IV. REGULATORY REFORM IN NETWORK INDUSTRIES: PAST EXPERIENCE AND CURRENT ISSUES

Introduction

Regulatory reform was widespread in the past two decades…

At different speeds, and starting at different times in the past 20 years, OECD countries have been reforming product market regulations, improving regulatory techniques and adapting them to changing market and technological conditions. Reforms concerned both inherently competitive industries (such as road freight and retail distribution) and so-called network industries, in which non-competitive and competitive segments co-exist.[1] Entry and prices in previously restricted markets have been liberalised. The role of the state as an owner of enterprises selling goods and services in the market has been reduced. New regulations have been designed to promote competition and ensure that traditional public interest goals can be met within an increasingly competitive framework. The objectives of regulatory reforms were to lower costs, enhance consumer welfare, and give greater incentives to producers to innovate.

… and some lessons can be learned concerning network industries

This chapter summarises the main lessons to be drawn from recent experience building on a substantial body of analytical work.[2] Focusing on industries with fixed network elements, it describes how and which reforms have been pursued in Member countries, the extent to which objectives have been met, and what new challenges governments face in a more liberalised market.

Evolving regulation: trends and outcomes

Regulatory reforms have had three, often concurrent, dimensions: liberalisation, state retrenchment and new regulatory design. In network industries, liberalisation and state retrenchment were mainly concerned with liberalising access to markets that had previously been restricted by legal and regulatory barriers, and putting into

1. In this chapter, network industries are defined as those industries in which a fixed infrastructure is needed to deliver the goods or services to end users, *e.g.* telephone or electricity cables and wires, railtrack, and airport runways.
2. A fuller discussion of trends, outcomes and issues in regulatory reform can be found in Gonenc *et al.* (2000). Regulatory reform in retail distribution and road freight has been analysed in Boylaud (2000). Detailed analyses of the patterns and effects of regulatory reform in the telecommunications, electricity and air travel industries of OECD countries can be found in Boylaud and Nicoletti (2000), Steiner (2000) and Gonenc and Nicoletti (2000), respectively.

Box IV.1. The OECD International Regulation Database

The OECD International Regulation Database is a comprehensive and internationally-comparable set of information about the state of regulation and market structures in OECD countries. For each Member country, it contains around 1000 observations, both quantitative and qualitative. The areas covered are economy-wide regulations concerning product markets (state control of business enterprises, legal and administrative barriers to entrepreneurship, barriers to international trade and investment, competition policies) and industry-specific regulations and market structures (in telecommunications, electricity supply, transportation and retail distribution). The database provides a "snapshot" of regulatory and market environments in 1998, as well as (for some industries) a time-series of regulations and market structures covering the past 15 years. The main sources of information are the responses of OECD countries to an *ad hoc* questionnaire, OECD Secretariat expertise and data published by the OECD and other international organisations. The data collected were extensively checked by OECD and government experts. The database will be made publicly available on the OECD website (*www.oecd.org*) in summer 2000.

the private sector activities that had been run directly by the government. This section provides a summary description of the OECD-wide evolution of these two dimensions of regulatory reform over time, partly drawing on data contained in the OECD International Regulation Database (see Box IV.1).[3] Issues of new regulatory design, which are more difficult to summarise and require a more detailed discussion, are addressed in the next section.

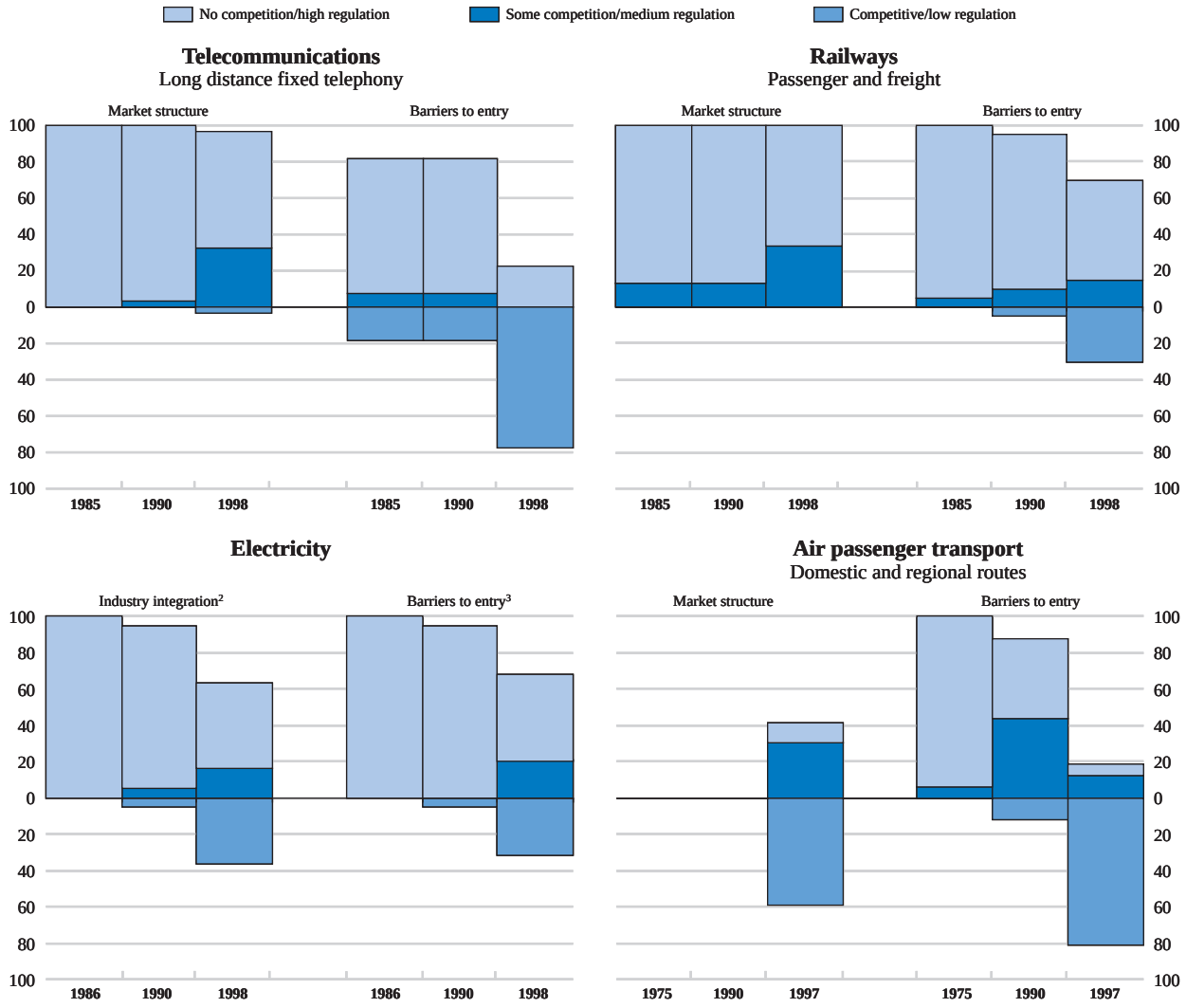
Markets have been liberalised, especially in air travel and telecommunications…

Figure IV.1 shows how barriers to entry and market (or industry) structures have changed in air travel, telecommunications, electricity supply and railways. These are industries in which non-competitive segments (such as fixed network infrastructures) coexist with potentially competitive upstream or downstream segments (*i.e.* the provision of inputs or final services). Liberalisation of access to the competitive segments of the industry is an essential element of reforms aimed at minimising the regulatory burden. The most striking regulatory changes occurred in the air travel and telecommunications industries. Over the nineties, legal monopolies (as well as fare restrictions) on domestic and regional air routes were lifted in most of the OECD area,[4] and entry in (domestic and international) long distance telecommunications was widely liberalised. By 1998, access to local and mobile telecommunications had also been freed (or limited only by spectrum) in most OECD countries. Overall, competitive pressures increased in these industries, but the role of incumbents remains significant. This role is largely unchallenged in international air routes (outside regional agreements), which remain dominated by highly restrictive bilateral air service agreements, and local fixed telephony, where access to the local loop (*i.e.* the connection between handsets and the local exchange) is still problematic. Changes in the railways and electricity supply industries have been less widespread. In electricity, liberalisation of the generation segment has been matched in some countries by a reorganisation of the industry structure involving the vertical separation of some of its segments (*e.g.* generation and transmission). In railways, limited

3. Time-series data on regulations are very scarce. Therefore, only very simple indicators can be constructed to follow the evolution of regulation in OECD countries over time. The dynamic indicators shown in this section are based on OECD (1992), Boylaud and Nicoletti (2000), Steiner (2000), Gonenc and Nicoletti (2000), European Conference of Ministers of Transport (1998), World Bank (1996) and the OECD International Regulation Database (see Nicoletti *et al.*, 1999).
4. Regional markets are markets formed by groupings of OECD countries, such as the European Union or North America. By 1998 only five OECD countries continued to restrict entry in the domestic market.

Figure IV.1. **Liberalisation of network industries across OECD countries**

Percentage of OECD countries falling in each category[1]



1. Country coverage changes across sectors and indicators, ranging from 15 countries in railways to 28 countries in telecommunications. To compare OECD-wide regulation over time, countries which joined the OECD after 1975 were excluded.
2. High regulation = vertical integration; medium regulation = limited vertical separation; and low regulation = vertical separation.
3. In electricity generation.

Source: Gonenc *et al.* (2000).

entry liberalisation (especially of the freight service) has not yet changed substantially the traditionally concentrated market structure.

… and the public enterprise sector has been downsized

Historically, state ownership of business enterprises was used to further public policy objectives in competitive economic activities and as a substitute for (or a complement to) arm's length regulation in activities thought to be characterised by market failures. Privatisations were generally motivated by two main factors. First, the role that the government can usefully play in the business sector was reassessed and it was concluded that the scope for public enterprises was narrower than previously

thought.[5] Second, it was felt that managerial incentives would be enhanced by privatisation, including by severing the link between managers and politicians and thereby lowering the deadweight costs associated with influence-seeking activities.[6] According to some estimates, the OECD public enterprise sector is currently less than half the size it was at the beginning of the 1980s.[7] Widespread privatisation policies, which were often preceded and supplemented by the corporatisation of public enterprises, left only a few countries with a significant share of state enterprises (see OECD, 1999). Figure IV.2 suggests that, over the nineties, privatisations increasingly concerned industries with fixed network elements. Among these, public ownership was significantly reduced in air passenger transport and telecommunications, while ownership changes in electricity and railways were very limited.

Liberalisation generally enhanced efficiency and quality, and reduced prices…

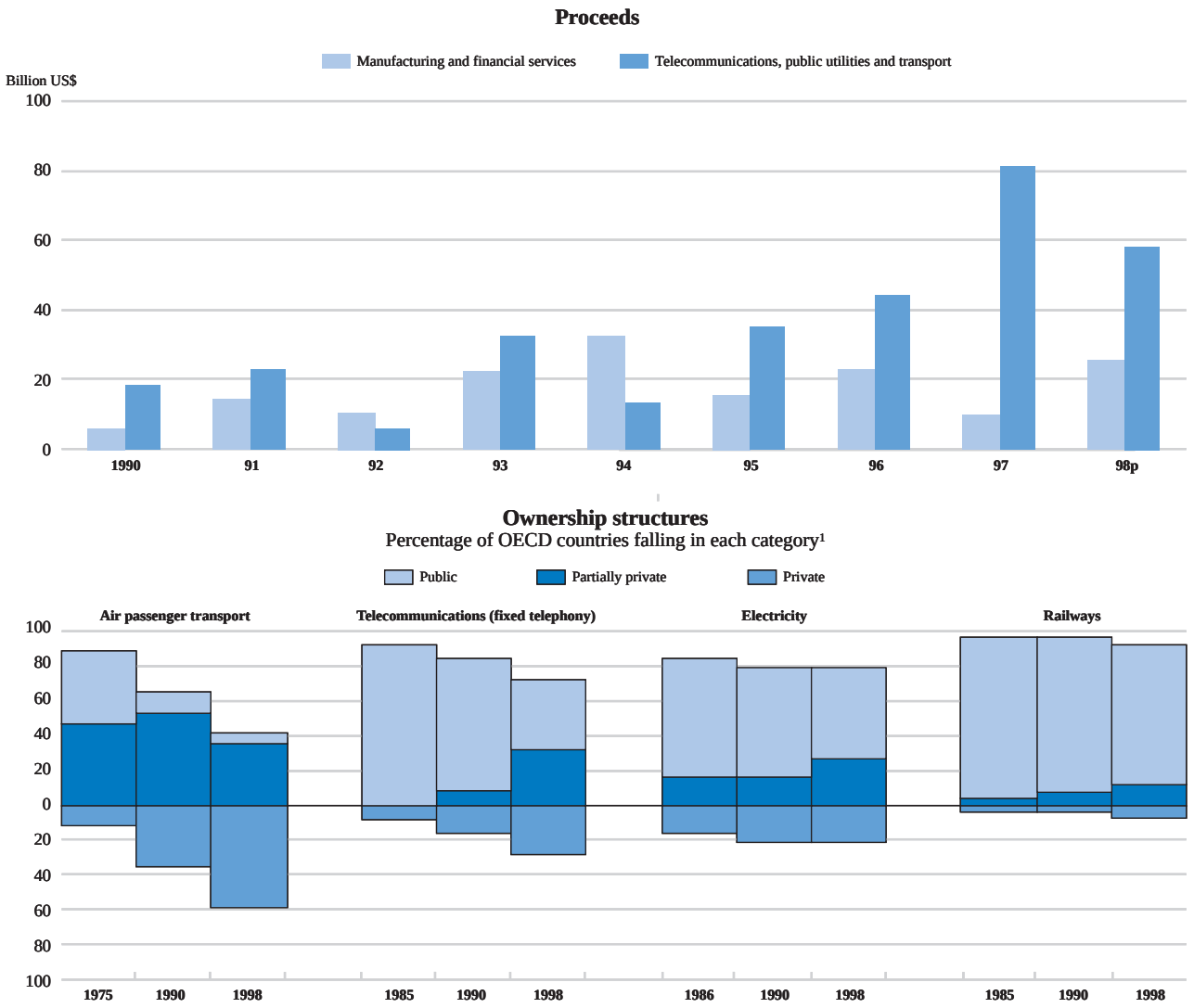
The available empirical evidence on the effects of liberalisation and privatisation suggests that liberalisation has been, on the whole, beneficial for efficiency and consumer welfare in reforming countries. As part of the OECD programme on regulatory reform, a recent review of empirical studies looking at the effects of liberalisation and increased market competition on the performance of network industries suggests that productive efficiency and quality of service tend to increase and prices tend to decline after reform (Gonenc *et al.*, 2000). There is also some evidence that the industry-level effects of reforms tend to translate into improved macroeconomic performance, such as higher growth and employment. However, the beneficial effects of reforms have been sometimes bedevilled by: regulatory flaws in the access by competitors to fixed networks (*e.g.* to airports); the failure to curb the use of market power by incumbents in the competitive segments of the industries; and the difficulty of addressing the complex technical issues arising after basic entry liberalisation has been implemented (such as in electricity supply).

… as did privatisation, when it was coupled with adequate reforms

The evidence also suggests that, on balance, privatisation has improved the performance of enterprises in network industries (Gonenc *et al.*, 2000). However, disentangling the effects of changes in ownership from those implied by stronger market pressures in the competitive segments of these industries is a difficult task since privatisation and liberalisation often go hand-in-hand. Furthermore, the outcomes of privatisations are also affected by the ability to replace direct control of the firm with effective arm's length regulation and by other external factors, such as the legal and corporate governance environment in which privatisations take place.

5. In the past two decades, property rights and public choice analyses have confined the scope for public enterprises to those (relatively rare) situations in which *a)* the unobservable quality characteristics of a product are significant and cannot be monitored *(ex post)* at arm's length; *b)* product or process innovation is not essential; and *c)* competition and consumer choice are weak and reputation is unimportant (Hart *et al.*, 1997).
6. The influence of ownership structure on managerial incentives is stressed by Shleifer (1998). The implications of privatisations for the ability of pressure groups to influence managerial decisions are illustrated by Boycko *et al.* (1996). Foster (1992) describes the pressures exerted on the management of former public enterprises in the United Kingdom; OECD (1994) describes the channels of political influence over state holdings in Italy.
7. Megginson and Netter (1999) cite various data sources suggesting that the overall share of the public enterprise sector in GDP in the OECD area may have declined from around 10 per cent to below 5 per cent since the end of the 1970s.

Figure IV.2. **Privatisation across OECD countries**



Note: 1998p = provisional data.
1. Country coverage changes across sectors and indicators, ranging from 17 countries in air passenger transport to 26 countries in railways. To compare OECD-wide regulation over time, countries which joined the OECD after 1975 were excluded.

Sources: Gonenc *et al.* (2000); OECD; World Bank and SBC Warburg.

Improving regulation where it remains necessary

Regulation is still needed in many industries but its quality can be improved

Regulatory reform is not merely concerned with eliminating restrictions where they are no longer necessary but also, and more importantly, with enhancing regulatory quality in areas where regulation is unavoidable (OECD, 1997). Network industries usually have a component that is non-competitive. For example, the local loop in telecommunications, electricity transmission and distribution, and rail track, are all characterised by economies of scale which give rise to a natural monopoly. The

presence of natural monopoly characteristics often means that competition cannot be relied upon to provide the socially optimal outcome and some form of government intervention in these industries may be desirable.

Many network industries also imply social benefits that cannot be fully appropriated by the industry (so-called "network externalities"). These arise when consumer demand for the product or service increases with network size, since there are benefits to being connected to a larger network (*e.g.* telecommunications, banking automated teller machine networks). Despite network externalities competition can still be viable; markets that exhibit network externalities can sustain more than one firm.[8] However, in the presence of these externalities, an unregulated industry may tend to settle on a network size that is smaller than would be socially efficient. The social costs associated with non-interconnecting networks may be quite high and mandating interconnection is often justified on these grounds. In addition, the presence of network effects provides incentives for firms to engage in anti-competitive behaviour.[9] This is why network interconnection and access issues are so important with regard to competition policy (Economides and White, 1994).

New policy approaches stress the role of incentives, the need to avoid distortions, and the importance of structural measures and institutional design

In the past two decades, several factors have changed the public policy approach towards the regulation of network industries. Developments in technology and the expansion of demand induced a reassessment of the borders between the competitive and non-competitive segments of these industries and improvements in regulatory techniques made it easier to target regulation at the non-competitive segments only. As restrictions to entry in competitive segments were lifted, rules had to be set to make access to the non-competitive segments by a plurality of service providers possible, non-discriminatory and efficient. Where liberalisation was matched by the separation of vertically-integrated monopolies into several independent entities (so-called "unbundling"), markets had to be created *ex novo* to replace transactions that were previously taking place within the firm. Where (non-economic) public interest objectives were ensured within a regulated non-competitive environment, ways had to be found to make these objectives consistent with competition. Finally, where firms had been privatised or activities had been contracted out, regulation through public ownership had to be replaced by effective arm's length regulation. The general trend in regulatory design has been towards: *i)* an increased reliance on incentives, above all those spurred by market forces, and the avoidance of potentially distorting mechanisms, notably for pricing access to integrated networks; *ii)* a preference for structural over behavioural regulation, such as measures aimed at separating vertically or horizontally formerly integrated utilities; *iii)* a reassessment of the scope for and the funding of non-economic objectives; and *iv)* attention to the economic implications of the design of regulatory mechanisms and institutions.

8. Industries that have network externalities but no scale economies on the cost side (*e.g.* faxes and mobile telecommunications, and banking automated teller machines networks) are typically characterised by relatively competitive market structures.
9. For example, switching costs and lock-in effects serve to increase firms' market power (Farrell and Shapiro, 1988 and 1989). Also see Salop and Scheffman (1983) for an analysis of the strategic effects of raising the costs of competitors.

Entry and pricing policies

Attention to incentives can enhance regulatory effectiveness and minimise the regulatory burden

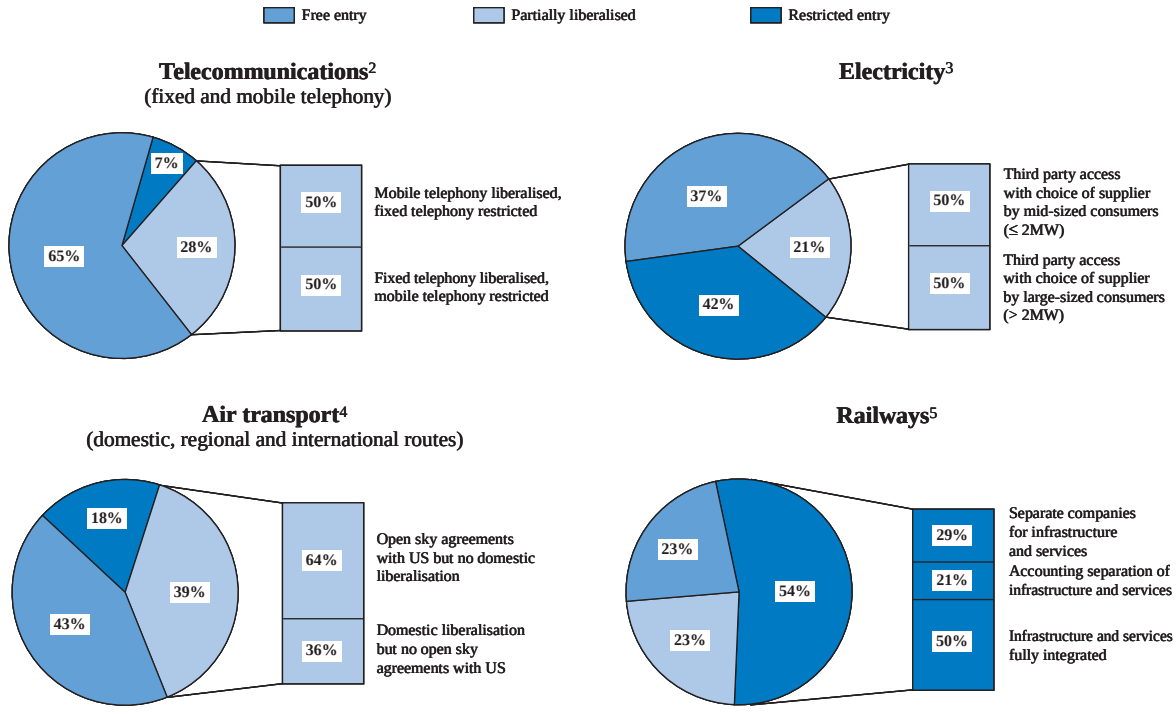
OECD governments have become increasingly aware that, by focusing on incentives, regulation can be made more effective while, at the same time, its burden can be reduced. Therefore, new regulatory approaches aim at increasing the amount of (market-wide and firm-specific) information available to the regulator and encouraging regulated firms to adopt low-cost and innovative production techniques. Two key aspects of incentive regulation are policies regarding entry into segments of the industry where competition is feasible and the design of new pricing rules in the segments of the industry where market power remains significant.

Market incentives are spurred by entry liberalisation…

Entry policies often entail complete liberalisation of activities that are potentially competitive (*e.g.* the provision of telecommunications services). The introduction of competition in these activities enhances regulatory efficiency because it reveals to the regulator cost and demand patterns of both competitive and non-competitive activities, which constitute useful information for regulating more effectively incumbent firms. In addition, as competition eventually takes root, entry minimises the regulatory burden by circumscribing the area over which regulation is required. Figure IV.3 provides details on the extent and the features of OECD-wide

Figure IV.3. **Access to networks, 1998**

Percentage of OECD countries falling in each category[1]



1. Country coverage changes across sectors and indicators, ranging from 19 countries in electricity to 29 countries in telecommunications.
2. Mobile telephony is liberalised when entry is only limited by spectrum and restricted when a legal duopoly exists.
3. Free entry means full consumer choice of supplier and third party access (TPA); restricted entry means no choice and no TPA.
4. 1996. Free entry means that either domestic or regional routes are liberalised and open sky agreements with US exist; restricted entry means that there is no domestic liberalisation and no open sky agreements.
5. Partially liberalised means that there is free entry in some parts of the network in either the passenger of the freight service.

Source: OECD International Regulation Database.

entry liberalisation in four network industries. It suggests that, although reliance on market forces has increased significantly, competitive access to the fixed network is now widely possible only in telecommunications.[10] It should be noted, however, that entry into the local loop is still virtually absent in most countries (OECD, 1999*a*).

… and ex ante competition can sometimes be established in non-competitive markets

In areas where competition is not viable (such as in the provision of infrastructures with natural monopoly characteristics), a competitive element can sometimes be introduced by auctioning off the right to operate in the non-competitive components of the industry. The use of auctions for new capacity can benefit consumers and also reveal information regarding the incremental costs of non-competitive activities, provided that auctions require firms to bid to supply the new capacity at the lowest price.[11] Ensuring that new capacity remains integrated with the existing network can then be addressed through appropriate interconnection policies.

Pricing rules can provide incentives for efficient resource allocation while keeping market power in check

Well-designed pricing rules are fundamental for ensuring efficient outcomes in regulated network industries. Where the market power of incumbents is significant, retail price regulations should prevent them from setting prices above costs at the expense of consumers, while at the same time preserving sufficient incentives for cost minimisation and efficient investment. Where vertically-integrated incumbents compete with new entrants in liberalised markets, the charges for accessing the incumbent's network should be reflective of the costs actually incurred in providing access. Where networks are congested, charges should also reflect demand patterns (such as in peak-load pricing), so that capacity is allocated to the most efficient users at peak times.

Price-cap regulation may enhance productive efficiency to the benefit of consumers…

Price-cap regulation (Box IV.2) is the most widespread pricing rule in both telecommunications and rail transport in the OECD area (Figure IV.4).[12] By contrast, the electricity industry is still governed primarily by cost-based regulation (such as rate-of-return regulation), perhaps because this industry supplies a homogeneous product; therefore cost information is easier to obtain and costs are easier to allocate than in telecommunications and railways, which provide several joint services (such as local, long-distance, mobile communications or freight and passenger transportation). Unlike cost-based regulation, price-cap regulation does not require detailed and continuous information about costs and demands. Instead, the aim of price-cap regulation is to provide adequate incentives for the company to reveal costs and to introduce lower cost techniques. Indeed, the main argument in favour of price-cap regulation is that it is less vulnerable than rate-of-return regulation to inefficiencies related to over-capitalisation since the firm has the incentive to minimise all of its costs.[13] Part of this expected increase in efficiency can then be passed on to consumers.

10. The figure reports the situation for mobile and (domestic and international) long-distance communications. As of 1998, the situation in local communications mirrors the latter.
11. Otherwise auctions fail to dissipate monopoly rents and only succeed in redistributing them from firms to the state and, eventually, taxpayers with no direct benefit to end-users and overall efficiency (see, for instance, Heimler, 2000).
12. Regulation of interconnection or access charges is prevalently cost-based. Only in Italy, Norway, and the United Kingdom are the prices of electricity transmission regulated through price caps. Prices for mobile telephony tend to be unregulated. For details on price regulation in telecommunications see Boylaud and Nicoletti (2000). Price caps are also increasingly used to control the market power of airport operators.
13. This is because under price cap regulation the firm is allowed to keep the excess profits it can earn in between review periods for the setting of the price caps (but must also absorb any losses) (Beesley and Littlechild, 1989). In rate-of-return regulation, prices are usually set annually such that the regulated firm is allowed to cover its production costs plus some fair rate of return on its investment. Therefore, the firm has little incentive to reduce its costs and has an incentive to overcapitalise, creating productive inefficiencies (Averch and Johnson, 1962).

Box IV.2. **Price-cap regulation**

With price-cap regulation the regulator sets a cap, including an adjustment factor X, for a specified period, that the firm can charge for a defined basket of goods and services.[1] Over longer intervals, the adjustment factors and the baskets are reviewed and possibly changed. For the pre-specified period, however, the company can make any changes it wishes to prices, provided that the change in the average price of the specified basket of goods and services is below or equal to the price cap.[2] Thus, the firm has an incentive to reduce costs and part of these cost reductions can be passed on to consumers *via* the adjustment factor X. Price-cap regulation is not, however, a panacea for all regulatory problems. This is because, regardless of the form of price regulation, asymmetric information inevitably leads to regulators being poorly informed relative to those they regulate and provides incentives for strategic behaviour on the part of regulated firms.

An important issue in price cap regulation is the determination of the caps and the frequency with which they are adjusted, especially the value of X. The shorter the interval between the setting of the price caps, the closer RPI-X is to rate-of-return regulation, see Acton and Vogelsang (1989). This is because, when reviewing the value of X, the regulator's perception of the scope for performance improvements is influenced by how well the incumbent has done in the recent past as indicated by its rate of profit. Since at the end of the day the regulator uses the rate of return as a benchmark when setting the cap, the firm may still have an incentive to inflate or distort its costs. A further problem arises when excessive profitability leads to unanticipated changes in the value of X since these changes may weaken the incentives that price cap regulation is supposed to instil and be detrimental for both investment and entry in the industry. Price-cap regulation also subjects firms to greater risks and, therefore, may raise their cost of capital (Alexander and Timothy, 1996). By shifting some of the risk to the public, rate-of-return regulation can lower the risk premium demanded by the regulated firm.

Another issue is that, as in rate-of-return regulation, an inappropriate design of price caps may fail to prevent cross-subsidisation, which is allocatively inefficient and may be used anti-competitively. This may happen when firms are selling some goods or services in potentially competitive markets: the incumbent firm can bundle competitive services with monopoly services and has an incentive to set prices (within allowances permitted by the cap) to the detriment of competition. It is important, therefore, to determine a suitable composition of the basket of goods and services that are subject to the price cap. For instance, by placing sub-caps on the non-competitive activities, price regulation may be used to prevent anti-competitive cross-subsidisation. It may be easier, however, to remove incentives for cross-subsidisation by separating non-competitive activities from those that are competitive.

1. It is also possible to have sub-caps on individual services within the overall basket.
2. Most countries use the retail price index (RPI) minus X. However, some countries (*e.g.* Australia) use the consumer price index (CPI) as the representative index instead of the retail price index.

… but its actual outcomes depend on how it is applied in practice

Although in principle price-cap regulation provides better incentives for productive efficiency, its merits relative to rate-of-return regulation depend on how it is applied in practice (see Box IV.2).[14] An alternative to either rate-of-return or price-cap regulation is some intermediate form of regulation such as profit-sharing, which permits the sharing of risks and rewards between owners and consumers. This retains the incentives to minimise costs provided by price cap regulation while, at the same time, minimising the risk of unanticipated changes in the regulatory contract which may have adverse consequences on the incentives of regulated firms (see below).

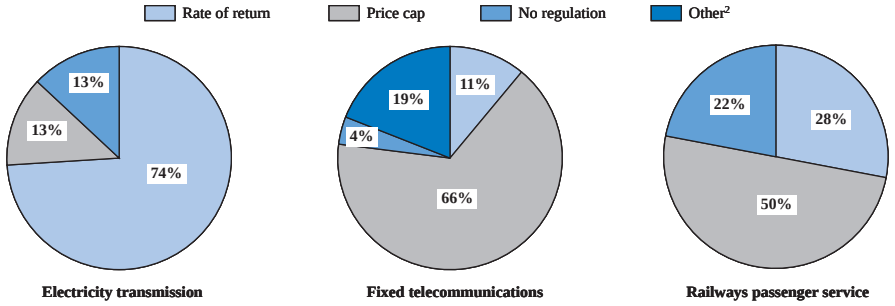
Access pricing has a crucial bearing on the outcomes of entry liberalisation and competitively neutral rules are to be sought

Interconnection or access charges, which determine the price at which entrants will be granted access to the network of a vertically-integrated incumbent, play a crucial role in the success or failure of entry in competitive services. Given the market power of incumbents, access charges will generally have to be regulated.[15] The regulator's dilemma is to find rules for setting access charges at a level that will only allow entry of competitors that are at least as efficient as the incumbent in supplying

14. Where quality is difficult to observe rate-of-return regulation may be preferable since it weakens the incentives of the regulated firm to reduce costs at the expense of product quality.
15. This kind of regulation can take many forms. The approach taken in New Zealand is one of "light-handed" regulation, in which access charges are freely negotiated between operators and the terms of these agreements are made public. This approach relies on competition authorities to discipline the market power of incumbents, in conjunction with the threat of more intrusive regulatory interventions (or "standard" regulation) when anti-competitive behaviour is observed (OECD, 1999b).

Figure IV.4. **Price regulation, 1998**

Percentage of OECD countries falling in each category[1]



1. Country coverage changes across sectors and indicators, ranging from 18 countries in electricity to 27 countries in telecommunications.
2. Including discretionary tariff approval.

Sources: OECD International Regulation Database; OECD (2000).

competitive products. Charges that are too high relative to the costs incurred by the incumbent in providing access will deter entry into competitive markets, prevent competitors that are potentially more efficient from surviving and encourage potentially wasteful investment in alternative networks.[16] Setting charges below the pertinent costs of the incumbent (which effectively amounts to a subsidy to entrants) also distorts the competitive process by inducing entry of competitors that provide products in competitive markets less efficiently than the incumbent (so-called "inefficient entry").

Congestion pricing can improve the allocation of scarce capacity

Congestion pricing is a useful regulatory mechanism for improving the allocation of a given amount of scarce network capacity and encourage the creation of new capacity to meet long-run trends in demand.[17] For instance, OECD governments have sometimes attempted to promote congestion pricing in airport use, in order to remedy the absence of a market mechanism for airport slots (*i.e.* landing or take-off rights in a given time period). In some countries peak-load charging was implemented, adjusting landing and take-off charges to variable demand levels at different times of the day. In a handful of OECD airports, free pricing in a (more or less organised) market for slots is allowed. The two mechanisms apply the same principle, even if slot pricing is potentially more effective than peak-load charging in equilibrating supply and demand and allocating capacity to their most efficient users.[18]

16. When access/interconnection tariffs are set above costs, new entry may lead to a duplication of the network which is not cost efficient (so-called "inefficient bypass"). Since final retail prices will reflect access charges, this can also result in entry into competitive activities of competitors that are less efficient than the incumbent in providing the competitive products. For example, large business users may build alternative facilities so as to bypass the network and avoid access charges, while at the same time providing themselves with the competitive products. This entry is inefficient if it would not have occurred with prices reflecting underlying costs.
17. Congestion appears either when the property rights are not well defined, or when mutual trading and contracting is excluded.
18. The important difference between the two approaches is that peak-load charging is akin to a spot contract and slot pricing is equivalent to a long-term contract for the right to land at a specific time and location. Typically, peak-load charging fails to change the existing allocation of slots among airlines (deriving from their "grandfather rights"), may imply very sharp fluctuations in airport charges for fully equilibrating supply and demand and may lead to welfare losses if charges are not set at the market clearing levels. On the other hand, slot-pricing is beneficial only if appropriate (*ex ante* or *ex post*) regulatory safeguards against the concentrated appropriation of slots by individual airlines are in place and a sufficient amount of slots is put on the market.

Structural measures

Privatisation may be a pre-requisite for unleashing market incentives…

Privatisation of public monopolies may often be a prior and necessary condition for unleashing market forces. It can also enhance the incentives of the incumbents' management and provide a better environment for entry liberalisation. In a market that features a state-owned incumbent the incentives of the government to engage in behaviour that favours the incumbent at the expense of other firms in the industry is high, particularly if the state-owned enterprise is ailing. This, in turn, may deter entry since potential entrants may be concerned about "unfair" competition. Privatisation may also make it easier to unbundle horizontally or vertically some of the activities owned by the former state monopoly. Their separate sale to different private investors may enhance competitive developments and facilitate the regulator's task by providing benchmarks against which to evaluate the performance of regulated firms.[19]

… provided the market and regulatory environment is friendly to competition

The experience of OECD countries shows, however, that privatisation needs to be accompanied by reforms that adjust the regulatory environment to the operation of the former public enterprise as a private business. These include: *i)* ring-fencing the non-competitive segments (*e.g.* through vertical separation) and exposing to competition the competitive segments of its activities; *ii)* equipping the regulator with the powers and the resources needed to stimulate cost efficiency, keeping market power under control and monitoring the quality of the products provided by the privatised firm;[20] and *iii)* ensuring that market regulation is consistent with the objective of making the corporate governance framework as efficient as possible.

Vertical separation alleviates the regulatory burden by making entry easier and preventing anti-competitive behaviour

Vertical separation of the ownership of competitive activities from the non-competitive component (supported by restrictions preventing re-integration into competitive activities) alleviates the regulatory burden and reduces the incentives of network owners to restrict access to rival firms in the upstream or downstream (potentially competitive) markets.[21] Especially when reliable information on costs and demand are difficult to obtain from the regulated firm, vertical separation reduces the opportunities and incentives for shifting costs and profits around within the firm for strategic purposes aimed at both rival firms and the regulator.[22] Weaker forms of separation, including accounting separation and 'functional' separation, do not overcome the incentives of the incumbent to "play games" with the regulator and restrict competition in the competitive activities, as it remains possible to strategically re-allocate costs and engage in other anti-competitive behaviour.[23] However, it is often the case that there are economies of scope between the various components

19. In some cases, such as in the airport industry, coupling congestion pricing with privatisation may lead to a closer relationship between the expansion of fixed infrastructures and demand developments, reducing the distortions related to congestion phenomena.
20. In many OECD countries this has involved taking away regulatory powers from the incumbent and/or the creation of new (horizontal or sector-specific) regulatory authorities having a statutory independence from the government.
21. A vertically integrated structure is less of a problem if competition can substitute for regulation. For example, to the extent that there is competition from air and road transport, vertical integration in the rail industry may not be an over-arching concern, unless the rail industry is immune to such competition (*e.g.* because of subsidies).
22. For example, vertical separation avoids the regulatory headache of allocating costs that are common to several activities in a vertically-integrated industry, and requires information only on the costs of providing access to the network facility. Where sufficient competition exists in the potentially competitive segments of the industry, vertically separating them from the non-competitive network segment may make it feasible to completely deregulate final prices while only regulating the price of the non-competitive component.
23. Hilmer (1993) argues that the failure to make a full separation of ownership and control, despite liberalisation and privatisation, is the major reason why infrastructure reform in the United Kingdom (*e.g.* in the gas industry) has not produced all the expected welfare gains.

Table IV.1. **Vertical separation in the electricity industry and in rail transport, 1998**

	Electricity		Rail transport
	Vertical integration (generation through supply)	Generation and transmission	Infrastructure and services
United States	Integrated	Accounting separation	Integrated[a]
Japan	Mixed	Integrated	Integrated
Germany	Unbundled	Accounting separation	Accounting separation[a]
France	Integrated	Integrated	Separate companies[b]
Italy	Integrated	Integrated	Accounting separation[c]
United Kingdom	Unbundled	Separate companies	Separate companies
Canada	Integrated	Integrated	Integrated
Australia	Mixed	Separate companies	Different state regimes
Austria	. .	. .	Accounting separation
Belgium	Integrated	Integrated	Accounting separation
Czech Republic	. .	. .	Accounting separation[c]
Denmark	Integrated	Accounting separation	Separate companies
Finland	Unbundled	Separate companies	Separate companies
Greece	Integrated	Integrated	. .
Hungary	. .	. .	Accounting separation
Ireland	Mixed	Accounting separation	Integrated
Korea	. .	. .	Integrated
Netherlands	Mixed	Integrated	Separate companies[d]
New Zealand	Mixed	Separate companies	Integrated
Norway	Unbundled	Separate companies	Separate companies
Poland	. .	. .	Accounting separation
Portugal	Mixed	Accounting separation	Separate companies
Spain	Mixed	Accounting separation	Accounting separation[c]
Sweden	Mixed	Separate companies	Separate companies
Switzerland	. .	. .	Accounting separation[c]
Turkey	. .	. .	Integrated

a) Open access provisions.
b) Infrastructure independent, but managed and maintained by service operator.
c) Infrastructure a separate division of service operator.
d) Infrastructure subsidiary of service operator.
Source: European Conference of Ministers of Transport, 1998; and OECD International Regulation Database.

of network industries (such as economies of co-ordination in rail transport), which argue in favour of vertical integration. At the end of the day, therefore, the benefits of vertical integration need to be weighed against their costs.[24] An increasing number of OECD countries is implementing some form of vertical separation in network industries (Table IV.1), but many use accounting separation as the regulatory instrument.

Horizontal separation may also enhance competitive developments and facilitate the task of the regulator

Horizontal separation, *i.e.* the breakup of similar activities formerly operated by the same firm, can also be instrumental in enhancing competitive developments and facilitating the task of the regulator. For instance, in many countries, the introduction of competition in the generation segment of the electricity supply industry can be made more effective by the (at least partial) breakup, and subsequent sale to different investors, of the generation potential belonging to the former state monopolies. In the absence of breakup, new entrants are unlikely to challenge the competitive position of the incumbent after lib-

24. The loss in economies of scope is mitigated when vertical contractual arrangements (between separate companies) can be used to reap the benefits of vertical integration. This may depend, in part, on the nature of the legal system. A legal system that is accommodating to the needs of long-term contracts is a factor in favour of separation; and a weak or imperfect legal system will be a factor in favour of integration. See Biggar (2000) for a discussion of when regulated companies should be vertically separated.

eralisation. Horizontal breakup may also be a prerequisite for applying the methods of yardstick regulation, which uses the performance of other firms as a benchmark by which to compare the performance of the regulated firm, thereby enhancing the information available to the regulator.[25] For instance, the monitoring of cost-efficiency of electricity distribution and airport companies can be greatly facilitated by the existence of several independent companies operating at the local level.[26]

Non-economic objectives

Non-economic objectives have remained a continuing public policy concern…

Network industries such as telecommunications, energy and rail are often required by governments to undertake non-commercial activities that fall into two broad categories: obligations to provide the basic service to all who request it at a uniform and/or "affordable" price ("universal service" or "carrier of last resort" obligations), and community service obligations (*e.g.* the provision of public telephone boxes) or special concessions to consumers who are deemed to be in need of some form of support (*e.g.* low user and lifeline tariffs, or the supply of special apparatus for the disabled). In industries where the risks for public health and the environment are perceived to be highest, such as in transportation and energy supply, non-economic objectives also include safety and environmental sustainability.

… but fears that competition will threaten them are often unjustified

Non-economic objectives have remained a continuing public policy concern, but meeting them in a competitive environment raises issues about regulatory design and the choice of the most effective policy instruments. In some countries, concern over the threat to universal and other public service or social obligations sometimes encouraged by incumbents, is a central factor impeding market liberalisation. However, there is growing empirical evidence, at least in telecommunications, that these obligations are not threatened by competitive entry. This is either because removing such obligations does not always imply a significant burden on consumers, especially in mature industries where penetration rates are already high, or because the relatively low costs they imply for incumbents do not always jeopardise their ability to compete. Where burdens are more significant, they can be financed in ways that are consistent with market competition.

The maintenance of public service obligations need not stand in the way of greater competition and cost-based pricing

Public service and social obligations imply that prices are not sufficient to cover some marginal costs. Historically, these obligations have been funded through the use of cross-subsidies. However, funding social and universal service obligations through distortions in the tariff structure is often at odds with efficient pricing and the promotion of competition, and can encourage entry by competitors that are less efficient than the incumbent.[27] In light of this, most OECD countries have undertaken a re-balancing of the tariff structures of fixed telephony (and, much less frequently, energy supplies) to make them more reflective of underlying costs. In this way costs and prices of

25. Benchmarks may include the costs of specific inputs, the rate of return earned and cost of capital faced by firms with similar technologies or capital needs. In some cases, the regulator may also use the performance of similar firms in other countries.
26. The wholesale privatisation of British Airport Authority has been criticised for missing the opportunity to introduce airport competition in the London metropolitan area and make yardstick regulation possible (see, Vickers and Yarrow, 1988; and Starkie and Thompson, 1985).
27. Inefficient entry occurs due to the possibilities for "cream-skimming" that arise from product prices that are above costs due to distortions in the tariff structure. Cross-subsidies can flow from competitive to non-competitive activities (*e.g.* prices for long-distance telephony subsidising the cost of local access) or can arise from uniform tariff structures even though there may be significant differences in costs of supply (*e.g.* geographically uniform electricity transmission charges).

Table IV.2. **Funding public service obligations in telecommunications, 1999**

	Funding mechanisms
Australia	The costs of the public service obligations (PSO) must be shared among carriers so that no one carrier is disadvantaged. To this end, the costs of the PSO are shared in proportion to carriers' shares of "eligible revenue". After obtaining the consent of participating carriers, the Minister may specify another cost-sharing mechanism.
Canada	Carriers are required to contribute to the PSO requirement through a Portable Contribution Subsidy. The Subsidy is an explicit toll levied on all long-distance traffic carried on the local telephone network. The funds are distributed to all local carriers based on subsidy requirements per residential Network Access Services or equivalent by rate band.
Denmark	If it is proven that a deficit exists in the provision of universal service, the regulator will collect a contribution from fixed voice telephony service providers on the basis of turnover.
Finland	There is no specific universal scheme and as such universal service costs are not borne by other market participants. Incumbent must meet all universal service costs.
France	A national universal service fund was established in 1997. Net cost of overall geographic supply will be compensated by interconnection surcharges until 31 December 2000 at the latest.
Japan	Designated carriers must bear the cost of the PSO provision which are funded by geographically uniform access charges and by long-distance charges. Funding of the PSO is to be reviewed in 2000.
New Zealand	Kiwi Share Obligation is met by TCNZ through surcharges on its interconnection rates. Public disclosure of Kiwi Share costs are required from January 2000.
Norway	The incumbent operator bears PSO costs based on its licence requirement.
Poland	Establishment of a PSO fund is predicted in the draft of new telecommunication law.
Spain	Telefonica has been designated the dominant operator required to fund universal service until the end of 2005.
Sweden	There is no specific universal scheme and as such universal service costs are not borne by other market players. Incumbent must meet all universal service costs.
Switzerland	Universal service licence granted on a periodic basis by tender. If a need for funding is noted, the granting authorities (ComCom/OFCOM) can impose a fee on companies with a licence.
United Kingdom	BT is responsible for the provision of the universal service obligation but the cost of the obligation is not re-imbursed. Kingston Telecom is also responsible for the provision of universal service.
United States	Each telecommunications carrier that provides interstate or intrastate telecommunications services must contribute, on an equitable and non-discriminatory basis, to the provision of universal service.
European Union	The European Commission permits, but does not require, the establishment of cost-sharing arrangements to finance PSO. It reports that nine Member States (from a total of 15) have decided either that the costs of the PSO do not constitute an unfair burden on the provider or that the costs of establishing a fund are not justified. The rebalancing taking place in Europe, to the extent that it has reduced constraints on cost recovery, may have reduced the burden on incumbents.

Sources: OECD (2000); Productivity Commission (1999).

competitive services can be lowered and the potential for the introduction of innovative services can be raised, for the benefit of consumers. Where the burden of social obligations is significant, the re-balancing process raises two related issues: how to fund any compensation for incumbents with continued obligations but no access to cross-subsidisation and how to offset any undesired effect on income distribution.

Cost-effective and competitively neutral mechanisms for funding public service obligations can be found…

Incumbents may need to be compensated because not reimbursing them for the cost of social obligations puts the universal service provider at a disadvantage in a competitive regime. A wide variety of funding mechanisms has been adopted in the telecommunications industry across OECD countries (Table IV.2). A common way of funding obligations is through interconnection tariffs, (*e.g.* Canada, France, New Zealand) but this can run counter to the objective of promoting competition.[28] Alternatively, these

28. For example, public service obligations funded through interconnection fees can result in access charges that not only deter entry but also prevent more efficient existing competitors from surviving (Baumol, 1999). Furthermore, contributions through access charges or geographically uniform tariffs can lead to inefficient bypass (Vogelsang and Mitchell, 1997).

costs are shared amongst carriers in proportion to their share of "eligible revenue" so that no one carrier is disadvantaged (*e.g.* the United States, Australia).[29]

… and undesired redistributive effects can be addressed through fiscal measures

If the concern is about the impact of tariff re-balancing on low-income households, alternatives to cross-subsidies include direct cash transfers to consumers or direct subsidies to operators serving remote rural areas at prices below costs or meeting other social obligations. The latter approach is increasingly being considered as a way to fund public service obligations in air and rail transport services.[30] While the fiscal burden would be greater, it helps make the cost of meeting such obligations more transparent. Regulators can use auctions in which firms bid to supply public service obligations at the lowest cost to minimise the subsidy to be provided by the government.

Evidence from the airline industry suggests that safety standards can be maintained in a liberalised environment…

Economic analysis and practical experience show that desirable safety and environment targets in sensitive industries such as transportation and energy may not be attained through market mechanisms alone. However, the combination of market incentives introduced by reforms, the increasing use of economic instruments (*e.g.* "green" taxes, tradable emission rights) and enhanced regulation may help to reach those targets more effectively. For instance, contrary to widely publicised warnings about deterioration of safety under competition, air transport reforms generally seem to have been accompanied with a clear improvement in safety performance. However, in drawing policy conclusions from these experiences the respective roles of long-term technological trends, market incentives introduced by reforms, and the impact of enhanced safety regulations must be distinguished.

… and more use of incentive regulation could help to reach environmental targets

In the areas considered in this chapter, less progress has been made on the environment side (*e.g.* control of engine gas emissions, noise emissions and traffic congestion), where an increased use of incentive regulation could help limit distortions. For instance, economic instruments could usefully supplement, or sometimes replace, command-and-control regulations such as international, regional or national standards concerning noise and gas emissions. Although fuel taxes are often high (except in North America), they are rarely based on (and in proportion to) external effects, and are frequently applied at different rates in different transportation modes, failing to bridge the gap between the social and private costs of transportation across modes and introducing distortions in the modal distribution of transport output. In particular, in-flight gas emissions are unregulated and aircraft fuel is exempt from tax in most countries.[31] As environment concerns, including climate change, put upward pressure on energy costs to other transport modes, the non-taxation of aircraft fuel becomes an increasingly important distortion. Another potential economic instrument relates to noise pollution. Governments could impose airport-specific variable noise taxes, and authorise tradable noise emission permits for different periods of the day.[32]

29. While this approach is more efficient than funding through cross-subsidies in the tariff structure or through interconnection charges, it only partially overcomes the funding problem. The problem arises since contributions are generally based on revenues and not profits. For example, if the incumbent were to break-even before contributing to the fund then it would operate at a loss after contributing to the fund since contributions are based on revenues. However, the problem with using profits as the basis for contributions is that profits are inherently difficult to measure.
30. The US "Essential Air Service" program for small communities utilises this approach. The European Union has adopted and recommends a similar policy for funding public service obligations in regional air transport.
31. Sweden is an exception, having introduced an airport fuel tax in 1989.
32. Tradable noise permits in specific airports and periods of the day may facilitate a more flexible allocation of available noise tolerance – to the airlines valuing them most. These permits may give positive incentives to noise-reducing airlines, by permitting them to commercialise their "noise savings".

Regulatory mechanisms and institutions

The potential for regulatory capture and excessive regulatory discretion must be considered

Regulators have the power to generate and redistribute rents across various interest groups, for instance, by creating or preserving monopoly positions or by maintaining cross-subsidies in the tariff structure. Therefore, regulated firms or the beneficiaries of regulation (such as user groups) have a strong incentive to attempt to "capture" the regulator so that the industry is regulated in their own interests. There is also a risk that an excessive use of discretionary power by regulators may distort investment incentives in the industry by introducing too much uncertainty about the regulatory provisions firms will have to face in the future. Therefore, the possibility of regulatory capture and the effects of excessive regulatory uncertainty both need to be taken into account in designing regulatory mechanisms and institutions.

Table IV.3. **Synopsis of regulatory institutions in telecommunications, 1999**

Number of countries in each category

Institutions	Role		Competencies						
			Regulatory responsibilities for licensing			Interconnection		Pricing	Service quality
	Yes	No	Issuance	Oversight of provisions	Mergers	Approval of charges set by dominant operators	Dispute resolution		
Ministry department	19	10	14	8	4	5	4	11	4
Competition authority	22	7	0	1	21	1	1	3	1
Sectoral regulator	25	4	16	20	6	18	24	16	23
of which:									
– Head appointed by president or prime minister (*vs.* sectoral minister)	15	12							
– Decision cannot be overturned by executive branch	20	7							
– Funded by industry fees (*vs.* general government budget)	17	10							

Source: Gonenc *et al.* (2000).

"Independence" of regulators can reduce the potential for capture…

Many OECD countries have aimed at limiting the potential for regulatory capture by attempting to create regulatory institutions that are "independent" of the executive branch of government (see Table IV.3 for a summary description of telecommunications regulation in the OECD). Making the regulator's status less dependent on political power limits the risk that private sector lobbies may use their political influence to affect regulatory decisions.[33] However, it does not eliminate the danger of capture by the regulated industry. Though complete independence may not be attainable in practice, desirable requirements include: *i)* providing the regulator with a legal mandate (covering also the cases and procedures for overruling its decisions); *ii)* ensuring that it is structurally separated and autonomous from the government; *iii)* defining a multi-party process for its appointment (*e.g.* involving both

33. This risk is particularly high in the case of public utilities, whose list of customers is practically identical to the voters' list (OECD, 1999*b*). Another line of argument not developed here is that politicians grant agencies independence especially when this can help shift the blame for politically difficult policy decisions onto agencies (Fiorina, 1982).

executive and legislative bodies); *iv)* protecting it from arbitrary removal (*e.g.* through fixed terms); *v)* defining its professional standards and adequate remuneration levels; and *vi)* designing a reliable source of funding (*e.g.* industry fees).[34]

… but there is no agreement on the best institutional setting

While the "independence" principle is widespread, institutional design differs across the OECD. The main patterns are several sector-specific regulators, as in the United States (at the federal level) and in most European countries, or an all-purpose regulator that cuts across several regulated industries, as in Australia and many US states.[35] Both types of institutional settings have merits and shortcomings. Multiple industry-specific regulators may provide a better information base for regulation, but may be more easily captured by the industries they regulate and may generate regulatory inconsistencies across industries, possibly distorting investment incentives (Helm, 1994).[36] All-purpose regulators may have less information, but they may also ensure regulatory consistency and cost-effectiveness, and be less prone to capture.[37]

Regulatory mechanisms should also be designed to limit regulatory risk…

Too much discretion for regulators also increases the "regulatory risk" faced by regulated firms, with potentially adverse effects on regulatory outcomes. For instance, re-setting price caps in between review periods or disallowing capital investments from the base for rate-of-return regulation can sometimes be justified *ex post* on economic or distributive grounds, but the risk of such regulatory moves can have undesired consequences for the investment of the regulated firms. Possible safeguards against excessive discretion of regulators include statutory or legal requirements ensuring that firms can finance their regulated activities, *ex ante* provisions for profit sharing between price-capped firms and customers (Baron, 1995),[38] the possibility for regulated firms to seek the judgement of competition authorities and/or of courts, and increasing the openness of regulatory decision making and of corporate reporting.

… though a balance between precommitment and flexibility should be sought

Regulatory mechanisms should incorporate a degree of pre-commitment so as to reduce the risk to firms that investment will be made unprofitable by subsequent regulatory decision while also, possibly, pre-empting political pressures arising as regulatory outcomes become known. Precommitment and constraints to regulatory discretion should not prejudge, however, the effectiveness of regulatory enforcement and the ability of the regulator to adjust regulation to changing technological and market conditions.

34. OECD (2000) discusses requirements for regulatory independence in the telecommunications industry. See also Smith (1997).
35. New Zealand is the only country that relies exclusively on the application of the general competition law.
36. Asymmetries are reduced because separation of regulators increases the total amount of information collected, limits the amount of private information that each regulator can use (Laffont and Martimort, 1999) and make it possible to compare the behaviour of different regulators (Neven *et al.*, 1993). A more direct way to reduce information asymmetries is to increase the transparency of regulation and the regulatory reform process for the public.
37. Because all-purpose regulators mediate interests of several industries at once, capture by any single industry may be more resource intensive than with an industry-specific regulator. Moreover, decision-making bodies in all-purpose regulatory institutions are less likely to have the kind of in-depth knowledge of the industry that would make them particularly valuable later on as employees or lobbyists for the regulated firms (OECD, 1999*b*)
38. Such provisions may sometimes help to reduce political pressures to rescind the price cap system in the event of unexpectedly high rates of return. They have been used in the United States in designing price cap policies for access charges to local telephone networks.

Conclusions

Regulatory reform has been implemented across the OECD area for more than two decades, with the focus increasingly put on network industries. By and large, reforms seem to have increased productive efficiency and consumer choice while at the same time lowering prices. In certain industries reforms have entailed the elimination of regulatory controls, but in others regulation remains necessary and reform has aimed to improve its quality and effectiveness. Governments have often relied on a learning-by-doing process to find innovative and effective ways to deal with these issues. Learning is set to remain important with the agenda for regulatory reform advancing continuously in response to developments in technology, consumer demand and market structure. Comparing approaches and outcomes of regulatory reform across countries is an important input to this learning process.

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