricity and gas markets, for example, cover the period up to 2003 and 2008 respectively. The timing of the effects within the reform period depends largely on external factors, in particular the legal framework for reform. Given that in the electricity and gas sectors consumer markets are the last to be liberalised – if they are liberalised at all – a substantial part of the potential price decrease is likely to be introduced towards the end of the reform process.

The supply-side effect of lower prices for network industry products may be accompanied by demand-side effects such as increased consumption of network industry products (notably in the case of telecommunications) as well as other goods. The relative extent of the supply and demand effects will determine the overall *readjustment of relative prices*. This is the main price effect to be expected from regulatory reform as in the long run changes in the overall price level are fundamentally determined by monetary forces.

During the transition period, *second-round effects* may occur and this possibility needs to be closely monitored by monetary policy-makers. With regard to wages, the overall impact of network industry reform remains uncertain. An initial reduction in inflation resulting from regulatory reforms may alleviate the pressure on nominal wages. However, as regulatory reform has the potential to raise productivity, this could eventually entail upward pressure on real wages.

All in all, this analysis of selected network industries shows that regulatory reforms have

a significant economic impact, including downward price effects. Against this background it seems advisable for monetary policy-makers to monitor closely the ongoing reforms in network industries in order to be able to assess the timing and extent of the temporary downward effects that these reforms are likely to have on inflation in the euro area economy as a whole. Moreover, further analysis of changes in the telecommunications sector may provide useful information for the assessment of potential New Economy-type developments in the euro area.

I Introduction

Over the past couple of years, the European Union (EU) has embarked on an ambitious liberalisation and deregulation programme for a number of European network industries, such as telecommunications, energy (electricity and gas), transport (urban, air and rail) and water. Against this background, experts from the European Central Bank (ECB) and the national central banks of the euro area have analysed the economic impact of the liberalisation and deregulation programmes currently under way in selected network industries of the euro area countries, namely the telecommunications and electricity sectors. The opening-up of the gas sector only began very recently, which has resulted in a more limited coverage of the gas industry in this report. The report focuses in particular on price developments and the potential repercussions for monetary policy.

The report is organised as follows. Chapter 2 reviews the impact of network industry

reform on prices and the possible repercussions for monetary policy. The current legal framework for regulatory reforms in the telecommunications, electricity and gas industries in the EU is provided in Chapter 3. Chapter 4 reviews progress with regard to the privatisation of network industries and the entrance of new players into the market-place and Chapter 5 examines price developments since 1996. Finally, Chapter 6 assesses potential problems with regard to measuring consumer price developments in the selected network industries.

Theoretical considerations regarding the regulatory framework for network industry reform and a review of the empirical literature concerning both the sector-specific and the economy-wide effects of regulatory reforms in the above-mentioned network industries are provided in Annex 1 and Annex 2 respectively.

2 Price effects of regulatory reform in network industries and possible implications for monetary policy

This chapter investigates the likely price effects of network industry reform and examines the possible implications for monetary policy. First of all, however, it is useful to define the terms “regulatory reform”, “deregulation” or “liberalisation”, and “privatisation”, since they are frequently used in the discussion of network industry reform.

- *Regulatory reform* refers to changes that improve the regulatory quality, that is, enhance the performance, cost-effectiveness or legal quality of regulations and related government formalities. Reform can mean the revision of a single regulation, the scrapping and rebuilding of an entire regulatory regime and its institutions, or the improvement of processes for making regulations and managing reform (OECD 1997a, Synthesis p. 11).
- *Deregulation, or liberalisation*, is a sub-set of regulatory reform and refers to the complete or partial elimination of regulation in a sector in order to improve economic performance. With regard to network industries, the aim of deregulation, or liberalisation, is to enhance competition at least in those parts of the industry that are not natural monopolies.
- *Privatisation* is the transfer of enterprises or assets from public to private ownership and is intended to introduce a better corporate governance system and to enhance internal efficiency. Whereas state-owned firms are often characterised by “soft budget constraints”, privatised companies are no longer in such a privileged position vis-à-vis the government when asking for public support.

As elaborated upon in greater detail later in this report, it can be expected that increased competition will result in price reductions in the liberalised network industries.² Competitive pressures should lead to productivity gains and thus to lower costs as well as reduced mark-ups. In addition, competition should stimulate innovative activity, which can also be expected to exert downward pressure on prices. However, the introduction of competition into network industries also affects the price structure, as tariffs across market segments (e.g. long-distance versus local telephone calls) are rebalanced to reflect costs more accurately. In some cases price increases may be necessary, if operators stop receiving public subsidies, for example. Moreover, if only parts of the industry are subject to competition, the incumbent may try to use monopoly rents earned in the sheltered sectors to cross-subsidise products in the competitive sector of the industry. Both effects, tariff rebalancing as well as cross-subsidisation, may result in *partial* price increases, although regulatory authorities should act in order to avoid cross-subsidisation.

For a comprehensive analysis of price effects, it is important to differentiate between the various possible transmission channels.

As illustrated in Figure 1, regulatory reform in network industries is not only expected to have a *direct consumer price effect* but, to the extent that the output of network industries serves as an input to other sectors of the economy, also a *direct producer price effect*. These in turn trigger a number of *indirect price effects*, for example lower prices for non-network industry inputs. Both direct and indirect producer price effects are likely to result in *indirect changes to consumer prices*.

In order to estimate the *total consumer price effect* of network industry reform, it is necessary to look not only at the direct consumer price effect, but also at the direct and indirect producer price effects as well as at possible second-round effects, e.g. price effects via changes in wages and productivity.

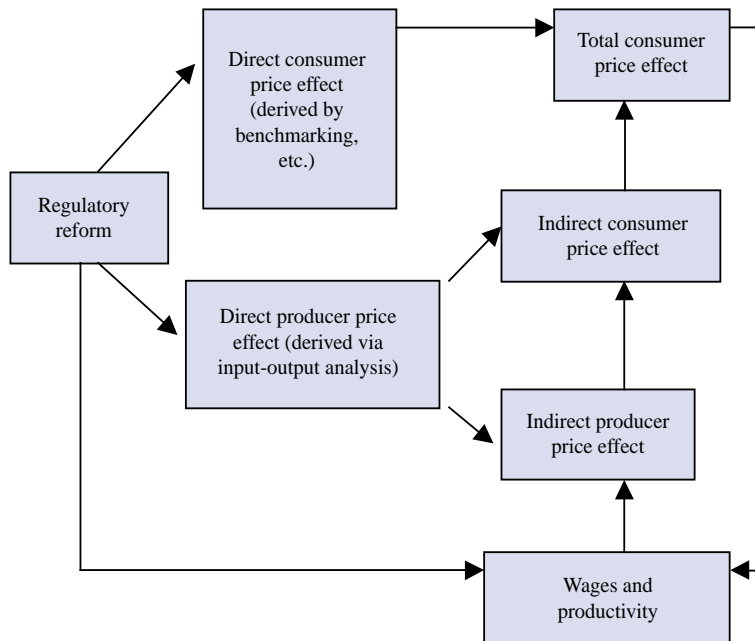
More precisely, it is of considerable importance from a monetary policy point of view to assess the timing and extent of the various price effects in order to obtain a more complete picture of the impact of network industry reforms on current and future prices. To this end, Chapter 5 looks at recent price developments in telecommunications, electricity and gas and contains a box on direct producer price effects. Furthermore, Annex 2 of the report provides an overview of the existing empirical evidence in the literature on the economic impact of regulatory reforms, both at the sectoral level and for the economy as a whole.

The analysis of selected network industries shows that regulatory reforms that succeed in increasing competition in previously sheltered network industries are most likely to have significant economic benefits. They are likely to result in permanently lower price levels in the network industries themselves, and are also likely to have a temporary downward effect on inflation in the economy as a whole.

In more detail, the downward price effects are likely to continue until the network industries have reached a new “steady state” with a lower price level. Broadly speaking, it can be expected that the period during which the downward trend in prices in these sectors continues will correspond with the length of the regulatory reform process itself plus the required adjustment period for the industries and households concerned. In view of the lengthy reform processes currently under way in the telecommunications, electricity and gas industries (see Chapter 3), an *estimated transitional period of around ten years* does not appear to be exaggerated. The timing of the effects within the reform period depends largely on external factors, in particular the legal framework for reform. A “big bang” type of reform with a very rapid opening-up of the market at the beginning of the process is likely

² An overview of the empirical literature on the economic impact of regulatory reform in selected network industries is provided in Annex 2.

Figure 1
Price effects of regulatory reform in network industries



to lead to strong initial dampening price effects that then taper off rapidly. A more gradual reform process, however, is likely to spread the price effects more evenly over time. As argued in Chapter 3, the current regulatory reform process in the electricity and gas industries can be described as a fairly gradual process. Regulatory reforms have advanced more rapidly in the telecommunications industry, but competition is still restricted by substantial technical and administrative hurdles.

From a longer-term perspective it is important to bear in mind that the supply-side effects of lower prices for network industry products may be accompanied by demand-side effects such as increased consumption of network industry products (notably in the case of telecommunications) as well as other goods. The relative extent of the supply and demand effects will determine the overall *readjustment of relative prices*. This is the main price effect to be expected from regulatory reform as in the long run changes in the overall price level are fundamentally determined by monetary forces.

During the transition period *second-round effects* may occur, for example with regard to wages and productivity. While the overall impact of network industry reform on wages remains uncertain, an initial reduction in inflation resulting from such reforms may lead to somewhat lower pressure on nominal wages. However, as regulatory reform has the potential to raise productivity, this could eventually entail upward pressure on real wages.

Furthermore, the following long-term considerations should be taken into account.

- With regard to telecommunications in particular, regulatory reform and technological progress (which may also be accelerated by the former) are likely to ease the introduction of Information and Communication technology (ICT) and, notably, the internet into the economy. This is regarded as a crucial prerequisite for the emergence of a *New Economy*.³ A New Economy environment would sustain

³ This effect is arguably of less relevance in the case of energy markets.

higher rates of economic growth, higher real wage increases and lower levels of unemployment without increased risks to price stability. However, for the time being the existence of a New Economy in the euro area is uncertain, and it is beyond the scope of this report to provide an assessment of the available evidence.

- If markets were to become more efficient as a result of regulatory reforms and price adjustments were to be carried out more swiftly, the *adjustment costs associated with monetary policy measures* may be reduced. This would facilitate the conduct of the stability-oriented monetary policy of the ECB.
- Regulatory reforms are likely to result in a decline in the influence of administered prices. Price changes in network industries will thus presumably become more closely related to market dynamics. However, it is not clear whether this will significantly

reduce or increase the *variability of the inflation rate* of utility prices. On the one hand, changes in administered prices tend to be more abrupt than price changes based on market dynamics. On the other hand, in the past administered utility prices were often kept “artificially” stable for political reasons and they may become more volatile in future.

Against this background it seems advisable for monetary policy-makers to monitor closely the ongoing reforms in network industries in order to be able to assess the timing and extent of the price effects that these reforms are likely to bring about, as well as any possible second-round effects that network industry reforms may trigger. Moreover, further analysis of changes in the telecommunications sector may provide useful information for the assessment of potential New Economy-type developments in the euro area.

3 The legal framework for the liberalisation of selected network industries in the EU

Telecommunications

As of 1 January 1998, free competition in the provision of voice telephony and telecommunications infrastructure was introduced in the EU.⁴ The harmonisation framework aimed to create a single European telecommunications market based on common principles for access to networks and services, a common regulatory environment and harmonised standards for services and technologies.⁵

By late 2000 significant progress had been made in the transposition of the various Directives. However, according to the European Commission’s sixth progress report on the implementation of the regulatory package, a number of problems remain:

- The physical requirements for ensuring competition in the local access markets (“last mile” problem) are still subject to

negotiation and may require decisive regulatory intervention. Moreover, a full range of carrier pre-selection services is not available in all Member States.

- Licence procedures are still cumbersome in some cases.
- Difficulties remain in obtaining rapid and equitable interconnection, and the timely delivery of leased lines is not always ensured.

In some Member States tariff rebalancing has not been completed. In particular, further work remains to be done by a

⁴ In some Member States the opening-up of the telephony and telecommunications infrastructure took place after 1 January 1998 (Spain and Ireland, 1 December 1998; Portugal, 1 January 2000; Greece, 1 January 2001).

⁵ For an overview of the regulatory package for telecommunications and the current state of implementation by Member States, see European Commission (2000).

significant number of national regulatory authorities on the supervision of cost accounting systems to eliminate price squeezes via cross-subsidised retail prices. Furthermore, call termination tariffs in mobile networks are still uncompetitive in some cases.

Overall, the European Commission argues that the market power of the incumbent operators is still the single most significant barrier to market penetration by new entrants.

Electricity

By 19 February 1999 the EC Electricity Market Directive (96/92/EC) had to be transposed into national legislation.⁶ The Directive calls for an initial liberalisation of at least 25% of the electricity market, a share which is due to increase to one-third of the market by 2003. Some Member States,

however, will exceed the minimum requirements of the Electricity Market Directive or have already done so. Table I provides an overview of the liberalisation plans for EU electricity markets.

Figure 2 illustrates the gradual opening-up of the electricity sector of the euro area (12 countries), displaying both the share of the total market that is open to competition (upper line) and the share of the market that is *fully* open to competition (lower line). The latter category includes a free market for the supply of electricity to private households. At present this applies only to Germany and Finland, but Austria (2001), Spain (2003), the Netherlands (2004) and Ireland (2006) plan to follow.

It should be kept in mind that only in those countries where the electricity market is *fully*

⁶ Belgium and Ireland had a transitional period of one year. Greece had a transitional period of two years.

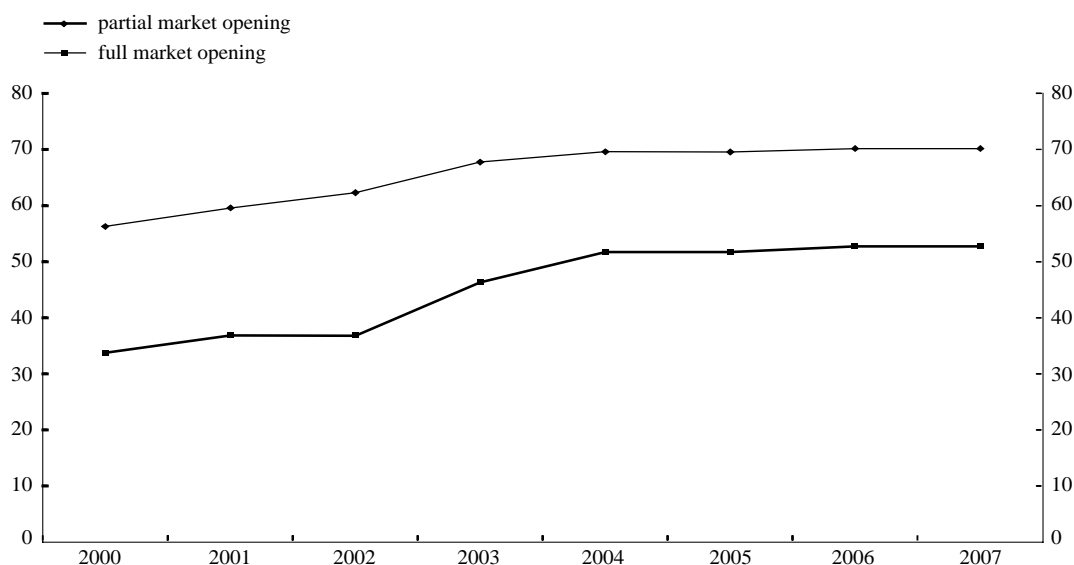
Table I
Summary of national liberalisation plans for the electricity market ¹⁾

Country	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	30	45		49				49
Germany	100			100				100
Greece	0	30		33				33
Spain	54			100				100
France	30			33				33
Ireland	30		40	40			100	100
Italy	35		40	40/70 ²⁾				40/70
Luxembourg	40	56		56		75		75
Netherlands	33		67		100			100
Austria	32	100		100				100
Portugal	33			33				33
Finland	100			100				100
Euro area (12 countries)	56	60	62	68	70	70	70	70
Denmark	5			100				100
Sweden	100			100				100
United Kingdom	100			100				100

1) Percentage share of liberalised segment in the total electricity market. The figures are compiled by the European Commission (www.europa.eu.int/comm/energy/en/elec_single_market/implementation/index_en.html) and refer to the application of the EU liberalisation guideline. Some figures have been updated by national central banks (NCBs). The ECB calculation of euro area (12 countries) market shares is based on electricity demand weights in 1997.

2) The Italian Government is currently taking measures to increase the degree of market liberalisation from the 40% originally planned to 70% by 2003. This increase has not been taken into account for the calculation of the euro area average.

Figure 2
Share of the liberalised market as a percentage of the total electricity market of the euro area (12 countries)



liberalised will all customers, including private households, be eligible to freely choose their supplier. This also implies that direct consumer price effects can only be expected in these countries.⁷ In other Member States consumer price effects may emerge either because reduced producer prices are passed on to consumers or as a result of the application of price cap rules that also cover the captive market or both. Indeed, the introduction of price cap mechanisms is to be considered a positive consequence of the recent liberalisation process. In some cases, the dominant position of the former public monopolist means that liberalisation per se does not guarantee competition, and some price regulation is needed at least in the initial stages. Such “administered” price falls can still be considered as direct effects of regulatory reform in network industries although they do not occur as a result of increased competition.

Gas

The EC Gas Directive (98/30/EC) had to be transposed into national legislation by 10 August 2000.⁸ The Directive calls for an

initial liberalisation of at least 20% of the national gas markets, a share that is due to increase to one-third of the market by 2008. As with the Electricity Market Directive, some Member States have exceeded or will exceed the minimum requirements established in the Directive.

In 2001 39% of the euro area (nine countries) gas market has already been liberalised, and this share is set to increase to 56% by 2010 (data excluding Germany). However, only Belgium, Spain, Italy, the Netherlands and Austria have so far made plans to fully liberalise their gas markets by 2010 at the latest.

Figure 3 illustrates the opening-up of the market in the gas sector of the euro area (nine countries), giving the share of the total market that is expected to be open to competition as well as the share of the gas

⁷ Moreover, it is worth pointing out that the extent of such effects largely depends on the acceptance of new suppliers by households.

⁸ Greece and Portugal are treated as “emerging gas markets” and have substantial derogations from the provisions of the Gas Directive. Finland’s gas imports will continue to be conducted by a sole company, while the gas trade within the country is being opened up (opening-up of the secondary market only).

Table 2**Summary of national liberalisation plans for the gas market ¹⁾**

Country	2000	2001	2002	2003	2004	2006	2008	2010
Belgium	47			49		66	66	100
Germany ²⁾	n.a.						n.a.	n.a.
Spain	70			100			100	100
France	20						33	33
Ireland	75						75	75
Italy	96			100			100	100
Luxembourg	0	51 ³⁾		74		81	83	99
Netherlands	45		51		100		100	100
Austria	50		100				100	100
Euro area (nine countries) ⁴⁾	39	39	41	44	52	53	54	56
Denmark	30						43	43
Sweden	47					100	100	100
United Kingdom	100						100	100

1) Percentage share of liberalised segment in the total gas market. The figures are compiled by the European Commission (www.europa.eu.int/comm/energy/en/gas_single_market/gas98_30.pdf) and refer to the application of the EU liberalisation guideline. Some figures have been updated by NCBs. The ECB calculation of euro area (nine countries) market shares is based on gas demand weights in 1997.

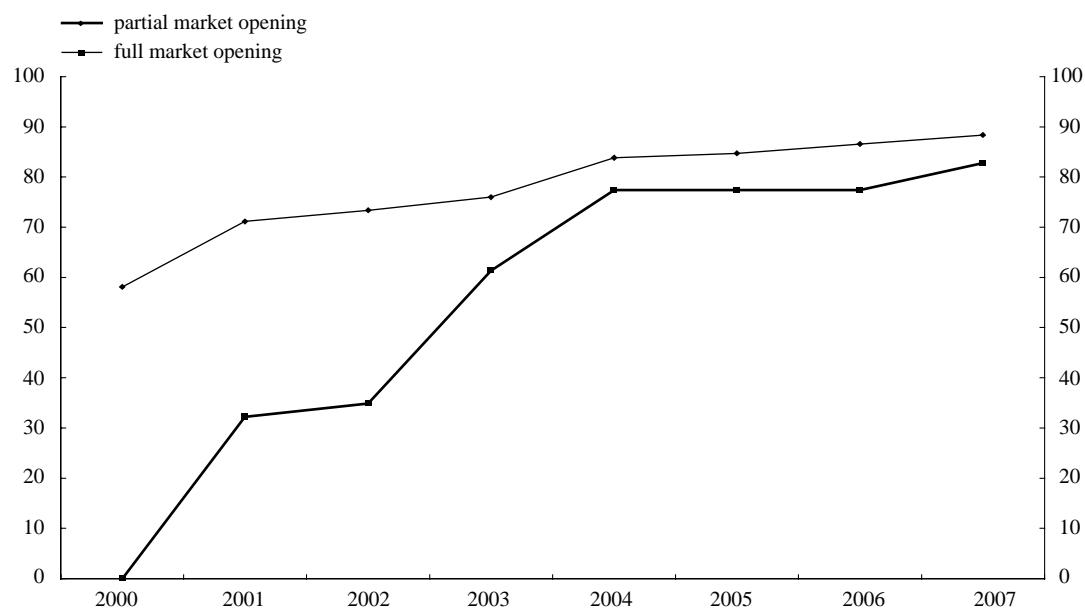
2) In Germany a revised voluntary agreement between producers, pipe-owners and large consumers to open up the gas market is currently under discussion. The timing of the opening-up of the market is therefore still unclear.

3) Luxembourg is late in implementing the EC Gas Directive. The current plan is to open up 51% of the gas market in the first stage of the liberalisation process.

4) Greece and Portugal have derogations; in Finland gas imports will continue to be conducted by a sole company while the gas trade within the country is being opened up (opening-up of the secondary market only).

market that is fully open to competition. In line with the situation in the electricity market, private households will only be eligible to freely choose their supplier in those countries where 100% of the gas

market is liberalised. Direct consumer price effects can only be expected in these countries except in cases where price cap rules also apply to the captive market. These market shares are set to increase by around

Figure 3**Share of the liberalised market as a percentage of the total gas market of the euro area (nine countries)**

30 percentage points once a solution has been found for the German gas market. The German Government and the gas industry have agreed in principle on a full opening-up of the market by 2002. However, by end-February 2001 the negotiations between the relevant industry associations had not yet been completed.

To summarise, with regard to both the electricity and the gas industry, the deregulation timetable adopted by the Council of Ministers allows for a gradual opening-up of the market over a period of up to ten years. Furthermore, there is no legal obligation for Member States to *fully liberalise* their electricity and gas markets. Although

there are a number of arguments in favour of such an approach⁹, the main reasons for Member States' reluctance to pursue more far-reaching regulatory reform plans appear to be of a political nature. However, unless Member States set themselves more ambitious liberalisation targets than the minimum standards set at the EU level, suppliers may use small consumers in the "captive" segment of the market to cross-subsidise electricity and gas prices for industrial users in the competitive market segment. Aside from the fact that this would raise serious distributional concerns, it would also significantly dampen possible price reducing effects resulting from regulatory reform.

4 Changes in the structure of selected EU network industries

Regulatory reform in the European telecommunications and electricity sectors can be expected to result in some profound changes in the structure of these industries. In particular, it is likely to result in privatisation and increased competition. This section of the report reviews the extent to which such structural changes have so far taken place. Since the opening-up of the gas sector only began very recently, the gas industry has not been included in this section.

Privatisation of network industries

Until the late 1980s public ownership of network industries was extensive. Since then, however, there has been a gradual move in several countries towards the privatisation of these industries.

In the case of telecommunications, it appears that privatisation has already been quite extensive. In fact, the governments of all Member States except Luxembourg have sold at least part of their shares in the incumbent firm. However, only seven public telephone companies have a share of public ownership below 50%, namely Belgacom (Belgium), Telefonica (Spain), Telecom Italia, Eircom

(Ireland), KPN (the Netherlands), Telecom Austria and Portugal Telecom (see Table 3). In the case of Spain, Italy and Portugal, however, the respective governments still retain "golden shares".

Concerning electricity, the differences between the countries with regard to ownership appear to be much greater. In Greece, France and Ireland the incumbent monopolies are still 100% state-owned. Partial private ownership exists in Belgium, Germany, Spain, Italy, Luxembourg, Austria, Portugal and Finland. With the exception of the Netherlands, where three out of the four main generators have recently been sold, no public electricity company has so far been completely privatised. Hence, generally speaking, public ownership is still more important in the electricity sector than in the telecommunications sector (see Table 3).

⁹ First, supply contracts with producing countries tend to be of a very long-term nature, particularly in the gas sector, and domestic suppliers have to remain in a position to honour such contracts. Second, possible problems related to the new regulatory framework have less severe economic repercussions if at first only parts of the market are subjected to this framework (test phase).

Table 3**The structure of the telecommunications and electricity sectors in euro area countries**

Country	Telecommunications			Electricity		
	Share of public ownership ¹⁾	Market share incumbent		Share of public ownership	Vertical separation	Number of generators
		Fixed line	Mobile service			
Belgium	50% - 1 share	>85%	65%	11%	Legal (forthcoming)	Two generators produce 97% of all electricity
Germany	58%	>75%	40.2%	ca. 35%	Accounting	9 ²⁾
Greece	51% ³⁾	100%	34%	100%	Accounting	Dominant generator accounts for 98% of all production
Spain	0% but golden share	94.3%	57.2%	3.3% and golden share	Legal	Four generators produce 94.3% of all electricity
France	63.6%	Close to 100%	50%	100%	Accounting	Dominant generator accounts for 98% of all production
Ireland	<3%	85%	60%	100%	Legal (forthcoming)	Independent only for small-scale generation
Italy	3.46% and golden share	>90%	65%	68.2% and golden share	Legal	Dominant generator accounts for 75% of all production
Luxembourg ⁴⁾	100%	100%	60.2%	41%	Not relevant	Not relevant
Netherlands	35%	90%	50%	3 out of 4 main generators have recently been sold	Legal	Four main generators account for around 60% of total production
Austria	44.1%	85%	49%	>51%	Accounting	10
Portugal	0% but golden share	>90%	44.5%	By end-2000 state will no longer be largest shareholder	Legal	4
Finland	53%	49%	63%	50%	Legal	120

Sources: Information provided by NCBs of the Eurosystem, European Commission (2000) and Bergman et al. (1999).

1) Remaining share of public ownership in enterprises that were previously publicly owned.

2) Generators operate in separate regional markets.

3) According to Law 2843 of October 2000, state participation in the share capital of the dominant provider of telecommunications services (OTE) may now fall to as low as 33.3%.

4) Luxembourg imports 95% of the electricity it consumes.

The entry of new players into the market-place

As outlined above the EU has developed a regulatory framework for *telecommunications* that provides for open and competitive markets as of 1 January 1998. However,

despite liberalisation and the granting of a significant number of licences in many Member States, the incumbent firms remain the dominant providers of fixed-line services in most countries (see Table 3). There are only five countries (Belgium, Germany, Ireland, Austria and Finland) in which the

incumbent supplies less than 90% of the market.¹⁰

The picture is quite different for the mobile segment. There is extensive competition in most Member States, with services being provided by two or more networks. The incumbents therefore tend to have a much smaller share of the market, although they are still the most important providers of mobile services, with shares ranging between 34% (for Greece) and 65% (for Belgium and Italy). It should be kept in mind that the market for mobile telephony has boomed during the last couple of years, with penetration rates of mobile telephony reaching 50% in several euro area countries. This has made it arguably easier for new market participants to establish themselves in the market.¹¹

In the case of *electricity*, competition can be introduced in two segments of the electricity supply chain: generation and supply. Given that these segments were traditionally highly integrated with the monopolistic transmission and distribution segment, the EC Electricity Market Directive requires a separation of the monopoly elements of the business from the potentially competitive segments. The aim is to ensure that controllers of the monopoly parts are unable to use their market power to abuse their position in the other stages of production. However, the degree of vertical separation differs from country to country. In Germany, Greece, France and Austria the ownership structure of the grid remains unchanged and the integrated firm is only required to separate the accounting for grid operations and the other activities of the vertically integrated firm. All other countries have opted for the creation of a legally independent transmission company (see Table 3).¹² The theoretical arguments provided in Annex I suggest that legal separation is more likely to stimulate competition in the market.

The degree of entry into the electricity market has been much lower than in the telecommunications sector.¹³ Moreover, despite the entrance of at least one independent generator in most cases, the market share of these new companies remains very limited. On the basis of the available information, it appears that the incumbents have so far remained by far the most dominant players in the electricity market and that significant changes in the market structure have not yet taken place.

In future, the large differences in electricity prices between the European countries (see Chapter 5) may trigger increased cross-border electricity trading which would in turn result in a more competitive market at the European level. This is likely to lead to a higher degree of convergence of pre-tax electricity rates across Europe, particularly for large users. It is therefore of particular importance that further progress be made in the regulatory reform of the EU electricity sector to ensure transparent and non-distorting cross-border transmission prices for electricity. Moreover, any exclusive rights to import electricity from other countries, usually granted to national incumbents, should be removed. Further development of the cross-border electricity infrastructure may be necessary to enhance trade and competition.

¹⁰ Figures in this section are derived from the European Commission (2000).

¹¹ New technological developments will make it increasingly difficult to clearly define the telecommunications markets. One example of this tendency is the emergence of intelligent mobile handsets (UMTS) which are bringing internet technology to mobile telephone systems, allowing the use of interactive information services. Since 1999, several countries have auctioned licences to operate this new service or allocated licences on the basis of "beauty contests". Implementation is not expected before 2002, however.

¹² It is also interesting to note that Member States that have opted for a legal separation of the industry tend to have a larger number of generators, thus implying somewhat more intense competition in the electricity market.

¹³ Only limited information is available on entry into the supply segment of the electricity market.

5 Price developments in selected network industries since 1996

Telecommunications

Over the past couple of years most Member States have witnessed substantial reductions in the prices of telecommunications. Table 4 illustrates changes in the telecommunications sub-index of the Harmonised Index of Consumer Prices (HICP).

When assessing these changes it should be remembered that there have been different schedules for the liberalisation of the telephony and telecommunications infrastructure within the EU and there are therefore significant differences in the time that has elapsed since liberalisation took place. This is generally reflected in the extent and timing of the price reductions that have occurred in the different countries. Nevertheless, two stylised facts can be deduced from Table 4:

- For almost all euro area countries a clear downward trend of the HICP telecommunications sub-index can be observed. In most cases this movement started in 1998, the year in which the relevant EC Directives were to be implemented. The only exception is Finland, one of the pioneers in the deregulation process of the telecommunications industry, where the bulk of telecommunications price cuts appears to have taken place earlier.
- In a number of euro area countries a downward development of prices can be discerned *prior* to the opening-up of the market to competition. This probably indicates pre-emptive behaviour on the part of the incumbents in order to reduce the incentives for potential competitors to enter the market. In other countries there were temporary increases in prices in specific years owing to the tariff rebalancing accompanying liberalisation.

Table 4
Evolution of the HICP sub-index “Telecommunications services”¹⁾

Country	1996	1997	1998	1999	2000	% change between 1996 and 2000	% change between 1998 and 2000
Belgium	100.0	105.0	104.1	98.0	95.8	-4.2	-7.9
Germany	100.0	96.2	94.9	84.1	79.9	-20.1	-15.9
Greece	100.0	104.7	106.1	99.8	85.3	-14.7	-19.6
Spain	100.0	99.7	101.6	103.7	97.9	-2.1	-3.6
France	100.0	97.6	93.1	93.4	88.6	-11.4	-4.9
Ireland	100.0	98.3	92.0	84.7	82.0	-18.0	-10.9
Italy	100.0	98.8	98.8	96.8	93.5	-6.5	-5.3
Luxembourg	100.0	103.2	101.6	92.7	85.6	-14.4	-15.7
Netherlands	100.0	99.6	100.7	95.2	89.0	-11.0	-11.6
Austria	100.0	100.3	98.8	96.6	92.0	-8.0	-6.9
Portugal	100.0	102.5	99.0	95.4	90.8	-9.2	-8.3
Finland	100.0	98.7	98.8	102.7	103.8	3.8	5.1
Euro area (12 countries)	100.0	97.7	95.8	90.5	86.4	-13.6	-9.9
Denmark	100.0	100.0	96.8	93.4	92.3	-7.7	-4.6
Sweden	100.0	97.0	99.5	99.2	90.2	-9.8	-9.3
United Kingdom	100.0	96.7	95.0	91.9	87.7	-12.3	-7.7

Sources: Eurostat and ECB calculations.

1) For Spain, Ireland, the Netherlands, Denmark, Sweden and the United Kingdom the figures represent the HICP in telecommunications services and equipment.

Table 5
Comparison of price levels for telecommunications services across the EU in January 2000¹⁾

(prices are in euro, net of taxes; euro area (12 countries) average is weighted)

Country	Local call charges	Long-distance call charges	International call charges	International/local	Mobile charges	Annual mobile charges
Belgium	0.12	0.43	1.32	11.00	0.51	757
Germany	0.11	0.48	0.84	7.64	0.52	820
Greece	0.06	0.57	1.14	19.00	0.87	871
Spain	0.08	0.54	1.02	12.75	0.79	786
France	0.09	0.33	0.71	7.89	0.67	674
Ireland	0.13	0.31	1.06	8.15	0.57	1,264
Italy	0.10	0.48	1.03	10.30	0.86	1,169
Luxembourg	0.11	0.11	0.54	4.91	0.32	714
Netherlands	0.10	0.17	0.53	5.30	0.54	593
Austria	0.19	0.48	0.95	5.00	0.18	469
Portugal	0.12	0.39	1.03	8.58	0.35	1,047
Finland	0.11	0.25	1.28	11.64	0.57	370
Euro area						
(12 countries)	0.10	0.43	0.89	8.90	0.63	827
Maximum	0.19	0.57	1.32	19.00	0.87	1,264
Minimum	0.06	0.11	0.53	4.91	0.18	370
Max./min. ratio	3.17	5.18	2.49	3.87	4.83	3.42
Denmark	0.11	0.16	1.09	9.91	0.53	429
Sweden	0.10	0.14	0.99	9.90	1.05	719
United Kingdom	0.16	0.33	1.30	8.13	0.83	600

Sources: European Commission, ECB calculations.

1) All call charges refer to three-minute peak-time calls. Annual mobile charges = average annual spending for mobile by a typical user resident in the EU. The mobile call basket is based on one operator per Member State and includes the yearly fixed rental (plus 20% of the installation charge), national calls to fixed networks, national calls to mobile networks and international calls.

Table 5 shows that significant price level differences exist between the different Member States and the different telecommunications services.¹⁴

- In all EU countries, international call charges remain substantially higher than local call charges, yielding an average ratio of international to local calls of 8.9 for the euro area countries.
- Price differences between the countries are lowest for international calls and highest for long-distance calls. The significant country-specific differences for long-distance calls may reflect the fact that some countries have already rebalanced their telecommunications price basket while others have not.

- With the exception of the “outliers”, Greece and Austria, there are no substantial international differences for local call charges.

- In all the countries analysed except Austria, charges for mobile calls are higher than those for local and long-distance national calls. The highest mobile call charges are recorded in Greece and Italy, while the lowest are recorded in Austria, Luxembourg and Portugal. However, the picture changes considerably when annual mobile charges are taken into account,

¹⁴ The latest figures on price levels refer to January 2000 and therefore do not reflect any possible additional reductions that may have taken place since then, which may have been sizeable in certain countries.

Table 6
Evolution of the HICP sub-index “Electricity”

Country	1996	1997	1998	1999	2000	% change between 1996 and 2000	% change between 1999 and 2000
Belgium	100.0	100.4	101.4	100.7	98.9	-1.1	-1.8
Germany	100.0	100.5	101.7	105.7	100.5	0.5	-4.9
Greece	100.0	101.5	104.9	97.1	91.3	-8.7	-6.0
Spain	100.0	98.9	96.2	92.8	90.6	-9.4	-2.4
France	100.0	97.8	95.7	91.4	89.5	-10.5	-2.1
Ireland	100.0	101.9	102.9	102.9	102.9	2.9	0.0
Italy	100.0	96.8	98.4	94.4	102.2	2.2	8.2
Luxembourg	100.0	101.0	101.2	101.5	100.2	0.2	-1.3
Netherlands	100.0	102.9	103.6	110.7	128.9	28.9	16.5
Austria	100.0	102.7	102.7	101.9	101.4	1.4	-0.5
Portugal	100.0	101.0	102.4	97.6	97.0	-3.0	-0.7
Finland	100.0	101.7	102.3	99.9	98.8	-1.2	-1.1
Euro area (12 countries)	100.0	99.5	99.7	99.5	98.2	-1.8	-1.3
Denmark	100.0	104.1	113.7	117.5	122.2	22.2	4.1
Sweden	100.0	106.4	109.8	104.9	102.2	2.2	-2.6
United Kingdom	100.0	95.2	90.9	89.8	87.9	-12.1	-2.1

Sources: Eurostat and ECB calculations.

with the highest prices being recorded in Ireland, Italy and Portugal and the lowest in Finland, Austria and the Netherlands.

Looking at the determinants of price level differences between the Member States, it appears that regulatory reform has been the driving force behind the substantial price decreases over the past few years, in particular in the long-distance, international and mobile market segments. Furthermore, past investments in infrastructure and the acceleration of technical changes in telecommunications are likely to have contributed to the recent price decreases in this sector. In line with the continued implementation of regulatory reform programmes, further price decreases and greater progress towards price convergence can be expected, partly as a result of increased competition and partly as a result of public regulators lowering price caps to their supposed competitive level.

Electricity

As discussed above, the liberalisation of the European electricity markets is less advanced than the reform process for the telecommunications sector. Therefore, in a number of Member States it cannot be expected that regulatory reform in this sector will already be reflected in the HICP. Table 6 illustrates changes in the HICP sub-index for electricity.

As from 1999 a downward price trend can be observed in most euro area countries. This can be regarded as a first tentative indication of regulatory reform starting to have an impact on euro area electricity prices.¹⁵ However, it would be premature to attribute

¹⁵ In the United Kingdom the electricity sector was liberalised earlier than in the rest of the EU and the HICP sub-index for electricity shows a continuous downward trend since 1996. However, despite falling prices and other performance improvements it is sometimes argued that the small number of generators licensed in the United Kingdom (four) has prevented prices from falling to a competitive level. See Bergman et al. (1999, pp. 89-115).

Table 7**Comparison of price levels for electricity across the EU in July 2000***(prices in euro/100 kWh, net of taxes; euro area (12 countries) average is weighted)*

Country	Small-scale household ¹⁾	Large-scale household ²⁾	Small-scale industry ³⁾	Large-scale industry ⁴⁾	Small household/ large industry ratio
Belgium	15.1	11.1	14.8	5.1	3.0
Germany	19.9	12.2	14.1	5.5	3.6
Greece	6.9	6.3	8.3	4.4	1.6
Spain	12.0	8.6	10.3	5.4	2.2
France	13.9	9.6	8.8	4.5 ⁵⁾	3.1
Ireland	13.8	7.6	12.6	5.3	2.6
Italy	7.7	17.8	15.4	6.2	1.2
Luxembourg ⁶⁾	21.0	10.2	13.1	4.4	4.8
Netherlands ⁵⁾	14.8	11.8	9.8	5.1	2.9
Austria	13.3	11.1	14.1	5.6	2.4
Portugal	12.1	10.6	11.9	4.7	2.6
Finland	12.3	6.1	5.9	2.7	4.6
Euro area					
(12 countries)	15.5	11.5	12.3	5.2	3.0
Maximum	21.0	17.8	15.4	6.2	4.8
Minimum	6.9	6.1	5.9	2.7	1.2
Max./min. ratio	3.0	2.9	2.6	2.3	3.9
Standard deviation	4.1	3.1	3.0	0.9	1.1
Denmark	24.3	14.7	6.2	4.2	5.9
Sweden	18.4	7.9	5.3	3.1	6.0
United Kingdom	20.1	9.3	11.5	5.3	3.8

*Sources: Eurostat and ECB calculations.**1) Small-scale households = 600 kWh p.a.**2) Large-scale households = 7,500 kWh p.a.**3) Small-scale industry = 50 MWh p.a..**4) Large-scale industry = 50,000 MWh p.a.**5) January 2000 data.**6) The consumption pattern of a small-scale household is not representative of a typical Luxembourg household.*

the recent falls in electricity prices primarily to intensified competition. In fact, they are more likely to occur either because of a pre-emptive pricing policy by the incumbent operators or because public regulators operate price caps in order to “simulate” competitive prices. In addition, it is important to keep in mind that electricity price changes are strongly influenced by developments in fuel prices (e.g. those of gas and oil) and changes in indirect taxes.

Regulatory reform and the creation of a single electricity market in the EU are likely to contribute to a convergence of pre-tax electricity prices. The current level of price

differences thus provides some information on the extent of possible future price reductions. Table 7 provides an overview of price levels for four different types of electricity consumers in July 2000.¹⁶

Table 7 shows that there are significant price differences between the various types of users. Prices for small private households are significantly higher than those for small and large industrial users, and small-scale users (households and industrial) pay significantly more than large-scale users (households and

¹⁶ These figures refer to July 2000 and do not reflect price developments that have taken place since then.

Box I**Estimating direct producer price effects by using input-output tables**

For monetary policy purposes it is desirable to obtain estimates of the *total consumer price effects* of network industry reform (see Figure 1). A large number of studies estimate potential *direct consumer price effects* (see Annex 2 A), but most studies omit the consumer price effects that are transmitted through lower *producer prices*. To tackle this problem input-output tables can be used to estimate *direct producer price effects*. Such tables measure the importance of the electricity and telecommunications input for the economy as a whole. By multiplying the input shares by the assumed price reduction it is possible to obtain an estimate of the *direct producer price effect* of regulatory reform in these sectors.

The table below summarises the *direct producer price effects* for selected countries. For France and Italy, the results are derived from OECD input-output tables, while for the Netherlands and Portugal, figures have been obtained from the relevant NCBs.

A 10% reduction in telecommunications prices would make *producer prices* in the selected countries fall on average by 0.082%, while in the case of electricity the same fall in prices would result in producer prices that are 0.124% lower. However, the extent of the impact differs significantly among the four countries.

The *direct consumer price effect* of a 10% reduction in electricity prices in the selected countries is estimated at 0.189%, and for telecommunications at 0.206% (using the weighted average of the HICP weights for these four countries). *Direct producer price effects* of lower electricity and telecommunications prices thus seem to add approximately *two-thirds* and *one-third* respectively to the total consumer price effect (assuming the producer price reductions are passed on in full to consumer prices).

Further consumer price effects can be expected as a result of *indirect producer price effects*. In order to estimate such effects it is necessary to use macroeconomic models (see Annex 2 B).

	Telecommunications	Electricity
Value of telecommunications/electricity input as a percentage of total output		
– Netherlands	1.350	1.270
– Portugal	1.146	2.217
– France	0.827	0.975
– Italy	0.627	1.439
Weighted average of input value as a percentage of total output	0.824	1.241
Total direct producer price effect		
10% price reduction	0.082	0.124

industrial).¹⁷ As a result of these differences, the (weighted) average electricity price for small-scale households in the euro area (12 countries) is three times that for large-scale industrial users.

Several reasons can be identified for the significant price differences between Member States:

- The main reason for differences in international electricity price levels appears

to be differences in fuel prices (e.g. the price of gas). This is due for example to the use of different suppliers, the choice of which is affected by considerations such as geographic proximity.

¹⁷ Italian consumer prices are an exception to this pattern as the Italian Government uses electricity prices to encourage energy saving. It is likely that this policy will be suspended as part of the general price reform in the Italian electricity market induced by liberalisation.

- Prices reflect the underlying technology of electricity generation and the resulting mix of primary energy sources.
- Differences with regard to the level of privatisation seem to contribute to price level differences.
- Finally, there are additional country-specific differences. The favourable evolution of prices in France, for example, appears to be at least partly linked to the maturity of the French nuclear programme of the 1970s.

Before regulatory reforms began, national policy considerations, such as a preference for certain generation technologies and different requirements with regard to reserve capacity, tended to be more important for the electricity sector than cost considerations. Enhanced competition is likely to change this situation, but the process will be a gradual one. The electricity generation structure, for example, cannot be changed quickly owing to significant

investment costs. Moreover, supply contracts for primary energy, especially gas, tend to be long-term. International price level differences within the EU are therefore unlikely to disappear rapidly but, as argued above, the creation of a competitive single European electricity market and increased cross-border electricity trading are likely to result in a reduction of the current differences in electricity prices.¹⁸

Gas

The liberalisation of the European gas markets is at an earlier stage than the reform process in the electricity sector. With the exception of the United Kingdom, where the

¹⁸ In order to allow such intra-European trade to develop it is important that competition policy prevents excessive cross-border market consolidation in the electricity sector as well as in other utilities. The expansion of incumbents that strongly dominate their home markets into other Member States should be subject to particularly critical assessment. Moreover, the remaining legal and technical problems need to be overcome, such as insufficiencies in the interconnection between different Member States.

Table 8
Evolution of the HICP sub-index “Gas” in EU countries

Country	1996	1997	1998	1999	2000	% change between 1996 and 2000	% change between 1999 and 2000
Belgium	100.0	103.4	105.4	100.1	111.6	11.6	11.5
Germany	100.0	103.8	103.9	101.7	118.3	18.3	16.3
Greece	100.0	105.0	109.7	110.9	118.0	18.0	6.4
Spain	100.0	104.7	98.6	101.9	108.6	8.6	6.6
France	100.0	105.8	107.7	102.0	110.2	10.2	8.1
Ireland	100.0	104.0	104.2	105.2	108.6	8.6	3.2
Italy	100.0	107.0	105.6	104.0	115.1	15.1	10.7
Luxembourg	100.0	105.3	105.9	101.1	114.1	14.1	12.8
Netherlands	100.0	113.4	114.1	111.1	124.5	24.5	12.1
Austria	100.0	105.3	102.3	101.2	106.7	6.7	5.4
Portugal	100.0	112.7	113.9	114.6	132.7	32.7	15.8
Finland	100.0	101.7	102.1	99.2	97.7	-2.3	-1.5
Euro area (12 countries)	100.0	106.4	106.2	103.7	116.0	16.0	11.9
Denmark	100.0	104.4	102.3	107.0	134.1	34.1	25.3
Sweden	100.0	97.9	98.3	89.8	89.8	-10.2	0.0
United Kingdom	100.0	99.0	95.9	95.8	93.8	-6.2	-2.1

Sources: Eurostat and ECB calculations.

gas market was liberalised some time ago, it cannot be expected that the HICP sub-index for gas (see Table 8) will already reflect progress in regulatory reform. In addition, the differing degree to which gas has been introduced as an energy source across the euro area countries renders the interpretation of price level differences and conclusions with regard to the effect of liberalisation more difficult.

It can be seen that Finland is the only euro area country in which a downward trend in gas prices is discernible; in all other euro area countries prices increased during the 1996-2000 period, triggered in particular by the sharp increase in oil prices in the course of 2000.

More significant price falls have taken place in Sweden and the United Kingdom. Price developments in the latter country have mainly been driven by a strong government initiative to force competition into the market, making the United Kingdom the most advanced Member State with regard to gas market deregulation. However, it is questionable whether the UK example will be repeated in other Member States. The severe price reductions required by the regulator have forced British Gas (the incumbent gas company) to incur severe losses and to lay off two-thirds of its employees. Other Member States may thus be inclined to proceed more cautiously.

As in the case of electricity, the European gas market is also characterised by significant

Table 9
Comparison of price levels for gas across the EU in January 2000

(prices in euro/Gigajoule (GJ), net of taxes; euro area (ten countries) average is weighted)

Country	Small-scale households ¹	Large-scale households ²⁾	Small-scale industry ³⁾	Large-scale industry ⁴⁾	Small households/ large industry ratio
Belgium	13.9	5.9	5.2	3.6	3.9
Germany	14.9	5.5	5.1	3.9	3.8
Spain	13.2	6.3	4.4	3.9	3.4
France	12.0	5.6	5.0	3.5	3.4
Ireland	17.3	7.3	5.7	3.6	4.8
Italy	10.9	8.4	6.0	3.5	3.1
Luxembourg	12.4	5.4	5.0	4.8	2.6
Netherlands	12.2	5.0	4.9	2.8	4.4
Austria	8.3	7.6	5.7	3.5	2.4
Finland ⁵⁾	6.6	5.6	6.2	3.9	1.7
Euro area (ten countries)⁶⁾	12.7	6.4	5.3	3.6	3.6
Maximum	17.3	8.4	6.2	4.8	3.6
Minimum	6.6	5.0	4.4	2.8	2.4
Max./min. ratio	2.6	1.7	1.5	1.8	1.5
Standard deviation	3.1	1.1	0.6	0.5	0.9
Denmark	n.a.	n.a.	7.6	3.8	n.a.
Sweden	11.3	6.8	5.6	5.1	2.2
United Kingdom⁵⁾	12.7	6.4	4.4	3.0	4.2

Sources: Eurostat and ECB calculations.

1) Small-scale households = annual consumption 8.37 GJ.

2) Large-scale households = annual consumption 1,047 GJ.

3) Small-scale industry = annual consumption 4,186 GJ.

4) Large-scale industry = annual consumption 418,600 GJ.

5) Consumer prices for January 1999.

6) Data for Greece and Portugal not available.

price differences between the various types of users as well as between different Member States. Table 9 provides an overview of these differences.¹⁹

It emerges that gas prices for private households are also significantly higher than those for industrial users and that small-scale households and industrial users pay significantly more than large-scale households and industrial users. In fact, the ratio between small-scale households and large-scale industrial users is even higher than that for electricity prices. However, international price differences within the different user groups as measured by the standard deviation tend to be smaller than for electricity.

As argued above, international gas price differences are partly attributable to the chosen supplying country, which depends to a large extent on geographical factors. Moreover, these differences appear to partly stem from country-specific factors such as tax differentials between gas and competing fuels²⁰ and the price of competing energy sources. Again, it can be assumed that the creation of a functioning European market for gas would contribute towards a reduction in international price differences. However, given the lower degree of current price divergence, the potential for inflation-reducing price convergence in the gas sector appears to be more limited than in the electricity sector.

6 Problems of measuring consumer price developments in network industries

This section of the report provides some information on the extent to which recent price developments in the telecommunications, electricity and gas sectors are reflected in the HICP. First, some measurement issues in connection with the design of the HICP are discussed. Second, the main possible causes of biased reporting are presented briefly. Third, the actual significance of these problems for reporting price developments in the euro area is evaluated.

Measurement issues and the design of the HICP

Most price indices and in particular most consumer price indices keep the consumption pattern (quantity structure) of the base year constant. The index development reflects the prices which are to be paid over time for a constant basket. The major advantage of such an index is that price developments are separated from changes in expenditure resulting from changes in the volume or structure of consumption. At the same time, the index formula can only produce representative and economically meaningful results if the changes in consumption are relatively slow or, in the

event of such changes, if appropriate measures are taken to ensure that the index is representative. In this context, four issues merit particular attention:

- The first issue is that the index weight of each expenditure component should be sufficiently representative for the consumption of the reporting period.²¹ The EU-wide rule for the HICP in this respect is that (a) weights must not be older than seven years, (b) each year the relevance of the weights is to be checked and (c) weights of individual components are to be updated if a weighting change would affect the HICP by more than 0.1 percentage point.
- A second issue is the inclusion of new products in the index. Working on the assumption that the price developments of new goods and services often differ from those of other products in the index, the

¹⁹ These figures refer to January 2000 and therefore do not reflect any price developments that may have taken place since then.

²⁰ Gas prices are set at the end of the chain, taking into account the competitiveness of the other energy sources. If the competing fuel is taxed higher than gas, the gas company will tend to raise the gas price, thereby absorbing at least part of the tax differential.

²¹ These patterns are derived from household budget surveys, for example, which only take place in most countries every five years.

timing of the inclusion of such products in the index has an effect on the results. The EU-wide requirement for the HICP is that new products have to be included in the index when the estimated consumers' expenditure accounts for at least 0.1% of consumption covered in the index. Moreover, it is required that the samples used for the HICP be sufficiently reliable to represent the diversity of items within each index category.

- A third issue is the treatment of tariff prices in cases where the structure of the tariff changes (e.g. a consumption-related tariff is replaced by a flat rate). Strictly speaking, in such a case there are no longer two prices which can provide a meaningful comparison. The EU-wide requirement is that the HICP reflect the estimated expenditure, preserving the pattern of consumption *before* the tariff change.
- Finally, there are procedures for adjusting the index to account for changes in the quality of the products. This is particularly relevant for products which show rapidly

changing (improving) quality features. Experience shows that there are significant differences in the way in which Member States deal with this problem, although general rules for the quality adjustment of the HICP do exist.

To summarise, the HICP shows the change in prices of a "fixed basket" of goods and services, and this implies that changes in the consumption pattern cannot and should not be "immediately" reflected in the results. Although there are several EU-wide rules for keeping the weights, the product sample and the tariff sample representative and up to date, it may be difficult in practice to meet these requirements completely, since the necessary statistical information is often not available in time.

Measurement problems in network industries and sources of bias in the HICP

Taking into account the rules and practices for the HICP mentioned above, there appear to be four main reasons why price

Table 10
HICP weights for telecommunications, electricity and gas
(percentages)

Country	Telecommunications	Electricity	Gas	Total
Belgium ¹⁾	2.04	3.30	1.47	6.80
Germany ¹⁾	1.67	2.63	1.18	5.48
Greece ¹⁾	2.62	1.65	0.11	4.37
Spain ²⁾	1.36	1.59	0.69	3.65
France ¹⁾	2.40	2.40	0.11	4.91
Ireland ²⁾	1.49	1.94	0.72	4.15
Italy ¹⁾	1.72	1.22	2.00	4.93
Luxembourg ¹⁾	1.17	1.71	0.73	3.61
Netherlands ²⁾	1.88	1.92	2.94	6.74
Austria ¹⁾	3.00	2.03	0.66	5.68
Portugal ¹⁾	2.04	2.69	0.92	5.66
Finland ¹⁾	2.00	2.91	0.02	4.92
Euro area (12 countries)	1.94	2.18	1.34	5.46
Denmark ¹⁾	1.70	2.77	0.80	5.27
Sweden ²⁾	3.31	4.38	0.06	7.75
United Kingdom ²⁾	2.30	1.70	0.13	4.13

Source: Eurostat (weights for 2000).

1) Telephone and telefax services.

2) Telephone and telefax equipment and telephone and telefax services.

movements in sectors that are undergoing deregulation and/or rapid structural changes might not be adequately reflected in the HICP. However, it should be taken into account that the weight of expenditure for these categories in the total HICP is limited and that the quantitative effect of mismeasurement is therefore limited (electricity, gas and telecommunications account for about 5-6% of the total weight of the euro area HICP, see Table 10).

- The first problem is that the *item weights in the HICP reflect the consumption pattern 2-7 years prior to the reporting period*. It is likely that the absence of detailed and up-to-date information on the structure of consumption will lead to measurement problems. Network industries can be particularly affected by this problem if their share in the overall consumption basket changes rapidly and significantly. Such changes could be brought about by substantial price changes or by increased innovation resulting from the regulatory reform process. In respect of the industries discussed in this report, this may be the case for the telecommunications sector in particular.
- The second problem is primarily relevant for highly innovative markets. *New products or services, such as mobile telephony, carrier select facilities and cable networks for internet services, may only be introduced with a considerable time lag*. Again, this results in a situation where price changes in the sector concerned will not be reflected correctly in the HICP, and this effect is all the more important the quicker the new product achieves a significant consumption share. Again, this issue appears to be particularly relevant for the telecommunications sector.
- Network industry reforms usually aim to increase the number of suppliers in the market. Although the price schedules of potential new suppliers are likely to differ from those of the incumbent, the relevant HICP sub-index might continue to reflect only

the price schedule of the incumbent, which in turn results in a reporting bias. This is relevant for all the sectors discussed here. However, as discussed in Chapter 4 of this report, it often takes a considerable period of time before new suppliers can penetrate the monopolist market.

- Rapid improvements in technology as well as *changes in the price policy of suppliers (tariffs)* present various measurement difficulties. Although it is not clear whether this is a reason for a “bias” in the index (i.e. a systematic upward or downward measurement error), different practices in the Member States may have a significant impact on the results and therefore affect the comparability of the data.

The HICP and price changes in the telecommunications sector

Looking at the extent to which the HICP telecommunications sub-index reflects recent market evolution, *most euro area NCBS report various measurement problems*. Only Greece states that price changes in telecommunications are fully reflected in the relevant HICP sub-index.

In Germany, Spain, Ireland, Portugal and Finland the HICP telecommunications sub-index appears to take all relevant telecommunications products and services into account. However, their weights are based on rather dated household budget surveys.²² In particular, the significant increase in the importance of mobile telephones and, more recently, internet services does not appear to be *adequately* reflected, although these products and services are in principle taken into account.

In Belgium the telecommunications sub-index reflects only price developments in fixed telephony services provided by the incumbent operator (Belgacom). In Austria the reporting

²² For Ireland, Portugal and Finland these surveys refer to 1994 or 1995.

for fixed-line service prices is also limited to the incumbent. However, in contrast to Belgium, mobile telephony is included in the index. In Portugal, internet services are not included. However, it is foreseen that these services will be included in the next update of the household budget survey in 2003.

In France and, to a lesser extent, the Netherlands, the precise composition of the telecommunications sub-index is unknown for reasons of confidentiality. However, it is likely that not all relevant services and suppliers are covered.

To summarise, a number of Member States appear to be undertaking considerable efforts to ensure that their HICP sub-indices are representative and up to date. Nevertheless, it would seem that the measurement problems outlined above currently result in an *under-reporting* of price decreases in telecommunications in most euro area Member States. More specifically, the index appears to report an unduly high level and the actual price decline appears to be larger than is indicated by the HICP sub-index. Unfortunately, however, the available information does not allow for a quantitative estimate of the likely reporting bias for telecommunications.

The HICP and price changes in the electricity and gas sectors

It tends to be easier to capture price developments in the electricity and gas sectors than in telecommunications. First, most euro area countries are still in the early stages of the deregulation process. This means that at present there are only a few new suppliers with a very limited market share. Second, the potential for product innovations that would require adjustments of the relevant sub-indices is rather limited.

In view of these considerations, it is not surprising that there appear to be fewer difficulties in tracing the relevant price developments. There are, however, a number of exceptions. In Spain, Luxembourg and Portugal in particular, the present electricity and gas consumption patterns appear to be incorrectly reported owing to the use of outdated weights. Apart from this problem, the HICP sub-indices for electricity and gas seem to provide a *broadly realistic picture* of price developments. However, it should be kept in mind that measurement problems might increase as the regulatory reform process results in more significant changes in market structure.

Annexes

I Theoretical considerations on the regulatory framework for network industry reform

Since the late 1980s technological progress and a changing political and corporate climate have profoundly changed the traditional views on public utilities. In particular, the question emerged as to the extent to which increased competition in some segments of the utilities industries (such as production and trade in the electricity sector) could be used to achieve a more efficient supply of public utilities at lower prices for the customer. However, there are a number of arguments against the full liberalisation of network industries (European Commission 1999, pp. 37-8, 42-3).

- Arguably the most important reason is the *presence of a bottleneck infrastructure with natural monopoly characteristics*. In the case of electricity and gas, it would be extremely expensive as well as economically inefficient to install competing transmission systems. The same holds true in principle for fixed-wire telecommunications. However, the increasing importance of mobile telephony and the possible use of cable television networks for the transmission of telecommunications services means that the importance of the fixed-line network is tending to decrease. If duplication of the bottleneck infrastructure is not efficient or feasible, new market entrants are dependent on access to existing facilities in order to reach customers. These facilities usually belong to the incumbent which has no interest in granting access to competitors. Regulation is therefore necessary in order to guarantee access under “fair” conditions and to avoid discrimination among competitors.
- The *incumbent frequently retains its monopolistic position in some market segments, whilst other market segments are liberalised*. In order to deter the entry of potential competitors, the incumbent may in this case cross-subsidise services that are subject to competition with the

monopoly rents derived from non-competitive parts of the industry.

- The *need for co-ordination between market participants* is very pronounced in some network industries. In the electricity sector, for instance, the flows through the transmission network must be centrally controlled. Intense co-ordination between what is normally a small number of players in the market, however, may facilitate collusion and thus jeopardise effective competition.
- Governments may want to pursue *non-economic objectives* such as ensuring universal service for all customers, equal prices across geographic regions and the security of the supply of essential services. It may be felt that these objectives will not be adequately fulfilled without sufficient regulatory oversight.

Prior to the start of the regulatory reform process in the network industries, national markets are typically characterised by the existence of one large, vertically integrated incumbent, covering both production and distribution. A key issue to be addressed in the reform process relates to the question of whether the incumbent should remain vertically integrated or whether the production and distribution activities should be separated. The main *advantage of keeping the incumbent vertically integrated* is the benefits that arise from having a common organisation for production and distribution.²³ The principal *disadvantage of vertical integration* is that it gives the provider of the bottleneck infrastructure an incentive to discriminate against market entrants to protect its own business interests. Regulatory measures can in principle ensure non-

²³ *Theoretical and empirical findings suggest that economies of scale play an important role in telecommunications but less so in electricity and gas. This is due to the more complex nature of the “product” telecommunications (Newbery 1999, Chapters 6-8).*

discriminatory network access for all competitors, but regulators have to overcome considerable information problems. The creation of “multi-utilities” which operate simultaneously in various network industries is likely to aggravate such problems. Moreover, such multi-utilities would provide operators with the opportunity to cross-subsidise services not only within an industry, but also across different industries.

Irrespective of the issue of the integration or separation of the industry, the conditions for network access by producers and traders must always be regulated. Generally speaking, this regulation can take the form of individually negotiated contracts between the owner and the user of the network, or a set of uniformly applicable regulations can be applied. After liberalisation, asymmetric regulation in favour of new entrants may sometimes be necessary to enhance competition.

In telecommunications, network access (“interconnection”) is technically possible at various distances from the final customers. However, in order to maximise potential competition, it is recommended that regulation ensure that interconnection takes place as close as is feasible to final customers.

In the electricity and gas markets, the right to access the existing transmission and distribution network is referred to as *third party access*. Electricity network access charges can be either negotiated individually for each contract (negotiated third party access or “nTPA”) or fixed uniformly for all contracts and competitors (regulated third party access or “rTPA”). The dominant view expressed in the literature available on the subject is that rTPA is preferable to nTPA, as it is transparent, non-discriminatory and thus conducive to competition. This view is mirrored by the fact that most EU countries prefer rTPA. With regard to domestic competitors, Germany is the only EU country to have implemented an nTPA system in the electricity markets (Bergman et al. 1999, pp. 78, 233, 242-3).

Another regulatory issue that arises irrespective of the structure of the industry is the fact that the *incumbent has to be able to recover the costs of investment that has lost part of its value as a result of liberalisation*. These are known as *stranded costs*. Again, the assessment of these costs requires very detailed information on the cost structure of the network provider.

At the institutional level, it appears crucial that the *respective responsibilities of the government, the regulator and the firms* should be *defined clearly*, and that the regulator is not only legally independent but also distances itself sufficiently from the dominant player(s). In fact, it is an important regulatory challenge to avoid a situation where sector-specific regulators are influenced too heavily by the incumbent firms (regulatory capture). The *privatisation of utilities* helps to ensure that the interests of the government and those of the incumbent firms are clearly separated. It is sometimes argued that there is a “golden rule” that state-owned monopolies should be reorganised (vertical separation and unbundling) before privatisation (Newbery 1999). This argument envisages conflict between the private shareholders’ interest (high profits) and the interests of society (more competition and lower prices). It should be kept in mind, however, that it is not ownership per se but rather the level of competition that affects market outcomes. Privatisation may increase efficiency, improve corporate governance and reduce the burden on public finances, but without liberalisation and the entry of new competitors this is unlikely to result in significant price reductions (Boylaud and Nicoletti 2000, and Newbery 1999).

Finally, it is important to point out that the nature and scope of network industry regulation should change in line with technological developments and changes in the level of competition. As competition becomes stronger, more light-handed regulation should be sufficient, and the need for sector-specific regulation may disappear altogether over time. The regular competition

authorities could then take the place of a sector-specific regulator. Given that the level of competition in the telecommunications sector is somewhat higher than in other network industries, and in light of the above-mentioned possibility of using various competing telecommunications networks such as mobile telephony and cable television, the need for continued sector-specific regulation in fixed-wire telephony, for instance, may be regarded with greater reservations.

2 Overview of the empirical literature on the economic impact of regulatory reform in selected network industries

A Effects of regulatory reform on network industries

Telecommunications

Prices and costs

In the *Sixth Report on the Implementation of the Telecommunications Regulatory Package* the European Commission finds a rapid increase in competition and drastic price cuts in the telecommunications sector (European Commission 2000). In the 12 months from August 1999, the number of fixed telephony operators in the EU rose by 89% in the market for long-distance calls and 67% in the market for international calls. Concomitant with the increase in competitive pressure, consumer prices dropped by an average of 13.5% for international calls by residential users, and 15.1% for those by business users. Charges for long-distance and local calls have dropped by 4.6% on average. The vast majority of these falls can be attributed to the long-distance market. In the local call market, tariff rebalancing in half of the Member States has resulted in price increases rather than decreases. In short, EU telecommunications markets have undergone an increase in competition, a fall in prices and some tariff rebalancing.

Econometric studies, such as the one by Boylaud and Nicoletti (2000), support the view that increased competition in telecommunications is likely to trigger direct reductions in consumer prices. The authors examine the effects of liberalisation and privatisation on prices, labour productivity and quality in the telecommunications sector across 23 member countries of the Organisation for Economic Co-operation and Development (OECD) from 1991 to 1997. They find strong evidence that competition is negatively related to consumer prices (see also OECD 1999a and 1999b).

The *OECD Report on Regulatory Reform* (OECD 1997a) estimates the long-term impact of the liberalisation of the telecommunications sector. This report relies on a *benchmarking technique*. Cross-country differences in productivity, consumer prices and profit margins are assumed to be related in part to differences in the national regulatory regimes. Potential gains from regulatory reform are then estimated by comparing the national performance with the optimum performance within the country group. The report concludes that consumer prices for telecommunications services will decrease considerably in the long run as a result of lower input costs and lower mark-ups.²⁴

Output, productivity and employment

In addition to the effect it has on prices, the reform of network industry regulation is also likely to affect the telecommunications industry's output and employment. With regard to *output*, the OECD estimates that in the long run liberalisation will boost sectoral output considerably, taking innovation-induced changes into account.²⁵ However, it is particularly difficult to extricate the effects of innovation and regulatory reform in a highly dynamic sector such as telecommunications.²⁶

The hypothesis of improved *productivity* owing to increased competition receives tentative support from the US experience (OECD, 1999b, pp. 25-6, 344-5) and the work of

²⁴ In the long run the OECD estimates average price reductions of 13% in the United Kingdom, more than 22% in Spain and Germany, and 30% in France. Quantitative estimates based on benchmarking work on the assumption that all countries can imitate the best performance (benchmark) with regard to productivity, for example. However, there may well be country-specific structural features that prohibit this. The per capita infrastructure costs for fixed telephony, for example, are likely to be particularly high in sparsely populated countries.

²⁵ According to the OECD (1997a, Vol. II), telecommunications output is expected to increase in the long run by more than 22% in Sweden and the United Kingdom, by between 41% and 45% in the Netherlands, Spain and Germany, and by almost 50% in France.

²⁶ This holds true not only for output developments but also for changes with regard to prices, productivity and employment.

Boylaud and Nicoletti (2000, pp. 18, 21, 37, 53-6), who find a significant positive correlation between liberalisation in telecommunications and labour productivity.

With regard to *employment*, the findings of the OECD and others support the commonly held view that liberalisation is likely to have adverse effects on employment in the short run. This is largely attributable to hidden unemployment in many of the incumbent telecommunications firms. After several years of adjustment, however, sectoral employment should rise in most countries, although this will probably be mainly due to innovation which in turn is enhanced by deregulation.

Innovation and quality

The effects of the liberalisation and privatisation of the telecommunications sector on *innovation* are subject to some controversy in the literature available on the subject. On the one hand, it can be argued that liberalisation encourages innovation, as it creates greater incentives to provide new services. On the other hand, liberalisation entails the loss of a secure franchise market through which to finance R&D investment, and this must be taken into account in the design of the regulatory framework for the industry (Newbery 1999). On balance, the empirical evidence seems to favour the view that competition acts as a spur to innovation (OECD 1997b, p. 19, and Van Cuilenburg and Slaa 1995).

The relationship between the liberalisation of telecommunications and the *quality* of services has not yet been central to the debate, partly as a result of measurement problems. Nonetheless, there is some evidence to suggest that liberalisation has a positive impact on product quality and product variety (OECD 1999b, pp. 25, 80, 82, and Boylaud and Nicoletti 2000, pp. 18-9, 21, 39, 53-4).

Electricity

Prices and costs

Empirical evidence suggests that the liberalisation of the electricity market tends to put downward pressure on prices. A recent econometric study of 19 OECD countries finds that the unbundling of generation and transmission, the expansion of third party access (TPA) and the introduction of spot markets tend to reduce industrial and residential end-user prices for electricity (Steiner 2000).

While the assertion that liberalisation tends to lead to lower electricity prices is relatively uncontroversial, estimating the extent of these reductions is difficult, especially as reforms in most euro area countries have just begun. London Economics (1997) used a simulation-based approach to examine the cost savings to be generated by the introduction of a single European market for electricity. By comparison with the situation in 1997, price reductions of 5-11% for industrial consumers and 2-4% for residential consumers are expected. These cost savings mainly originate from lower construction and operating costs for generating plants and optimal fuel choice. Further gains can be realised by introducing supply (retailing) competition and national electricity pools.

Working on the assumption of increased competition, the OECD (1997a) estimates the effects of national deregulation and liberalisation programmes in the electricity sector, again using the benchmarking methodology described above.²⁷ These figures are also supported by recent studies for the Netherlands (OECD 1999a, pp. 28, 62, 238, and Haffner and Van Bergeijk 1997).

²⁷ It is estimated that in the long run consumer prices for electricity will drop by 11-15% in France, Germany and the United Kingdom.

Output and employment

The OECD forecasts that lower electricity prices resulting from regulatory reform will boost sectoral *output* in the long term.²⁸ However, given the considerable level of hidden unemployment in the electricity sector, it seems likely that a fall in employment can be expected even in the long run.²⁹ As in the case of telecommunications, this is mainly due to strong productivity growth following regulatory reform (Steiner 2000, pp. 7, 18-9, 24-5, 35). However, by contrast with the telecommunications sector, employment in the electricity sector is not predicted to rebound as the growth and innovation prospects for the sector appear to be much more limited.

Gas

Prices and costs

The amount of research on regulatory reform in the gas sector is far more limited than for the telecommunications and electricity sectors. However, in the United States, the reform of gas regulation has been under way since the early 1980s, with the result that the industry structure now demonstrates marked changes. The OECD (1999b, p. 25) reports that these reforms led to a 35% cost cut in real terms between 1984 and 1994. Prices for consumers likewise dropped, with margins in transmission and distribution declining by 31% between 1984 and 1993.

In order to cope with the uncertainties of the EU liberalisation process, a model-based study by Van Oostvoorn and Boots (1999) sets up two scenarios for the implementation of the EC Gas Directive, the “full competition” scenario and the “semi-open competition” scenario. Based on these scenarios, the authors estimate the impact on both industry structure and consumer gas prices for different consumer groups in seven EU countries. In the “full competition” scenario, all seven EU countries are expected to see substantial gas price reductions

between 1995 and 2010.³⁰ Moreover, the authors predict a considerable rise in gas consumption, the convergence of consumer gas prices across EU countries and between different consumer groups owing to arbitrage, and the erosion of the profit margins of national transmission companies. In the “semi-open competition” scenario, which applies a minimalist implementation of the Directive, only small gas price reductions are predicted (but not quantified), with price differentials across countries and market segments persisting and profit margins expected to remain constant or even increase slightly.

London Economics (1997) also estimates the gains resulting from the creation of a European market for gas using two different simulation models and three scenarios: “business as usual”, “increased competition” and “open gas markets”. They conclude that the effects of a single gas market differ significantly from those of a single electricity market, as a result of very large economies of scale in gas transmission, vertical separation with oligopoly in both production and transmission, and the location of major gas producers outside the EU. Even in the most favourable scenario³¹, the gains from the creation of a European gas market, while sizeable, are only estimated at one-ninth of the gains from an integrated electricity market.

28 In the long run the OECD (1997a, Vol. II) expects output to increase by 4.5% in Sweden, approximately 5.5% in the United Kingdom and France, 7.3% in Germany, 9.9% in Spain and 11% in the Netherlands.

29 The OECD (1997a, Vol. II) predicts for example that employment in the electricity sector will decrease in the long run by 9% in Sweden, 12.1% in Spain, 18.6% in France, 26% in the Netherlands, 29.7% in the United Kingdom and 46.3% in Germany.

30 Prices in the residential gas market segment are predicted to fall by 15% in the Netherlands and the United Kingdom, 20% in France, 25% in Austria, 30% in Germany and Belgium, and 40% in Italy. Price reductions for industrial gas consumers are expected to range from 8% in Belgium to 30% in Germany.

31 This is based on the assumption that consumers' bargaining power exceeds that of producers, allowing them to capture more of the rents, and that there is real gas-to-gas competition.

Productivity and employment

In the United States, labour productivity in the gas sector rose by 24% in the first ten years of the reforms of the US gas sector (starting in 1984). This increase was partly due to a 13% decline in sectoral employment over the same period (OECD 1999b, p. 25). If similar figures were to apply to the EU, this would imply smaller long-term sectoral employment losses and smaller labour productivity gains than in the electricity sector.

B Economy-wide effects of regulatory reform in network industries

Prices and inflation

The economy-wide impact of network industry reforms is of particular importance for the purposes of monetary policy-making. Unfortunately, specific research on the economy-wide effects of regulatory reform has been rather limited thus far.

The OECD (1997a Vol. II) presents estimates of the effects of deregulation on a variety of macroeconomic variables. These estimates are derived by means of simulations using the OECD INTERLINK model, a macroeconometric model frequently used for longer-term simulation exercises.³² According to the report, producer prices in the long term are predicted to fall by 0.8-0.9% for the United Kingdom, France and Germany as a result of the combined effect of deregulation in the telecommunications and electricity industries.³³ These estimates take into account not only the direct producer price effect, which is derived from lower costs for electricity and telecommunications inputs in all sectors, but also indirect producer price effects. The latter comprise all repercussions of regulatory reform on producer prices as captured by the model, e.g. lower wage costs owing to reduced consumer prices.

Following the full implementation of the reform the downward pressure on prices is predicted to subside and inflation rates to

return to their pre-reform level.³⁴ Thus, in the very long run – after ten years for the purposes of the OECD report – inflation rates are projected to be unaffected by regulatory reform, whereas the price level is expected to remain permanently lower.

Output, employment, productivity and growth

The long-term employment effect for the economy as a whole, which is precipitated by regulatory reform in the electricity and telecommunications sectors, is projected to range from -0.28% and -0.21% in Germany and the United Kingdom respectively, to -0.1% in France and Sweden and to 0% in Spain and +0.29% in the Netherlands.³⁵

Higher output in the telecommunications and electricity sectors is expected to increase total business sector output directly by between 0.44% in Sweden and 1.15% in Spain. However, the overall output effect on the economy is likely to be higher. To our knowledge no attempts have yet been made to quantify this overall effect.

As implied by the projected rise in output together with the (in some cases) rather small employment effects, regulatory reform is expected to trigger a substantial increase in labour productivity. For Germany and France,

32 The first-round effects described for different industries in the first part of this OECD paper are fed into the model as exogenous changes in order to simulate all macroeconomic responses to the shocks, including second-round effects. As a general caveat for this kind of model-based analysis it should be kept in mind that a successful regulatory reform process is likely to result in structural changes of the economy that – by definition – reduce the ability of the model to capture the long-term effects of the reform process.

33 These figures are considerably higher than the estimates obtained for direct producer price effects using input-output tables. These results – for France, Italy, the Netherlands and Portugal only – are reported in Chapter 5, Box 1.

34 The report assumes that the implementation of the reforms will be completed within ten years.

35 These are deviations from the baseline scenario. The assumed time horizon is ten years.

for instance, this increase is estimated at 2.61% and 1.28% respectively.³⁶

Finally, it is worth remembering that several studies investigate the relationship between the rigidity of regulation in a broader sense, not focusing specifically on network industry regulation, and real GDP growth rates.³⁷ All these studies find a negative correlation

between the rigidity of national regulation and average growth rates of GDP per capita.

³⁶ A simulation by De Nederlandsche Bank based on the assumption of a reduction of domestic prices by 1% (via a narrowing of profit margins due to deregulation) finds for the Netherlands a negative impact of -2.5% on employment in the long run (eight years). Consumer prices are expected to fall by 0.74% over the same period, while consumption is expected to rise by 0.59% (Van Els and Van Rooij 1999).

³⁷ See Koedijk and Kremers (1996), Gwartney and Lawson (1997) and Dutz and Hayri (1998).

Table 11
Important empirical studies on the regulatory reform of network industries

Author	Country/ period	Method	Explanatory variable	Performance variable	Main findings
Telecommunications					
Boylaud & Nicoletti, (2000)	23 OECD countries, 1991-97	Econometric	Liberalisation	Consumer prices Quality Labour productivity	Negative Positive Positive
			Privatisation	See above	Insignificant
Van Cuilenburg & Slaa (1995)	24 OECD countries, 1989-92	Econometric	Liberalisation	Innovation	Positive
European Commission (1999)	EU Member States August 1998 - August 1999	Descriptive	Competition	Consumer prices	-21% for internat. calls by residents, -15% for long- distance, +4% for local calls
OECD (1997a)	8 OECD countries Long-term	Benchmarking	Competition, regulatory reform	DE, ES, FR, NL SE, UK Consumer prices Output Labour productivity Employment Innovation	-13 to -30% +22 to +50% +20 to +40% -2 to +23% Positive
OECD (1997b)	5 OECD countries, 1980-1993	Descriptive	Competition	Innovation	Higher growth of patents where competition is stronger
Electricity					
London Economics (1997)	EU Member States	Simulation	nTPA rTPA Under the implementation of a single market	Cost savings Consumer prices	ECU 4-6 billion ECU 10-12 billion Down 5-11% for industrial, down 2-4% for residential
OECD (1997a)	8 OECD countries Long-term	Benchmarking	Competition, regulatory reform	DE, ES, FR, NL, SE, UK Consumer prices Output Labour productivity Employment	-9 to -20% +5 to +11% +30 to +100% -9 to -46%

Author	Country/ period	Method	Explanatory variable	Performance variable	Main findings
Steiner (2000)	19 OECD countries	Econometric	TPA, unbundling Privatisation	Consumer prices Efficiency Consumer prices Efficiency	Negative Positive Positive Positive
Gas					
OECD (1999b)	United States, 1984-1994	Descriptive	TPA, spot markets, liberalisation	Profit margins Costs Labour productivity Employment	-31% (1984-93) -35% +24% -13%
London Economics (1997)	EU	Simulation	Implementation of a single market through nTPA/rTPA	Cost savings Consumer prices	ECU 256 million to ECU 283 million (up to ECU 1,382 million in most favourable scenarios) Negative
Van Oostvoorn & Boots (1999)	EU	Simulation	Scenarios for the implementation of a single market for gas	BE, DE, FR, IT, NL, AT, UK Consumer prices	Residential: -15 to -40%; Industrial: 0 to -30%
Economy-wide					
OECD (1997a)	8 OECD countries Long-term	Simulation	Competition, regulatory reform of telecommunications and electricity	DE, ES, FR, NL, SE, UK Producer prices (DE, FR, UK) Output Employment Inflation	-0.77 to -0.93% +0.44 to +1.15% -0.28 to +0.29% nil (very long- term)

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