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Regulation in Services:
OECD Patterns and
Economic Implications

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ABSTRACT/RÉSUMÉ

The paper looks at patterns of regulation in service industries and explores their implications for service performance. Focusing on restrictions to market mechanisms, a map of the state of service regulation in OECD countries is provided, based on data recently collected and summarised by the OECD. The paper also surveys the available cross-country empirical evidence on the effects of regulatory reform on service productivity, prices and innovation. Finally, it discusses ways in which regulation can encourage competition, efficiency and investment in those segments of the service industries where non-competitive elements persist. The main conclusions reached are: *i*) in the past two decades OECD governments extensively reformed regulatory environments in both competitive and network service industries, generally making them closer to market mechanisms; *ii*) however due to differences in initial conditions and in the pace of reform, within each service industry the dispersion of regulatory approaches is still wide and a large scope for further reform exists; *iii*) cross-country empirical evidence suggests that these reforms could contribute substantially to improve economic performance and living standards in the OECD area; *iv*) but to take full advantage of the reform process, policies in network service industries should take into due account the implications of regulatory settings for the incentives of regulated firms to invest and innovate.

JEL classification: L50, L51, L43, K23, L9, L80.

Keywords: Regulation, liberalisation, privatisation, regulatory reform, network industries, competition policy, services.

Cette étude analyse les approches réglementaires dans les secteurs des services et explore leurs implications pour les performances sectorielles dans les pays de l'OCDE. En concentrant l'attention sur les restrictions imposées aux mécanismes de marché, l'étude décrit l'état de la régulation des services en 1998 à partir des données récemment rassemblées par l'OCDE. L'étude examine aussi l'évidence empirique concernant les effets de la réforme de la réglementation sur la productivité, les prix et l'innovation dans les services. Enfin, elle analyse la manière dont la régulation peut encourager la concurrence, l'efficacité et l'investissement dans les marchés des services où il existe encore des segments non-concurrentiels. Les principales conclusions sont : *i*) au cours des deux dernières décennies les gouvernements de l'OCDE ont réformé d'une façon extensive les réglementations concernant les services purement concurrentiels et les services de réseaux ; *ii*) pourtant, à cause de différences dans les conditions initiales et dans le rythme des réformes, pour chaque service il existe encore de fortes disparités dans les approches réglementaires, et les possibilités de réforme sont loin d'être épuisées ; *iii*) l'évidence empirique au niveau international suggère que ces réformes pourraient contribuer d'une façon substantielle à l'amélioration des performances sectorielles et du niveau de vie des consommateurs dans les pays de l'OCDE ; *iv*) toutefois les avantages de ces réformes ne seront pas complets si les politiques mises en œuvre dans les services de réseaux ne tiennent pas suffisamment compte des implications des contextes réglementaires pour les incitations à l'investissement et à l'innovation des entreprises régulées.

Classification JEL : L50, L51, L43, K23, L9, L80.

Mots-clés : Réglementation, libéralisation, privatisation, réforme de la réglementation, industries de réseau, politique de la concurrence, services.

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REGULATION IN SERVICES: OECD PATTERNS AND ECONOMIC IMPLICATIONS

Giuseppe Nicoletti¹

I. Introduction

1. Service industries are characterised by several stylised facts in industrial countries.² Their contribution to GDP and employment growth is increasingly important and, hence, they represent a growing share of OECD economies. Services also represent a growing share of world trade and FDI, but in absolute terms their share in trade remains relatively small and, as a result, international competition still exerts little discipline on domestic industries. Historically, services have been highly regulated, partly due to pervasive market failures in some industries, but also as a result of the domestic influence of special interest groups sheltered from foreign competitive pressures. In the past two decades, many service markets have been extensively liberalised and, where it remained necessary, service regulation has often been overhauled. However, initial conditions differed a lot across countries, and the pace and extent of regulatory reform also differed widely. As a result, the friendliness to market mechanisms of regulatory environments remains uneven across countries in many service industries. There are good reasons to believe that this reduces consumer welfare and constitutes a major hindrance to growth and innovation in this crucial sector of OECD economies.

2. This paper looks at patterns of regulation in service industries and explores their implications for service performance. It surveys the available empirical evidence on the effects of regulatory reform on service productivity, prices and innovation and discusses ways in which regulation can encourage competition, efficiency and investment in those segments of the service industries where non-competitive elements persist. To this end, regulatory environments in industries that are structurally competitive, such as road freight and retail distribution, and in network industries, where competitive and non-competitive markets coexist, are analysed separately. For illustrative purposes, mobile telephony and air passenger travel are included among the structurally-competitive industries, though they share some characteristics of network industries. Moreover, for the sake of completeness, the electricity supply industry is analysed together with other network industries, although *stricto sensu* electricity supply cannot be classified as a service. The analysis does not cover important areas such as financial, business, personal and community services.

3. The paper is organised as follows. In section II, a map of the state of service regulation in OECD countries is provided, drawing on data recently collected and summarised by the OECD. Regulatory

1. OECD Economics Department. This paper was presented at the Innovation and Productivity in Services Workshop held in Sydney, Australia, in November 2000. The paper largely draws on the results of the OECD Economics Department project on regulation and performance. Special thanks go to the other members of the regulation team -- Olivier Boylaud, Rauf Gonenc and Faye Steiner -- as well as to Stefano Scarpetta. I remain entirely responsible for errors and omissions. The opinions expressed in the paper are those of the author and do not engage the OECD or its Member countries.

2. See Pilat (2001) for an overview of the recent evolution of service industries in the OECD area.

environments are assessed based on their restrictive impact on market mechanisms, with no attempt to evaluate their quality or their ability to reach stated public policy objectives. In section III, the empirical evidence on the impact of different regulatory regimes on service sector performance is reviewed, focusing especially on cross-country studies. In section IV, issues of regulatory design in network industries are briefly discussed, focusing on ways in which entry of efficient operators can be encouraged in liberalised service markets, while at the same time stimulating the necessary investment in networks. The concluding remarks summarise the main findings and point out some areas of concern for policy.

II. Regulatory patterns: some cross-country evidence from the OECD database

4. Comparing regulation across countries can help policy-makers to situate their country across the range of possible regulatory policies, and economists to infer the economic consequences of different regulatory choices. However, the task is arduous because information about single regulatory provisions can hardly be analysed in isolation from the wider regulatory environment, and detailed information about regulatory environments is usually scarce and qualitative in nature. Furthermore, in many cases this information needs to be supplemented with data about market structure to provide an adequate picture of the state of competition in an industry.

5. To address some of these problems, the OECD has constructed a database and indicators containing detailed information about regulatory and market environments in the OECD area (see Box 1 and Figure 1). The data focus on economic and administrative regulations in the product market.³ Social (*e.g.* health and safety) and environmental regulations are not covered. The information collected is multidimensional, encompassing several aspects of a given regulatory area. The data collection methodology was uniform across countries, relying as much as possible on a multiple-choice questionnaire. The resulting data cover both industry-specific and economy-wide regulations, *i.e.* regulations that apply to all industries equally. Economy-wide data include administrative procedures needed for business start-ups. Industry-specific data focus on services and electricity supply.

[Figure 1. The OECD benchmarking exercise]

3. The OECD also collected data on labour market institutions and regulations (OECD 1999a). The same methodology described in this section has been applied to the subset of data contained in OECD (1999b) to construct indicators comparing employment protection legislations across countries (Nicoletti *et al.* 1999).

Box 1. The OECD International Regulation Database (IRD)

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 over 1 100 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 sector-specific regulations, regulatory settings and industry or market structures in:

- telecommunications (local, trunk and international fixed telephony; analogue and digital mobile telephony);
- transportation (road freight; air passenger travel; rail);
- electricity supply;
- retail distribution.

The database provides a "snapshot" of regulatory and market environments in (or around) 1998, as well as (for telecommunications and electricity supply) a time-series of regulations and market structures covering the past 15 years. Regulations and market structures in over 100 main international air routes are also covered. 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 is available on the OECD website at <http://www.oecd.org/subject/regdatabase/>

6. The data on regulation and market structure can be used for the purpose of international benchmarking, which is particularly instructive for policy making.⁴ However, to perform effective cross-country comparisons, data on regulations often need to be summarized, to facilitate a comparative assessment of cross-country approaches in different regulatory areas. In doing so, regulatory approaches need to be appraised using a uniform criterion. To this end, the OECD constructed summary indicators of economy-wide and industry-specific regulations measuring (along a least-to-most restrictive scale) the friendliness of regulatory environments to competition (see Box 2).⁵ Regulatory indicators were used to benchmark each country's environment against best practice in the OECD area and to investigate empirically the impact of cross-country differences in regulatory environments on economic performance.

4. International benchmarking has been conducted frequently by the European Commission to monitor and stimulate the process of European integration. The Australian government has also systematically benchmarked domestic regulation and performance in several areas and industries against policy practices and outcomes of commercial partners. See, for instance, Bureau of Industry Economics (1996) and Productivity Commission (1999).

5. An analysis of the cross-country patterns of regulation highlighted by the summary indicators, as well as details on sources and methodologies used for their construction can be found in OECD (1999c), Nicoletti *et al.* (1999) and Gonenc *et al.* (2000).

Box 2. The OECD summary indicators of regulation

The regulatory indicators are cardinal measures that summarise economy-wide and industry-specific regulations by regulatory domain. They are all designed to express the stringency of regulations, from least to most restrictive (generally along a 0-6 scale), as regards their impact on market competition. The indicators have a pyramidal structure. At the top of the pyramid they summarise the overall regulatory environment in the product market, in a regulatory area or in a specific industry. At lower levels, they summarise information about increasingly specific classes of regulatory interventions. The construction of the summary indicators involved several steps. First, the raw information contained in the database was coded into country scores. Second, a large set of detailed indicators were created by aggregating the country scores on individual regulatory provisions. The coding and the aggregation of different regulatory provisions typically involved some discretion in the construction of the detailed indicators. Third, the detailed indicators were summarised into more synthetic measures using a statistical approach based on factor analysis, in which each detailed indicator is weighted according to its contribution to the overall variance in the data. A similar approach to the analysis of economic data was used by Berlage and Terweduwe (1988).

Factor analysis is appealing because the aggregation of the detailed indicators is data-based and ensures that the resulting summary indicators account for a large part of the cross-country variance of the detailed indicators. In addition, factor analysis assigns the largest weights to the indicators that have the largest variation across countries, quite independently of prior views on their relative economic importance. Therefore, the focus is set only on those dimensions of regulation that are potentially useful for explaining the cross-country variation in regulatory environments and the summary indicators are constructed without pre-empting the conclusions of the analysis, since the weights do not depend on the analyst's beliefs as to the likely impact of regulations on performance. These properties are particularly desirable for cross-country comparisons of regulatory structures and analyses of the effects of differences in regulation on performance.

7. In the following, the OECD data and indicators are used to map the cross-country dispersion of product market regulations that potentially affect competition in service industries. In general, both economy-wide and industry-specific regulations may be relevant, to the extent that they restrict entry or business operation, or create fixed costs that increase the minimum efficient scale of companies. Here, the focus is set on three dimensions of industry-specific regulations: legal and/or administrative barriers to entry, involvement in business operation and the degree of vertical integration (in railway transportation and electricity supply). In addition, the economy-wide administrative requirements for businesses are also considered, since they may be particularly relevant for dynamic small and medium-sized service firms. For illustrative purposes, services are classified into competitive and network industries. The first group includes road freight, retail distribution, air passenger travel and mobile telephony. The second group includes fixed (trunk and international) telecommunications, railway transportation and electricity supply. As mentioned above, the latter is not usually classified among services but, from the standpoint of regulation, electricity supply shares many points in common with the other network industries, and hence was included in the analysis.

II.1 Economy-wide regulations

8. Economy-wide administrative requirements for businesses represent fixed costs that can play an important role especially in competitive service industries, such as road freight, retail distribution and communications services. These industries typically consist of a large number of small and medium-sized firms with high turnover rates. Costly administrative procedures, such as multiple and complicated licensing systems, may constitute barriers to entry, affecting the number of start-ups and the survival rate

of new firms, and providing market power to incumbents. Ultimately, the barriers to entry generated by regulation-induced fixed costs may create rents that impinge on consumer welfare.⁶

9. There is a large variability in administrative approaches across OECD countries. The OECD indicators summarise three main administrative dimensions as of 1998: administrative requirements for sole proprietor and corporate business start-ups (number of required licenses, number of competent government departments, average delays, direct and indirect costs); features of the licensing system (*e.g.* existence of “silence is consent” rules); and opacity of rules and regulations. Administrative burdens in the most regulated countries are estimated to be as much as six times heavier than in the most liberal ones. Interestingly, restrictive administrative regulations often go hand in hand with restrictive economic regulations - defined to include state control over business enterprises and legal barriers to competition (Figure 2). This correlation suggests that overall regulatory environments that are hostile to competition combine heavy administrative burdens with regulatory restrictions to market mechanisms. This combination of policies is bound to be particularly harmful in competitive service industries, curbing new entry and innovation.

[Figure 2. Regulatory approaches across countries: economic and administrative regulations]

II.2 Industry-specific regulation

10. Most restrictions to market mechanisms in services are industry-specific. They may affect entry, pricing and service provision. Some of these restrictions may be justified by the existence of market failures and by the wish to satisfy non-economic objectives, though the latter need not stand in the way of greater competition and cost-based pricing. However, many restrictions have no economic justification other than the protection of incumbents. Moreover, regulation is sometimes used as an improper tool for reaching policy objectives that could be obtained in a more transparent and less distorting way.⁷ Realising this, most OECD countries have reformed, sometimes radically, the regulatory environments in which services and electricity are provided. Using a simple characterisation of regulatory environments (as high/medium/low regulated), Figure 3 summarises entry price and service liberalisation in the competitive and network industries for which historical data on regulations is available. Reforms have been widespread in road freight and air passenger transport (though generally restricted to domestic and regional markets) as well as in telecommunications, but they have been much more limited in railway transportation and electricity supply. Despite the reforms, markets in network industries remain often dominated by incumbents and competitive pressures are weak.⁸

[Figure 3. Product market liberalisation in OECD countries]

11. Although in the past two decades many OECD countries have taken a more market-oriented approach in regulating services, a map of regulatory environments by country and industries in 1998 shows that industry-specific policy approaches still vary widely across countries and, in the same country, across industries. Table 1 summarises these environments for seven industries by means of the OECD summary

6. The role of private interest motivations in explaining administrative burdens on business start-ups has been recently analysed empirically by Djankov *et al.* (2000).

7. For a discussion of how non-economic objectives can continue to be achieved in more competitive environments at minimum cost for society, see Gonenc *et al.* (2000).

8. See Gonenc *et al.* (2000) and the references therein for more information on the evolution and current status of market structures in the service and electricity supply industries of OECD countries.

indicators (see Box 3).⁹ In each industry, policy approaches have been labelled “very liberal”, “liberal”, “restrictive” or “very restrictive” depending on whether the value of the summary indicator of regulation falls short or exceeds by more or less than one standard error the average value found in the OECD countries included in the sample. Indicators for retail distribution, road freight, mobile telephony and air passenger travel include barriers to entry and government involvement in business operation. Indicators for the network industries include only barriers to entry and industry structure: government involvement in business operation was assumed to be justified by the existence of the non-competitive segments. In mobile telephony and electricity supply barriers to entry refer to the digital and generation segments, respectively.

[Table 1. A map of regulatory environments in service industries and electricity supply]

Box 3. Summary description of the indicators of regulation

In road freight and retail distribution, indicators of barriers to entry include industry-specific administrative burdens, capacity limitations and participation of professional bodies to decisions concerning entry. In road freight they also include discriminatory provisions against foreign trucking companies and price restrictions; in retail distribution they also include special provisions concerning large outlets. Government involvement in business operations includes the use of command and control regulations (*e.g.* restrictions on driving periods, haulage, shop opening hours) and, in retail distribution, price controls. In mobile telephony, barriers to entry are defined as legal provisions limiting the number of competitors in the digital business. In air travel, the indicator of barriers to entry summarises information about liberalisation of domestic and regional routes, the existence of open-sky agreements on international routes and flag carrier entrenchment. In fixed telecommunications, barriers to entry include legal provisions limiting the number of competitors in long distance (trunk and international) services. In electricity, the indicator includes third party access provisions, the existence of an organised electricity market and the extent of consumer choice of supplier. In railways the indicator includes legal limitations on the number of competitors in the passenger and freight services. Only regulatory provisions applying at the national (or federal) level have been taken into account.

12. It should be stressed that the four types of policy approaches have to be interpreted in relative terms and in the light of the structural characteristics of the industries themselves. For instance, widespread reforms have considerably reduced the tightness of regulations throughout OECD countries, but the indicators in Table 1 measure the strictness of remaining regulations relative to the OECD average. Similarly, a “very restrictive” approach has a different meaning in railways, where non-competitive segments dominate, and in retail distribution, an industry that is structurally competitive. As a reminder of this, industries have been ordered from most to least competitive.

13. Ordering countries by the percentage of industries in which they are deemed to have a liberal approach, several clusters emerge:¹⁰ a very liberal cluster - including Australia, the United States, Sweden and the United Kingdom; a mostly liberal cluster - including Germany, the Netherlands, New Zealand, Finland, Norway, Korea, Canada, Ireland and Mexico; a cluster characterised by a balanced mix of liberal and restrictive approaches - including Iceland, Denmark, Belgium and Japan; and a mostly restrictive cluster including all the remaining countries. Among the latter, Poland, Italy, Turkey and Greece have particularly restrictive environments.

9. For details on how these indicators were constructed, see Gonenc *et al.* (2000), Boylaud (2000) and Gonenc and Nicoletti (2000).

10. This ordering is purely illustrative, since data for the seven industries was not available for all countries and the criteria for classifying countries into the four categories of policy approaches were somewhat arbitrary, especially for borderline countries.

14. Cross-country differences in approaches concern both competitive and network industries, but they are larger in the latter.¹¹ Interestingly, while countries having a liberal approach in network industries could be expected to have, *a fortiori*, a similar approach in competitive industries, this is not always the case: for instance, the United Kingdom and Germany have relatively restrictive policy stances in retail distribution and road freight, respectively, which is in sharp contrast with their liberal approach in other industries. Japan has a restrictive approach in several competitive industries and a mostly liberal approach in network industries.

15. These simple indicators are unable to tell whether liberal approaches are matched by policies that promote competition in liberalised markets. Taking a step in this direction by combining the regulatory data with information about market structures increases the polarisation between liberal and restrictive clusters by shifting Canada, Korea and Mexico towards the more liberal clusters, and other countries (especially Norway and Ireland) towards the less liberal clusters.

16. Through this kind of benchmarking, original “economic” rationales for restrictive regulations can be better assessed. In areas or industries where “zero-based” regulation is an option, looking at the experience of countries that have eliminated unnecessary restrictions to market access, pricing or service provision in an industry is particularly useful for deciding whether to push ahead with domestic reform or not. Examples of this are the “destructive competition” argument for restricting access or regulating prices of road freight, the “safety” argument for restricting access in air passenger travel, or the “spectrum scarcity” argument for limiting competition in mobile telephony. International examples of liberalisation in these industries have probably contributed as much as economic analyses to stimulate reform in OECD countries.

17. Summary indicators are less useful in evaluating the merit of different regulatory approaches in the non-competitive segments of network industries, where the devil is in the details. However, international benchmarking at a finer level of data disaggregation can provide some information on the scope for specific regulatory approaches. For instance, the available evidence on the use of price caps to regulate retail prices in different industries suggests that RPI-X rules have been massively adopted in fixed telecommunications and, to a lesser extent, in railways but are seldom used in the electricity supply industry. One of the reasons why price-cap regulation is more prevalent in telecommunications than in the electricity industry may be that cost information is easier to obtain in the latter.¹² Other areas in which benchmarking of regulation in network industries could be helpful are the scope for and the pricing of network access, the scope for and the funding of public service obligations, and the design of regulatory institutions.¹³ In many of these industries, reforming countries are still “experimenting” new regulatory approaches. Therefore, international benchmarking may help policy-makers to establish the range of possible options and their relative success.

III. Economic implications

18. Regulatory reform in services is likely to have effects both at the industry and macroeconomic levels. The benchmark against which to judge different regulatory approaches is their effect on productive

11. The cross-country standard deviations of the summary indicators of regulation in competitive industries range from 0.9 in road freight to 1.7 in mobile telephony, while they are around 2.5 in network industries.

12. Costs may be easier to allocate in electricity supply because the “product” is relatively homogeneous. Telephone networks deliver several different kinds of service (local, long-distance, mobile, data transmission, etc.). Therefore, in telecommunications, where informational requirements are high, more incentive-based measures may be required to promote efficiency in the industry.

13. Examples of this kind of benchmarking are provided in Gonenc *et al.* (2000).

efficiency, innovation and consumer welfare. Most of the empirical research has concerned their effects on the performance of specific industries in individual countries. Here, the focus will be on the available cross-country evidence concerning the economic effects of regulation and regulatory reform in the seven industries covered in the previous section of this paper as well as, in a more suggestive way, at the economy-wide level. Although this restricts the scope of the analysis to a thinner empirical literature, the interest of moving to a cross-country dimension is to see whether there are general conclusions that can be drawn as to the relative economic advantages of different regulatory choices.

III.1 Economy-wide effects of service regulation

19. While there have been attempts to estimate the overall welfare effects of certain reforms, very few studies have analysed how industry-specific effects work through the economy to affect macroeconomic outcomes, such as the rates of employment and GDP growth. Among such studies only two took a comparative cross-country approach: Haffner and Van Bergeijk (1996) summarised the evidence contained in several country-specific reports and in a report aimed at assessing the effects of the implementation of the EU Single Market;¹⁴ the OECD (1997) looked at the effects of a plausible medium-term programme of regulatory reform in eight countries using estimates of efficiency gains in several service industries.¹⁵ All these studies reported sizeable and positive effects of product market liberalisation, mainly concerning service industries, on the levels and growth rates of GDP. For instance, the OECD study reported long-run potential output gains ranging from 3 to 6 per cent in some European countries and Japan to 1 per cent in the United States, reflecting the initial state of regulation in different countries.

20. While these simulation studies can be suggestive of the welfare gains to be obtained from service sector regulatory reform, more direct empirical evidence of the linkages between reforms and macroeconomic outcomes is needed. To date few attempts have been made to estimate these linkages on the basis of the two decades long experience of OECD countries with regulatory reform. This is partly due to the inherent difficulty of summarising regulatory environments by means of quantitative indicators that can be used in empirical analysis as well as the lack of comparative and historical data on such environments across countries. Some recent studies, using the new OECD summary indicators of regulation, provide some initial insights on the possible linkages between service sector reforms and macroeconomic performance. Controlling for differences in GDP per capita, Messina-Granowski (2000) finds that anti-competitive product market regulations are associated with low employment shares of services in a cross section of 27 OECD countries. Controlling for several dimensions of labour market regulations and institutions, Nicoletti *et al.* (2000) find that such regulations also have a negative impact on business employment rates in a panel of 19 OECD countries over the 1982-1995 period. Finally, Bassanini *et al.* (2000) find a significant inverse relationship between anti-competitive regulations and catch up in TFP growth during the 1990s in a cross section of 18 OECD countries. Figure 4 attempts to illustrate these relationships by means of bivariate correlations using the same sample of OECD countries and a single indicator of regulation. The relationships are weaker than in the studies quoted above, but some suggestive evidence remains.

[Figure 4. Regulation, the employment rate, the share of service employment and total factor productivity]

14. The country-specific reports included the effects of service deregulation in Germany (Lipschitz *et al.*, 1989), the Netherlands (Van Sinderen *et al.*, 1994) and Australia (Industry Commission, 1995). The EU study was performed by Emerson *et al.*, 1995.

15. The OECD study combines static input-output effects with a dynamic macro simulation framework.

21. The robustness of these (highly tentative) findings has to be checked and the economics behind them needs to be developed further. However, a conjectural explanation may relate to the effect of regulations on service sector performance. Restrictive regulations, which often combine heavy administrative burdens with barriers to competition and extensive state control (see Figure 3 above), may disproportionately damage entrepreneurial initiative in services, curbing service sector growth.¹⁶ Given the high employment content of this sector, both its share in overall employment and employment rates may be negatively affected. Moreover, to the extent that dynamic service sector firms are intensive users of new information technologies, the ability of the economy to trigger “new economy” externalities is impaired, with negative consequences on productivity growth.

III.2 *Industry-specific effects*

22. Measuring output, costs and prices in services is particularly difficult. Pitfalls in measuring services output are well known.¹⁷ An important source of cost mismeasurement (and of regulatory failures) in network industries is the allocation of costs that are common across the different services provided through the network. Collecting meaningful service price data is often problematic either because they are not observable, such as in retail distribution, or because market and posted prices differ widely (*e.g.* due to discounts). These empirical problems are somewhat easier to handle on a single-country, single-industry basis, and indeed much of the existing evidence on the economic effects of service regulation and regulatory reform concerns individual industries and countries, especially the United States. In the following I briefly summarise the main conclusions of empirical studies covering competitive and network industries in different countries, and report more extensively on the results of cross-country studies, focusing on the recent work made at the OECD in this area.

III.2.1 *Competitive service industries*

Retail distribution

23. The main kinds of regulations affecting the retail distribution industry are legal or administrative entry barriers (restrictions on large outlets, requirements for setting up businesses, limitations on product ranges, etc.) and provisions that constrain business operation (opening hours, pricing restrictions, etc.) (Boylaund and Nicoletti, 2001a). Due to the difficulty of finding reliable data on both performance and regulatory regimes, most empirical studies of the effects of deregulation in the retail distribution industry are based on simulation techniques (see Pilat 1997, OECD 1997, van Bergeijk and Haffner, 1997, and the references therein).¹⁸ Only a few of them take an econometric approach using cross-country/time-series data on performance and/or regulation (Hoj *et al.*, 1995, Pilat, 1997). Both simulation and econometric studies point unequivocally to potentially large welfare gains from the liberalisation of entry and prices in retail trade:

- Distribution systems become more efficient (notably as large outlet restrictions are removed).

16. The most significant correlation found by Bassanini *et al.* (2000) is between the indicator of administrative regulations and the catch up in TFP growth.

17. These problems are reviewed in Bosworth and Triplett (2000).

18. The most economically relevant performance concept, distribution margins, is hard to estimate and depends on a host of local and country-specific factors (such as land-use regulations and real estate prices). Regulations on outlet start-ups and siting are often designed and implemented at the local level, making the information difficult to collect.

- Employment and the volume of sales increase.
- Margins decline putting downward pressure on consumer prices.¹⁹

24. Gains from liberalisation in these industries point to the lack of solid economic rationales for restricting access, service provision and prices (apart from provisions protecting consumers against abuse, such as transparency requirements on promotions and sales). The widespread benefits to be obtained from regulatory reform suggest that restrictive regulatory arrangements are mainly motivated by private interest factors (such as pressures to protect incumbents).²⁰ There remains, however, ample scope for further empirical research on the motivations and the effects of regulation in retail distribution.

25. For instance, some additional insights on the relationship between the regulatory environment and industry structure can be drawn from plotting across countries the OECD summary indicators of regulation in retail distribution against an index of industry concentration (Figure 5). The inverse relationship suggested by the figure can be interpreted as evidence that excessive regulation prevents the modernisation of the industry. However, this interpretation should be qualified to the extent that excessive concentration may be harmful to competition and, ultimately, consumer welfare. Efficiency gains in modern distribution systems are passed on to consumers only if competitive pressures remain strong and competition authorities keep in check that the increasing buying and market power of large distribution companies does not reduce competition between retailers (OECD, 1999*d*).

[Figure 5. Concentration and regulation in retail distribution]

Road freight

26. The main regulatory restrictions currently affecting road freight in the OECD area are discriminations against foreign hauliers, limitations on own-account transport and, in some countries, price controls; regulations limiting access or price-setting freedom are often designed and enforced in collaboration with professional bodies (Boylaud and Nicoletti, 2001*b*). There is a vast body of evidence on the effects of entry and price liberalisation in road freight.²¹ Empirical approaches in this industry include simulations, *ex post* descriptive assessments of reform outcomes and econometric studies. Although no studies have been made so far to evaluate the effects of reform on a cross-country basis, the results of research on individual countries are unambiguous:

- Industry employment and output rise.
- Productive efficiency and the quality of services are enhanced, partly due to network rationalisation and an increased rate of innovation.
- Fares fall by a significant amount.

19. For instance, one estimate (Pellegrini 2000) sets the real income gain to be obtained from liberalisation in Italy to over 1 per cent of GDP.

20. For instance, the OECD International Regulation Database reports that in at least 7 OECD countries professional associations representing incumbent firms have a say on decisions concerning entry at the local level.

21. A survey of this evidence can be found in Boylaud (2000).

27. Estimates of price reductions following deregulation range from 15 per cent in France to 75 per cent (for truckload trucking) in the United States, where reforms were more radical (McKinnon 1996; OECD, 1999*e*). In the United States, performance improvements and price reductions have concerned both the truck-load and less-than-truckload segments of the industry (Winston, 1998). Welfare gains from regulatory reform are estimated to be correspondingly significant.²²

28. The relatively long experience of countries that liberalised road freight suggests that most of the motivations underlying regulatory interventions were unfounded. For instance, the idea that price and service regulation were needed to make sure that shippers in small communities were not deprived of transportation services (the “public service” argument) proved to be baseless. Similarly, the concern that entry and price liberalisation would lead to instability and widespread bankruptcies due to cut-throat competition among road haulage firms was not substantiated by post reform outcomes (OECD, 2000*a*). The lack of empirical support for “economic” and “social” arguments for regulation and the strong evidence of welfare gains from reform suggests that previous regulatory restrictions were mainly the result of pressures by special interest groups, such as railway companies, incumbent firms and unionised workers.²³

Mobile telephony

29. There is ample cross-country evidence of the benefits of competition in the mobile telephony industry. For instance, the OECD has documented the differentials in output growth and prices between liberalised and regulated countries over the 1990s (OECD, 2000*b*). In the former, the density of mobile phones has grown much faster and prices have fallen more rapidly.²⁴ At the European level, econometric evidence on the impact of competition on mobile penetration was provided by Gruber and Verboven (1999). More extensive econometric evidence for the OECD area has been recently provided by Boylaud and Nicoletti (2000*c*), who used the OECD summary indicators of regulation and market structure to look at the effects of privatisation, liberalisation and competition on productive efficiency and prices in a panel of 23 OECD countries over the 1993-1997 period. Table 2 summarises the empirical findings by pointing out the sign of the statistically significant effects of the policy or competition variables. Regression estimates controlled for country-specific effects and other influences assumed to be unrelated to ownership, regulation or market structure over the sample period (such as technology and economic structure).²⁵ For simplicity these variables are omitted from the table.

[Table 2. Effects of ownership, regulation and market structure on productivity and prices in the mobile telephony industry]

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22. Some estimates set the ex post real income gains to 16 billion of 1990 US\$ in the United States (Winston 1993) and the potential gains from reform up to 8 billion of 1990 US\$ in Japan (Yamauchi 1995).
23. The wish to protect the regulated rail industry has often been an explicit motivation for trucking regulations, especially in the United States. Indirect evidence on the role of incumbents and unions is provided by the fact that in 11 OECD countries professional associations of truckers participate in regulatory decisions concerning pricing and licensing (OECD International Regulation Database), and by the existence of significant wage premia in the regulated road freight industry, which declined significantly after liberalisation (Rose, 1987).
24. These comparisons are generally made on the basis of posted prices that do not reflect the large discounts made by mobile telephony companies, especially in competitive markets. Therefore, they are likely to undervalue price differentials among liberal and regulated countries.
25. The choice of technology may be related to the regulatory and market environment even over relatively short time spans. However, no attempt was made to endogenise technology in the empirical analysis.

30. The main messages conveyed by these results are:

- Productivity (defined as cellular subscribers per industry employee) increases as liberalisation approaches; but
- Average prices (defined as mobile revenue per cellular subscriber) decline only as competition in the market unfolds; and
- Neither ownership nor prospective privatisation per se have positive effects on the performance variables.

31. Prospective and actual competition have important effects on productivity and prices, but ownership per se does not appear to have had a clear bearing on performance in the mobile telephony industry.²⁶ Thus the mere prospect of competition generates changes that lead to gains in efficiency, as incumbent operators prepare to meet future competitive pressures. However, incumbents have no incentive to cut prices until new entrants are operational. Thereafter, the number of competitors is crucial in determining the degree of price competition. This has important implications for mobile telephony prices in the OECD area. For instance, it is estimated that in a number of countries (including the United Kingdom, the United States and Canada and Germany) competitive pressures contributed as much as all other factors taken together (technology, economic structure, ownership, etc.) to keep prices below the OECD average. In other countries (such as Australia, Greece and, to a lesser extent, Germany), the downward effect of competitive pressures more than offset the upward effect of other factors.

Air passenger transportation

32. Reforms in air passenger travel have been more limited than in other competitive service industries, involving only domestic routes and routes included into regional free trade agreements. Most international routes, which constitute the bulk of world traffic outside the United States, are still governed by restrictive bilateral agreements or, at best, “Open sky” agreements that do not grant all traffic freedoms to participating airlines and generally exclude third party competition. Furthermore, the air transportation industry shares some elements of network industries that make the competitive features of air travel markets peculiar. Carriers compete at both the route and network levels. Common costs over the network may make in some cases cross-subsidisation efficient, with consequences on competition at the route level. More importantly, regulatory and competitive conditions in accessing ground fixed infrastructures affect in important ways competitive pressures on city-pair markets. For all these reasons, empirical research about the effects of entry and price liberalisation on industry performance and consumer welfare has been complex and general conclusions have often been difficult to reach.²⁷

33. The available evidence on reform outcomes, mostly concerning the United States, generally pointed to large efficiency gains implied by network rationalisation and significant reductions in airfares on long-haul routes, with prices sometimes tending to increase on short-haul ones.²⁸ Infrastructure

26. The negative effect of time to privatisation on productivity levels may reflect a “reverse causality” relationship, whereby governments accelerate the privatisation of the less productive companies.

27. See Gonenc and Nicoletti (2000) for a survey of regulation, competition issues and empirical research in air passenger transportation.

28. See, for instance, Borenstein (1992).

congestion, airport domination and market concentration were found to temper the benefits of reform.²⁹ US research also demonstrated that certain feared outcomes of liberalisation -- such as declines in safety levels, or deprivation of small communities of air service -- failed to materialise. On the contrary, reforms have been matched by an increase in the number of destinations serviced and an overall improvement in safety performance.³⁰ The relatively rare analyses documenting the implications of airline competition for efficiency and airfares outside the United States, such as in trans-Pacific routes or the European internal market, found less clear-cut results, perhaps due to more limited liberalisation and the wider presence of exogenous factors damping competition.³¹

34. Cross-country examinations of the relationship between regulatory frameworks, market structures and performance in air passenger transportation have been few. A recent study by Gonenc and Nicoletti (2000) uses the OECD summary indicators to investigate the effects of different regulatory and market environments at both the national and route levels in a cross-section of 27 OECD countries and 102 international city-pair routes connecting the 14 largest OECD airports. The results of the econometric analysis, which controls for the influence of technology (*e.g.* fleet composition and age) and economic structure (*e.g.* propensity to air travel) at route ends, are summarised in Table 3.

[Table 3. Effects of ownership, regulation and market structure on productivity and prices in the air passenger transportation industry]

35. The main conclusions are as follows:

- At the national level, restrictive regulatory and, especially, market environments are unambiguously associated with lower overall efficiency of the domestic industry.
- At the route level, regulation and market structure influence in different ways different performance indicators.
- Efficiency (as measured by the highest load factor) improves significantly in competitive environments, but entry deregulation per se may have adverse consequences, as incumbents implement pre-emptive strategies against potential new entrants (*e.g.* increased frequency of flights on liberalised destinations).
- Business and economy fares tend to decline significantly when the route-specific regulatory environment is relaxed, but are little affected by further competitive developments in the city-pair market (such as increases in the number of competitors and reductions in market concentration).
- Business and economy fares tend to rise with the tightness of infrastructure access conditions at route ends, the capacity share of airline alliances and the role of government-controlled carriers on the route.

29. See, for instance, Evans and Kessides (1993), Abramowitz and Brown (1993), Kim and Singal (1993), US Department of Transportation (1999) and Marìn (1998).

30. Statistical analyses of the US transport industry, including “before/after” comparisons of various safety indicators as well as multivariate regressions, support this conclusion (see *e.g.* Oster *et al.*, 1992, Rose, 1992). It is difficult however to separate the effects of reforms from the impact of contemporaneous enhancements in safety regulations.

31. The persistence of bilateral agreements on extra EU routes originating within the European Union prevents network rationalisation as extensive as in the United States. Moreover, airport congestion and dominance are more widespread than in the United States.

- Discount fares tend to decline significantly when the overall market environment at route ends is friendlier to competition, and when charter rights are extensive and challenger airlines (*i.e.* limited size incumbents) exist on the route.

36. Thus, although to a different extent and in different ways depending on the performance indicator, both regulation and the market environment affect efficiency (at the national and route levels) and air fares. The latter are also affected by airport dominance/congestion and government control over route carriers.

37. Figures 6 and 7 provide graphical illustrations of some of these effects at the national level and for a selection of routes, respectively. Figure 6 shows the positive cross-country correlation between the summary indicator of strictness of the national regulatory and market environment and an indicator of the industry-level efficiency gap relative to best OECD practice.³² Figure 7 describes, for a selection of routes, the effects of regulation (including government control over route carriers), market structure and other route characteristics on the deviation of business and discount fares from their average values, taking into account differences in route stage length. Contributions are positive or negative depending on whether regulations and market structures are more or less adverse to competition than in the average OECD country. The combined effect of regulation and market structure is often as large as that of all other route characteristics taken together. The relative contributions of regulation and market structure are reversed for different categories of fares. Business fares are mainly influenced by regulation, access to infrastructure and alliances, with only a minor influence of market structure. Discount fares are mainly influenced by market structure, with a smaller influence of regulation and no impact of the other factors.

[Figure 6. Efficiency in air passenger transportation and the regulatory and market environment]

[Figure 7. The contribution of regulation, government control and market structure to air fares]

III.3 Effects in network industries

38. Network industries have non-competitive segments that need to be regulated. Moreover, due to past regulatory arrangements their price structure is often distorted, and needs to be redressed gradually to make it consistent with competition in the liberalised segments. Therefore assessing the economic impact of regulation is more complicated. One has to assess at the same time the effects of competition where entry and prices have been liberalised and the effects of remaining access, pricing and service regulations in the non-competitive parts of the industries. Moreover, dominant firms in these industries are often privatised shortly before, or shortly after, sectoral regulatory reforms are implemented. Empirical studies are rarely able to take into account all these dimensions. They generally concentrate on specific aspects, at best attempting to control for only a few of the others. Furthermore, save for a few countries, regulatory reform in network industries has a relatively short history and attempting to evaluate its effects on performance is often premature.

39. The corresponding lack of cross-country empirical studies on the effects of regulation and/or liberalisation in network industries is unfortunate because it is precisely in these industries that policy guidance is needed. Evidence is particularly thin in railways and (to a lesser extent) electricity supply, where regulatory issues are most complex and liberalisation is most challenging. Fixed telecommunications is an area that has been increasingly explored as its crucial role in fostering growth became evident.

32. For each country, the efficiency gap was estimated by Data Envelope Analysis (see Gonenc and Nicoletti, 2000).

Railway transportation

40. Railway transportation is perhaps the most highly regulated industry in the OECD area, partly because economies of scale leading to natural monopoly are pervasive (Kessides and Willig 1995). It is also the industry in which the fewest studies were made to evaluate systematically the effects of different regulation and market structure arrangements on performance. Only three localised experiences of global reforms in this industry exist in the OECD area: the US reform of 1982; the UK reform implemented a decade later; and the reform in Mexico at the end of the 1990s. Interestingly, the first two took two opposite approaches. The US reformers maintained vertical integration between railtrack and services, but required open access to the network by competing service providers; within this framework, entries and fares were fully liberalised. The UK unbundled railtrack, rolling stock and services: railtrack became a regulated natural monopoly, three rolling stock companies were created and services were franchised out to private bidders for a fixed term and subject to fare regulation. The Mexican reform concerned only rail freight and was closer in spirit to the US framework, with the national company being split into several regional vertically-integrated companies. In other OECD countries, reforms have concerned mainly the reorganisation of the industry, with widespread but timid attempts at separating the various functions, and the opening up of the rail freight business, with rights of access by competing service providers being (very) gradually extended.

41. The country-specific evidence available on post-reform outcomes suggests the following conclusions:

- The US reform has led to a radical reduction in rail passenger transportation and a relatively strong growth in freight services, with fares declining by 30 to 50 per cent in certain markets and efficiency and quality of service being enhanced (OECD, 1999e; Wilson, 1994).
- The UK reform is still too short-lived to be appropriately assessed, but franchisees of passenger traffic often made larger-than-expected profits, leading to renegotiation of price caps with the regulator, moreover attempts to introduce competition in rail freight did not yet succeed (OECD, 2000c).
- The Mexican reform has led to a moderate decline in freight fares and an improvement in the quality of service, but the effects on efficiency are unclear (OECD, 1999f).
- Given the existence of radically different policy options and the dearth of empirical evidence on the effects of regulation in railways, this is an area where further empirical research is needed.

Electricity supply

42. Over the past decade, the regulatory environment of the electricity supply industry has begun to change. A few OECD countries have already implemented new regulations to stimulate competition by attempting to liberalise the industry, focusing reform efforts on functions that do not possess a natural monopoly component. Other countries are taking initial steps to open up to competition the generation segment of the industry.³³ However, regulatory design issues in the electricity supply industry are formidable: create a market for a non-storable good where there was none, provide the right price incentives for the location of generation plants, ensure access by suppliers to a vertically-integrated

33. For instance, most EU countries just met the implementation deadlines of the European Commission Electricity Directive to establish a single internal market for electricity in Europe.

industry or reorganise it to promote competition, establishing benchmark competition in markets that are inherently local monopolies, etc. Moreover, because of their sheer size, the vital role they play in the economy and their connections with government, incumbents often effectively lobbied for the delaying of measures aimed at promoting competition in electricity supply. Thus, even in the case of early reformers, implementation of reform has been a slow process, so that at most a handful of countries can point to actual progress toward competition.³⁴

43. Liberalisation of the electricity supply industry holds the promise of enhancing welfare by improving efficiency and reducing prices. However, there is no consensus on the specific regulatory reforms most likely to achieve the benefits of competition. Empirical work in this area has been largely country-specific and/or anecdotal, and was often based on simulations.³⁵ Concluding an extensive survey of existing studies, Pollitt (1997) lamented “the small amount of academic literature ... on such a world-wide policy programme”. Results were at best mixed and difficult to generalise, because they generally depend on a host of country-specific factors.

44. A recent study by Steiner (2000) used the OECD regulatory indicators to assess the impact on electricity prices and industry efficiency of specific policy provisions aimed introducing competition in electricity generation, based on a sample of 19 OECD countries over the 1986-1996 period. Provisions included privatisation, liberalisation, vertical separation, third party access to the grid, creation of an electricity pool and the degree of consumer choice of supplier. The results of the analysis, which controlled for differences in economic structure (*e.g.* urban density and consumer preferences) and generation technologies, are summarised in Table 4.

[Table 4. Effects of ownership, regulation and industry structure on efficiency and prices in the electricity supply industry]

45. Steiner’s cross-country analysis makes it possible to reach the following general conclusions as to the impact of regulatory reforms:

- Electricity prices (measured as the ratio of industrial to residential end-user tariffs) tend to fall when generation and transmission are unbundled, third party access to the grid is expanded and an electricity market is created.
- Productive efficiency of generation plants (measured by both the rate of capacity utilisation and reserve margins) tends to increase when ownership is private and generation and transmission are unbundled.

34. For example, England and Wales unbundled its electricity supply industry (ESI), privatised generation, introduced transmission price-caps, and introduced a spot market in electricity under implementation of the Electricity Supply Act of 1990. New Zealand also unbundled its ESI and introduced a spot market with the Energy Act and Company Act of 1992. Norway unbundled its ESI, introduced unconstrained choice of supplier, and extended its wholesale electricity pool to other Nordic countries with the Energy Act of 1990. Sweden reformed its ESI according to a similar pattern with a bill passed in 1996. Note additionally, that progress has been slow in some countries due to the issue of remunerating “stranded costs”, that is costs of investments undertaken under regulation, but no more profitable in a competitive environment.

35. Many authors have concentrated on the implications of US regulatory frameworks (*e.g.* Comnes *et al.*, 1996) or the UK experience with liberalisation (*e.g.* Newbery and Pollitt, 1997). Wolak and Patrick (1997) discuss markets in England and Wales, Norway, New Zealand, and Victoria, Australia, including an empirical description of performance in each country.

- Private ownership, or the imminence of privatisation, tend to increase industrial end-user prices.

46. Thus promoting competition in electricity supply through both structural and regulatory measures is crucial for harnessing the benefits of electricity reform. The cross-country evidence is consistent with the proposition that privatisation per se reduces x-inefficiencies but can hardly enhance welfare if it is not matched by effective market liberalisation.

47. Figure 8 describes some of the implications of these results for the comparative efficiency of electricity supply industries across the OECD. Efficiency is measured by the rate of capacity utilisation. Contributions to efficiency are positive (negative) when liberalisation, privatisation or other effects (related to economic structure, technology and other country-specific unexplained factors) are broader (narrower) than in the average OECD country. The combined effects of privatisation and liberalisation are generally larger than other effects in explaining the relative efficiency position of countries. Given the limited degree of liberalisation in OECD countries, privatisation often has the largest effect. However, in countries that have reformed more extensively their regulatory framework (*e.g.* the United Kingdom, New Zealand and Norway), the positive impact of liberalisation is apparent.

[Figure 8. The contribution of ownership, regulation and industry structure to efficiency performance in the electricity supply industry]

Fixed telephony

48. Liberalisation of entry into long-distance (trunk and international) telecommunications is already history in much of the OECD area. Most countries are now moving forward to make access to the local loop possible. Reconciling competitive provision of fixed voice services with the persistence of strong market power over networks continues to be a difficult issue for regulators, but experience in telecommunications reform is longer-lived than in electricity supply and a broader consensus exists on the policies that are more apt to lead to competitive developments. Most countries regulate prices charged by the incumbent operator(s) for accessing the network or interconnecting it with other networks (taking into account both the common costs faced by the incumbent and the need to encourage only entry of efficient service providers) as well as tariffs charged to users in markets where market power persists (usually through variants of the price cap mechanism). However, the debate is still open on the best kind of interconnection pricing rule and the degree of network unbundling to be ensured by the incumbent.

49. While empirical research on detailed regulation issues (such as interconnection price regulation and unbundling options) and on the effects of opening up the local loop is still thin, evidence on the economic benefits of entry liberalisation and competitive developments in long-distance fixed telephony is more extensive. However most of it is country-specific and concerns the experience of the United States.³⁶ The liberalisation of trunk and international services was generally found to create competitive pressures (in both trunk and local markets) that generated productivity gains and improved allocative efficiency of previously regulated firms.³⁷

36. Several studies looked at the effects of entry regulation in telecommunications markets, generally in the context of the regime change implied by the 1983 break-up of ATT. See, for instance, Ying and Shin (1993) and Oum and Zhang (1995) and, more recently, Gort and Sung (1999).

37. However, it was unclear whether the significant price reductions that followed liberalisation were the result of these pressures or of changes in price regulation that imposed a significant rebalancing of prices (see Taylor and Taylor, 1993).

50. Few studies have looked at these effects from a cross-country perspective. Van Cuilenberg and Slaa (1995) found that the increase in competitive pressures implied by entry liberalisation had positive effects on an index of innovation in the OECD area. A recent study by Boylaud and Nicoletti (2000) used the OECD indicators of regulatory and market environment to assess the effects of regulatory reform and changes in market structure on the efficiency, the quality and the prices of trunk and international telecommunications services in 23 OECD countries over the 1991-1997 period. The analysis controlled for country-specific effects due to economic structure and technology, which were assumed to be unrelated to the regulatory and market environment over the sample period. The empirical results are summarised in Table 5.

[Table 5. Effects of ownership, regulation and market structure on productivity and prices in the telecommunications industry]

51. The main conclusions from this cross-country analysis are the following:

- Anticipated entry liberalisation (measured as the time remaining to announced liberalisation) has a significant impact on the performance of trunk and international services, leading to increases in productivity, improvements in quality and lower prices.
- Competitive pressures following liberalisation (measured by the share of new entrants) further increase productivity and lower prices of both trunk and international services.
- The effects of ownership and privatisation per se are unclear.

52. Thus the mere perspective of liberalisation sets in motion adjustments that reduce inefficiencies and curb prices as incumbents prepare to meet future competition. While in mobile telephony these adjustments can be delayed until competitors actually enter the market, in fixed telephony they have to be anticipated because x-inefficiencies of incumbent operators are often large and unwinding the complex web of cross-subsidies established in the previous regulatory regime takes time. Actual competition reinforces these adjustments, making sure that productivity gains are translated into lower prices for consumers. Once changes in regulation and competition are accounted for, there is not much evidence that changes in ownership affect performance.³⁸ The effects of cross-country differences in regulatory and market environment on average telecommunications prices (including fixed and mobile communications) are graphically illustrated in Figure 9. Deviations of prices from OECD average are decomposed into effects of policies opening up markets and effects linked to other country characteristics (including ownership, economic structure, technology, price rebalancing and other unexplained factors). In many countries (*e.g.* New Zealand, the United Kingdom, Canada, Finland and Sweden), liberalisation policies have contributed significantly to keeping prices relatively low, and have sometimes offset other countervailing effects (as in Canada, Australia and the United States). In other countries (*e.g.* Italy, Ireland, Belgium, Portugal, Turkey) restrictive environments explain most of the excess of prices over the OECD average.

38. In some cases, prospective privatisation appeared to be associated with relatively low productivity; at the same time, there is evidence that the presence of foreign operators in domestic markets is associated with relatively low productivity and relatively high prices. These results could be explained by an endogeneity problem: on the one hand low productivity may make privatisation urgent and, on the other, foreign operators are attracted by situations in which there are margins for productivity gains and the possibility to gain market shares through price reductions (but since their role remained marginal over the sample period, these efficiency gains and price reductions do not show up at the industry level).

[Figure 9. The contribution of regulation and market structure to average telecommunications prices]

IV. Regulation, competition and investment in liberalised network industries

53. One of the areas that has been least analysed empirically is the effect of regulatory reform on dynamic efficiency. In many industries reforms have been made inevitable by technical progress: digital technology made it easier to fit several operators in a given frequency spectrum; technologies that bypass fixed networks made it possible to create competitive pressures in fixed telecommunications even ahead of liberalisation; new electricity generation technologies have substantially reduced economies of scale, making competitive entry in electricity supply possible; the Internet and e-commerce have the potential to undo entry barriers in distribution systems. What have been the feedback effects of reforms on investment in human and physical capital and technical progress? Everyday experience suggests that entry and price liberalisation in competitive service industries and in competitive segments of network industries often stimulates innovation and product diversification. This casual observation is corroborated by economic analyses describing the evolution of specific industries in individual countries, but systematic empirical studies of the linkages between regulatory reform, capital accumulation and innovation are lacking (see, however, Van Cuilenburg and Slaa, 1995).

54. This empirical lacuna is particularly serious in the analysis of network industries where regulation remains necessary and, hence, there is a risk that regulatory failure may affect the dynamic efficiency of the regulated industry. In these industries, empirical research mainly looked at the differential effects on investment by the network operator of rate-of-return and price-cap regulation of retail prices in markets where the incumbent has market power. In telecommunications, price-cap mechanisms were generally found to lead to a better set of incentives and more efficient investment patterns.³⁹

55. Apart from alternative forms of retail price regulation, a number of other regulatory interventions can affect investment and innovation in network industries. A non-exhaustive list includes:

- *Open access to a vertically-integrated network.* In some cases competitive service provision in network industries is introduced by enforcing third party access to the network (e.g. railways in the United States, telecommunications in the European Union, electricity supply in France). This regulatory approach may have consequences for investment and innovation because it may not be in the interest of the owner of the vertically-integrated firm to implement the capacity expansion or introduce the innovations that would be needed to accommodate new entry, and the regulator may not be able to force the regulated firm to do so (OECD, 2000c).⁴⁰
- *Vertical separation of infrastructure and services.* By controlling the terms and conditions at which competitors in (upstream or downstream) liberalised markets can have access to the network, a vertically-integrated owner has the incentive and the ability to restrict competition. Therefore, pro-competitive regulatory reform may require the unbundling of the

39. Studies of the effects of alternative forms of price regulation in telecommunications include Kridel *et al.* (1996) and Braeutigam and Panzar (1993).

40. Examples include an integrated electricity generation/transmission utility that limits the capacity of interconnections with foreign networks, to limit competition from foreign generators; or a public telecommunications operator that refrains from investing in innovative technology that would make it easier for competitors to operate through its network (such as devices allowing users to choose without additional numbering burdens a default long-distance operator).

competitive and non-competitive segments of a network industry. To the extent that innovations in service and infrastructure require co-ordinated planning (as may be the case in certain transportation industries), vertical separation may reduce innovation incentives. In addition, several kinds and degrees of unbundling can be envisaged, and some may have consequences for investment and innovation.⁴¹ For instance, in so-called “operational unbundling” in which the vertically-integrated firm retains ownership but hands over control of the network to an independent operator (*e.g.* a non-profit body)⁴² may weaken incentives for network maintenance, upgrading investment and innovations in response of customer demands. Dynamically efficient unbundling may require that the independent operator receives a share of the profits generated by the operation of the network, or that more radical ownership separation is implemented (OECD, 2000c).

- *Network access/interconnection pricing.* The existence of common or fixed costs in network operation requires pricing rules that include a mark-up over marginal costs, to make it possible for the network operator to recover total costs. Pricing rules can be cost-based, demand-based or efficient entry rules. Cost-based approaches (*e.g.* long-run average incremental costs) generally apportion common or fixed costs in an arbitrary way, with no guarantee that the right incentives are given to the network operator to implement efficient investment.⁴³ Demand-based approaches (*e.g.* Ramsey prices) are aimed at minimising static efficiency losses from setting prices above marginal costs, but may imply excessively high margins on certain products (which effectively cross-subsidise other products). This may lead to dynamic inefficiencies as competitors may be willing to bypass the existing network by duplicating parts of it. Efficient-entry rules (such as Baumol’s efficient component pricing rule) do provide in principle the correct investment incentives to the network operator, but may imply static inefficiency as they are unable to control for the incumbent’s market power on the market for the final product.
- *Institutional design.* Regulatory settings in network industries take several patterns: i) several sector-specific regulators, as in the United States (at the federal level) and in most European countries; ii) an all-purpose regulator that cuts across all regulated industries, as in Australia and many US states; or iii) the exclusive reliance on the application of the general competition law (so-called ‘light-handed’ regulation), as in New Zealand. A possible drawback of multiple sectoral regulators is that regulatory inconsistencies across industries can induce distortions in the investment of the regulated firms, especially when the activities concerned by inconsistent regulatory enforcement are substitutes (*e.g.* road, rail and air transport; electricity and gas; post, telecommunications and broadcasting) (Helm, 1994).
- *Regulatory risk.* Too much discretion by regulators increases the “regulatory risk” faced by regulated firms, with potentially adverse effects on investment by regulated firms and, hence, regulatory outcomes.⁴⁴ For instance, re-setting price caps in between review periods or disallowing capital investments from the rate base can be justified *ex post* on economic or

41. In electricity supply, vertical separation of the generation and transmission functions was found to lead to investment in generation capacity closer to optimal levels (Steiner, 2000).

42. This approach has been adopted in the US electricity supply industry.

43. A special case concerns airport landing and take-off charges, which are often cost-based. By failing to signal the value of additional airport capacity to airport operators, cost-based rules prevent the adjustment of airport capacity to its optimal level.

44. This is the under-investment that occurs in the classic hold-up problem arising from firm-specific or relationship-specific investment (Hart and Moore, 1988).

distributive grounds. However, the perceived risk that such regulatory changes may take place can have undesired consequences for the investment of the regulated firms. Other sources of regulatory risk that may affect investment by regulated firms are uncertainties about future policies towards liberalisation;⁴⁵ changes in environmental policy or the possibility that the regulated firm will be subject to some kind of restructuring. For regulatory risk and its undesired consequences on investment to be minimised, the regulatory framework should be reasonably stable and predictable, and regulators should be credible. Reconciling the stability and credibility of regulation with the necessary flexibility and responsiveness to unexpected events is a policy challenge. Steps in this direction can be *i*) to provide regulated firms with legal safeguards against excessive regulatory discretion (such as rules or appeal mechanisms protecting them against regulatory expropriation or guaranteeing fair rates of return on their investments);⁴⁶ and *ii*) design rules that interiorise the policy reaction to a range of possible regulatory outcomes.⁴⁷

56. Regulatory choices would be made easier by a better knowledge of the scope for these inefficiencies and the comparative advantages of different countervailing policies. However, empirical studies analysing the evidence on these possible sources of regulation-induced distortions and the effectiveness of different regulatory options designed to prevent them are lacking. This is, therefore, a very useful area of research for policy making.

Conclusions

57. Services have traditionally been a highly regulated area of OECD economies. To a different extent depending on the service provided, regulation has typically concerned entry, output and/or price choices of firms, restricting actual and potential competition. The range of service activities is broad and heterogeneous, including both industries that are fully competitive and industries in which competitive and non-competitive markets coexist. Therefore, regulation has had a variety of motivations, some based on economic grounds, others of a more political nature. Due to a variety of factors, including technological advances that made the social costs of inappropriate regulations more evident, in the past two decades OECD governments reformed extensively regulatory environments in both competitive and network service industries, generally making them closer to market mechanisms. However, initial regulatory conditions and the pace and extent of reform have differed across countries. As a result, within each service industry the dispersion of regulatory approaches is still wide and a large scope for further reform exists. Policy areas covered in this paper where step forwards could be made in many countries as well as on a multilateral basis include:

- The simplification of administrative requirements for businesses, which are particularly burdensome for dynamic small and medium-sized service firms.

45. If a firm believes there is a chance that there will be free and effective entry at some point in the future, then this can remove the incentive for the firm to engage in sunk investments since it may not be able to recover the costs of these investments once the market is liberalised (Armstrong *et al.*, 1994).

46. At the same time, these legal requirements may not provide sufficient incentives for firms to reduce their costs and can lead to x-inefficiency in the use of capital.

47. For instance, *ex-ante* provisions for profit sharing between price-capped firms and customers (such as those used in the United States for access charges to local telephone networks) may sometimes help to reduce political pressures to rescind the price cap system in the event of unexpectedly high rates of return (Baron, 1995).

- The elimination of restrictive provisions concerning entry and/or investment in competitive service industries such as retail distribution and road freight - for instance the removal of provisions discriminating against certain categories of service providers or investors (large outlets, foreign firms).
- The opening up of international air travel routes to competition and the elimination of FDI restrictions in airline companies.
- The creation of conditions for competitive service provision of rail freight services.
- The promotion of competition in liberalised telecommunications services (*e.g.* through appropriate network interconnection and access policies) and, especially, the creation of conditions for opening up the local loop to competitive service providers (*e.g.* through appropriate unbundling requirements).
- The acceleration of reforms in the electricity supply industry - involving vertical separation of generation and transmission, extensive third party access to the grid and unrestricted choice of suppliers by retail consumers.

58. The empirical evidence surveyed in this paper, including cross-country analyses made at the OECD, suggests that these reforms could contribute substantially to improve economic performance and living standards in the OECD area. In countries where competition-enhancing regulatory reforms in service industries and electricity supply have gone further:

- The share of services, employment rates and the catch-up in productivity growth have been higher.
- Distribution systems have been modernised.
- Rail and road freight transportation became less costly.
- Air transport networks have been modernised and made more efficient, and airfares for all categories of travellers declined substantially.
- Telecommunications and electricity supply have become more efficient and cheaper, especially for industrial consumers.

59. In many industries, regulatory reform has been matched by technical progress, innovation and product diversification. Competitive pressures in liberalised markets have encouraged productivity-enhancing investment. However, to take full advantage of the reform process, policies in network service industries should take into due account the implications of regulatory settings for the incentives of regulated firms to invest and innovate:

- Structural interventions in these industries, such as vertical separation of infrastructure and services, should strike a balance between the need to encourage competition in their competitive segments and the need to encourage investment and innovation by the owner of the non-competitive component.
- The design of network access provisions should seek to prevent inefficient bypass while maintaining (or creating) sufficient and correct investment incentives for network operators.

- Institutional design and regulatory policies should avoid cross-sector inconsistencies in order to prevent potential distortions in the allocation of capital across industries that provide substitute products.
- The danger that investment in networks could be deterred by regulatory risk should be minimised by establishing stable and credible regulatory settings and rules that are at the same time predictable and flexible enough to cope with unexpected events.

BIBLIOGRAPHY

- ABRAMOWITZ, A.D. and S.M. BROWN (1993), "Market share and price determination in the contemporary airline industry", *Review of Industrial Organization*, 8: 419-433.
- ARMSTRONG, M., S. COWAN and J. VICKERS (1994), *Regulatory Reform: Economic Analysis and British Experience*, MIT Press.
- BARON, D.P. (1995), "The economics and politics of regulation: perspectives, agenda and approaches", in J.S. Banks and E.A. Hanuser (eds), *Modern political economy*, Cambridge University Press.
- BASSANINI, A., S. SCARPETTA and I. VISCO (2000), "Knowledge, technology and economic growth: an OECD perspective", *OECD Economics Department Working Papers*, No. 259, Paris.
- BERLAGE, L. and D. TERWEDUWE (1988), "The classification of countries by cluster and by factor analysis", *World Development*, Vol. 16, No. 12, pp. 1527-1545.
- BORENSTEIN, S. (1992), "The evolution of US airline competition", *Journal of Economic Perspectives*, Vol. 6, No. 2, Spring, pp. 45-73.
- BOSWORTH, B.P. and J.E. TRIPLETT (2000), "Numbers Matter", *Policy Brief*, No. 63, The Brookings Institution, Washington, D.C.
- BOYLAUD, O. (2000), "Regulatory reform in two competitive sectors: road freight haulage and the retail trade", *OECD Economics Department Working Papers*, No. 255, Paris.
- BOYLAUD, O. and G. NICOLETTI (2001a), "Regulatory reform in retail distribution", *OECD Economic Studies*, No. 32, Paris.
- BOYLAUD, O. and G. NICOLETTI (2001b), "Regulatory reform in road freight", *OECD Economic Studies*, No. 32, Paris.
- BOYLAUD, O. and G. NICOLETTI (2000c), "Regulation, market structure and performance in telecommunications", *OECD Economics Department Working Papers*, No. 237, Paris.
- BRAEUTIGAM, R. and J.C. PANZAR (1993), "Effects of the change from rate-of-return to price-cap regulation", *AEA Papers and Proceedings*, May, pp. 191-198.
- BUREAU OF INDUSTRY ECONOMICS (1996), *Business Licences. International Benchmarking Report*, 96/9, Canberra.
- COMNES, G.A., E.P. KAHN, and T.N. BELDEN (1996), "The performance of the US market for independent electricity generation", *The Energy Journal*, Vol. 17, No. 3, pp. 23-39.
- DJANKOV, S., R. LA PORTA, F. LOPEZ-DE-SILANES and A. SHLEIFER (2000), "The Regulation of Entry", *NBER Working Paper*, No. 7892, September.
- EMERSON, M., M. AUJEAN, M. CATINAT, P. GOYBET and A. JACQUEMIN (1988), *The Economics of 1992: The EC Commission's Assessment of the Economic Effects of Completing the Internal Market*, Oxford, Oxford University Press.

- EVANS, W.N. and I. KESSIDES (1993), "Structure, conduct and performance in the deregulated airline industry", *Southern Economic Journal*, Vol. 59, No. 3, January, pp. 450-466.
- GONENC, R. and G. NICOLETTI (2000), "Regulation, market structure and performance in air transportation", *OECD Economics Department Working Papers*, No. 254, Paris.
- GONENC, R., M. MAHER and G. NICOLETTI (2000), "The implementation and the effects of regulatory reform: past experience and current issues", *OECD Economics Department Working Papers*, No. 251.
- GORT, M. and N. SUNG (1999), "Competition and productivity growth; The case of the US telephone industry", *Economic Inquiry*, Vol. 37, No. 4, October, pp. 678-691.
- GRUBER, H. and F. VERBOVEN (1999), "The diffusion of mobile telecommunications services in the European Union", *CEPR Discussion Paper Series*, No. 2054.
- HART, O. and J. MOORE (1988), "Incomplete Contracts and Renegotiation", *Econometrica*, Vol. 56, pp. 755-786.
- HELM, D. (1994), "British Utility Regulation: Theory, Practice, and Reform", *Oxford Review of Economic Policy*, Vol. 10, pp. 17-39.
- HOJ, J., T. KATO and D. PILAT (1995), "Deregulation and privatisation in the service sector", *OECD Economic Studies*, No. 25, Paris.
- INDUSTRY COMMISSION (1995), *The Growth and Revenue Implications of Hilmer and Related Reforms*, Belconnen Act.
- KESSIDES, I.N. and R.D. WILLIG (1998), "Restructuring regulation of the rail industry for the public interest", OECD, DAF/CLP(98)1, Paris, pp. 147-181.
- KIM, E.H., and V. SINGAL (1993), "Mergers and market power: Evidence from the airline industry", *The American Economic Review*, Vol. 83, No. 3, June, pp. 549-569.
- KRIDEL, D.J., D.E.M. SAPPINGTON and D.L. WEISMAN (1996), "The effects of incentive regulation in the telecommunications industry", *Journal of Regulatory Economics*, 9(3), pp. 269-306.
- LIPSCHITZ, L., J. KREMERS, T. MAYER and D. McDONALD (1989), "The Federal Republic of Germany: Adjustment in a Surplus Country", *IMF Occasional Paper* 64, Washington DC.
- MARIN, P.L. (1995), "Competition in European aviation: Pricing policy and market structure", *The Journal of Industrial Economics*, Vol. XLIII, No. 2, June, 141-159.
- MCKINNON, A. (1996), "Is complete deregulation possible? Which regulations should be kept?", *Privatisation and Regulation of Road Freight Transport*, ECMT Seminar, Paris, September.
- MESSINA-GRANOWSKY, J. (2000), "The Role of Product Regulations in the Process of Structural Change", EUI Dept. of Economics, *mimeo*.
- NEWBERY, D. and M.G. POLLITT (1997), "The restructuring and privatization of Britain's CEGB - Was it worth it"? *Journal of Industrial Economics*, 45, pp. 269-303.

- NICOLETTI, G., S. SCARPETTA and O. BOYLAUD (1999), “Summary indicators of product market regulation with an extension to employment protection legislation”, *OECD Economics Department Working Papers*, No. 226.
- NICOLETTI, G., R.C.G. HAFFNER, S. NICKELL, S. SCARPETTA and G. ZOEGA (2000), “European integration, liberalisation and labour market performance”, in G. Bertola, T. Boeri and G. Nicoletti (eds), *Welfare and Employment in a United Europe*, MIT Press, Boston.
- OECD (1997), *The OECD Report on Regulatory Reform, Volume II Thematic Studies*, Paris
- OECD (1999a), *Implementing the OECD Job Strategy: Assessing Performance and Policy*, Paris.
- OECD (1999b), *OECD Employment Outlook*, Paris.
- OECD (1999c), *OECD Economic Outlook*, n. 66, Paris.
- OECD (1999d), *Roundtable: Buying power of multiproduct retailers*, DAFPE/CLP(99)21, Paris.
- OECD (1999e), *Regulatory Reform in the United States*, Paris.
- OECD (1999f), *Regulatory Reform in Mexico*, Paris.
- OECD (2000a), “Regulation and Competition Issues in Road Transport”, *Competition Policy Roundtables Series*, Paris.
- OECD (2000b), *Cellular mobile pricing structures and trends*, Paris.
- OECD (2000c), “Structural Separation in Regulated Industries”, DAFPE/CLP/WP2(2000)8, Paris
- OSTER, C.V. Jr., J.S. STRONG and C.K. ZORN (1992), “*Why airplanes crash: Aviation safety in a changing world*”, Oxford University Press.
- OUM, T.H. and Y. ZHANG (1995) “Competition and allocative efficiency; The case of the US telephone industry”, *The Review of Economics and Statistics*, pp. 82-96.
- PELLEGRINI, L. (2000), “Regulations and the retail trade”, in G. Galli and J. Pelkmans (eds), *Regulatory reform and competitiveness in Europe, 2, vertical issues*, Edward Edgar Publishing Limited, Northampton, Massachusetts.
- PILAT, D. (1997), “Regulation and performance in the distribution sector”, *OECD Economics Department Working Paper* No. 180, OECD, Paris.
- PILAT, D. (2001), “Innovation and productivity in services: state of the art” in *Innovation and Productivity in services*, OECD Conference Proceedings, forthcoming, Paris.
- POLLITT, M.G. (1997), “The impact of liberalization on the performance of the electricity supply industry: An international survey”, *The Journal of Energy Literature*, Vol. III, No. 2.
- PRODUCTIVITY COMMISSION (1999), *International Benchmarking of Australian Telecommunications Services*, Research Report, AusInfo, Melbourne, Australia, March.

- ROSE, N.L. (1987), "Labor rent sharing and regulation: Evidence from the trucking industry", *Journal of Political Economy*, Vol. 95, No. 6.
- ROSE, N.L. (1992) "Fear of flying? Economic analyses of airline safety", *Journal of Economic Perspectives*, Vol. 6, No. 2, Spring, pp. 75-94.
- STEINER, F. (2000), "Regulation, industry structure and performance in the electricity supply industry", *OECD Economics Department Working Papers*, No. 238, Paris.
- TAYLOR, W.E. and L.D. TAYLOR (1993), "Post divestiture long-distance competition in the U.S.", *American Economic Review, Papers and Proceedings*, Vol. 83, No. 2, pp. 185-190.
- UNITED STATES DEPARTMENT OF TRANSPORTATION (1999), *Competition in the US domestic airline industry: The need for a policy to prevent unfair practices*, May.
- VAN BERGEIJK, P.A.G. and R.C.B. HAFFNER (1996), *Privatization, Deregulation and the Macroeconomy*, Elgar Publishing Ltd.
- VAN CUILENBURG, J. and P. SLAA (1995), "Competition and innovation in telecommunications: An empirical analysis of innovative telecommunications in the public interest", *Telecommunications Policy*, Vol. 19, No. 8, pp. 647-663.
- VAN SINDEREN, J. P.A.G. VAN BERGEIJK, R.C.G. HAFFNER and P.M. WAASDORP (1994), "De kosten van economische verstarring op macro-niveau" (The macroeconomic costs of inertia: in Dutch), *Economisch-Statistische Berichten* 79 (3954), pp. 274-9.
- WILSON, W.W. (1994), "Market specific effects of rail deregulation", *The Journal of Industrial Economics*, March, pp. 1-22.
- WINSTON, C. (1993), "Economic deregulation: Days of reckoning for microeconomists", *Journal of Economic Literature*, Vol. XXX1, pp. 1263-1289, September.
- WINSTON, C. (1998), "US industry adjustment to economic deregulation", *Journal of Economic Perspectives*, Vol. 12, No. 3, pp. 89-110, Summer.
- WOLAK, F.A., and R.H. PATRICK (1997) "Industry Structure and Regulation in the England and Wales Electricity Market", in M.A. Crew, ed., *Pricing and Regulatory Innovations Under Increasing Competition*.
- YAMAUCHI, H. (1995), "Regulatory Reform and changes in the Japanese Trucking Industry", *Economic Analysis*, No. 143, Economic Research Institute, Economic Planning Agency, Tokyo, December.
- YING, J.S. and R.T. SHIN (1993), "Costly gains to breaking up: LeCs and the baby bells", *The Review of Economics and Statistics*, pp. 357-361.

Figure 1. The OECD benchmarking exercise

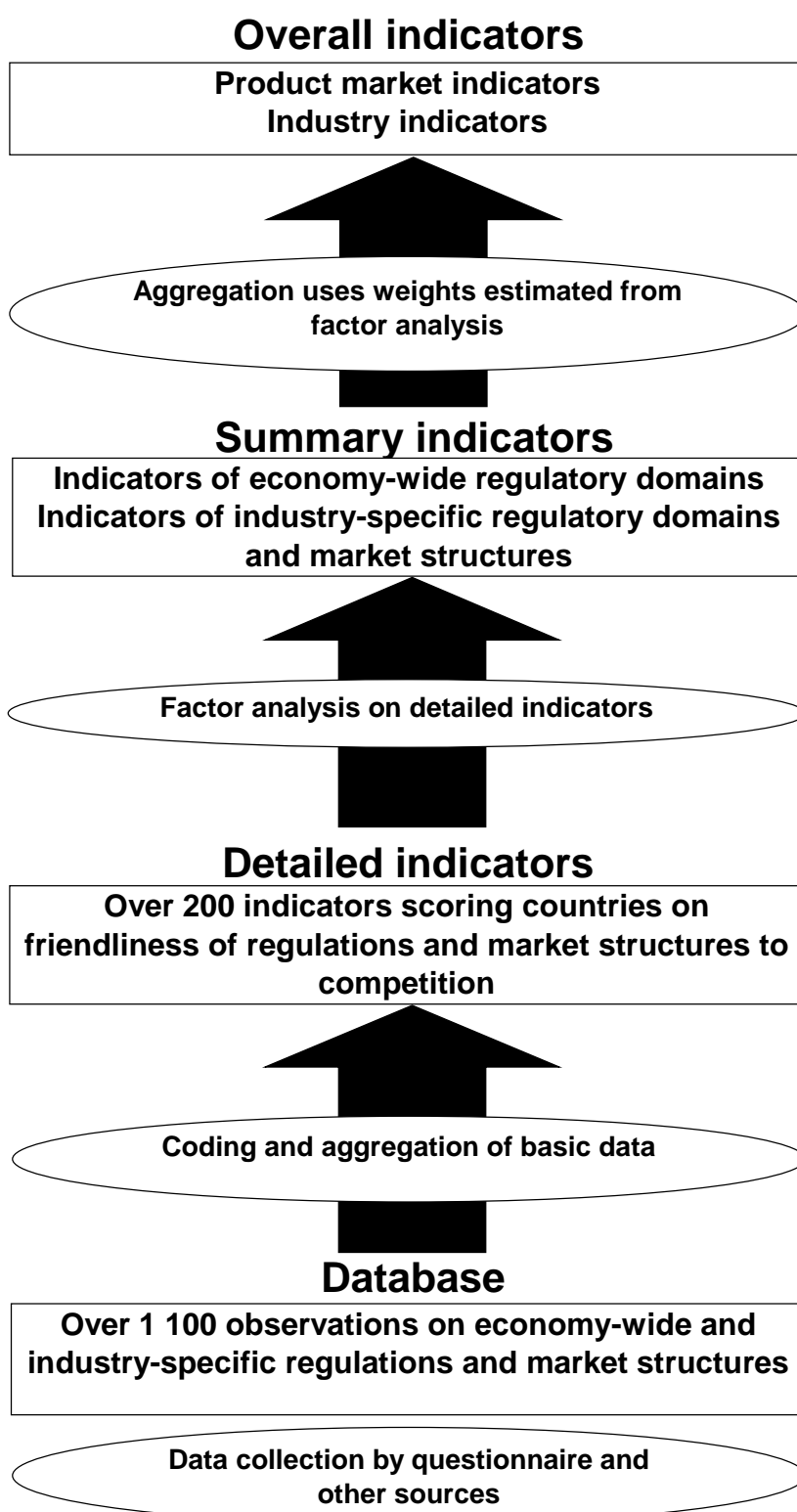
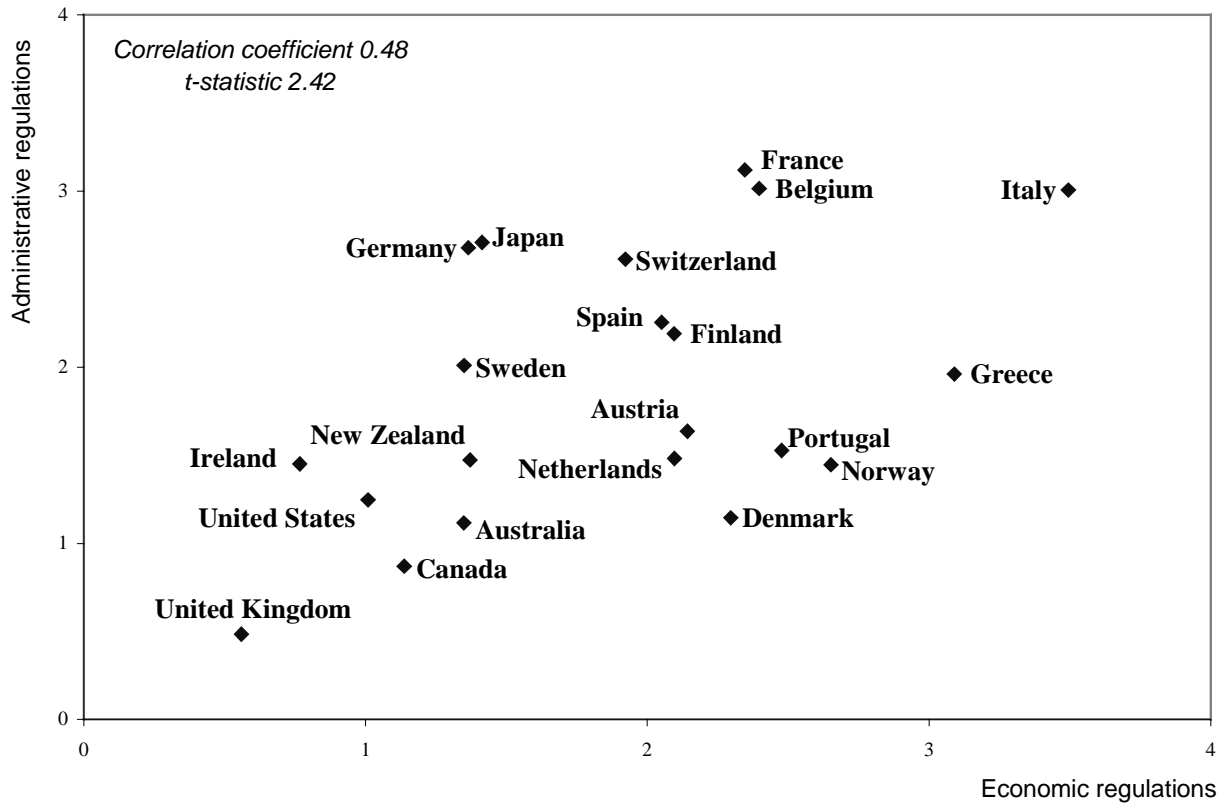


Figure 2. **Regulatory approaches across countries: economic and administrative regulations**¹

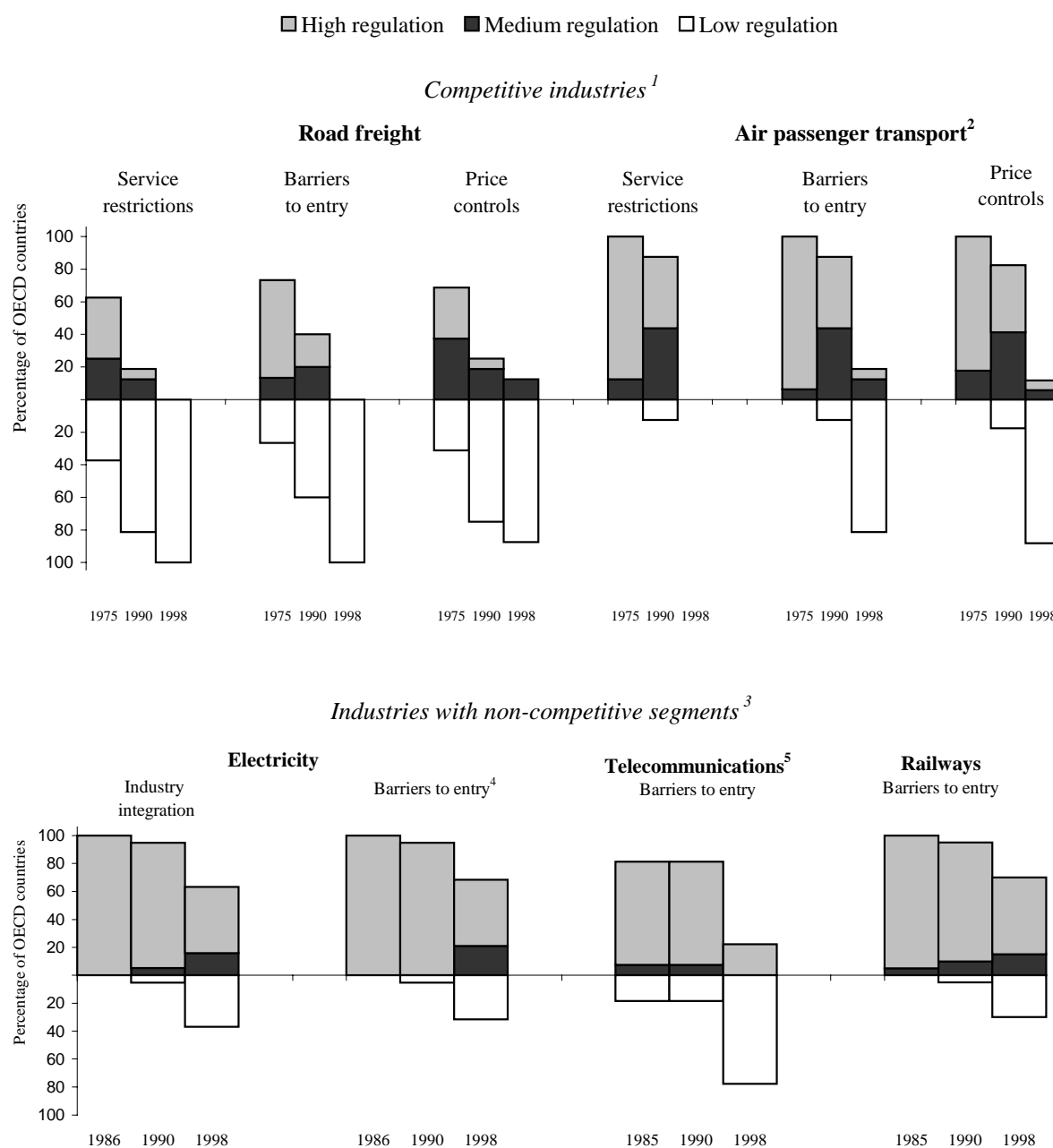
Economic and administrative regulation



1. The scale of indicators is 0-6 from least to most restrictive.

Source: Nicoletti *et al.* (1999)

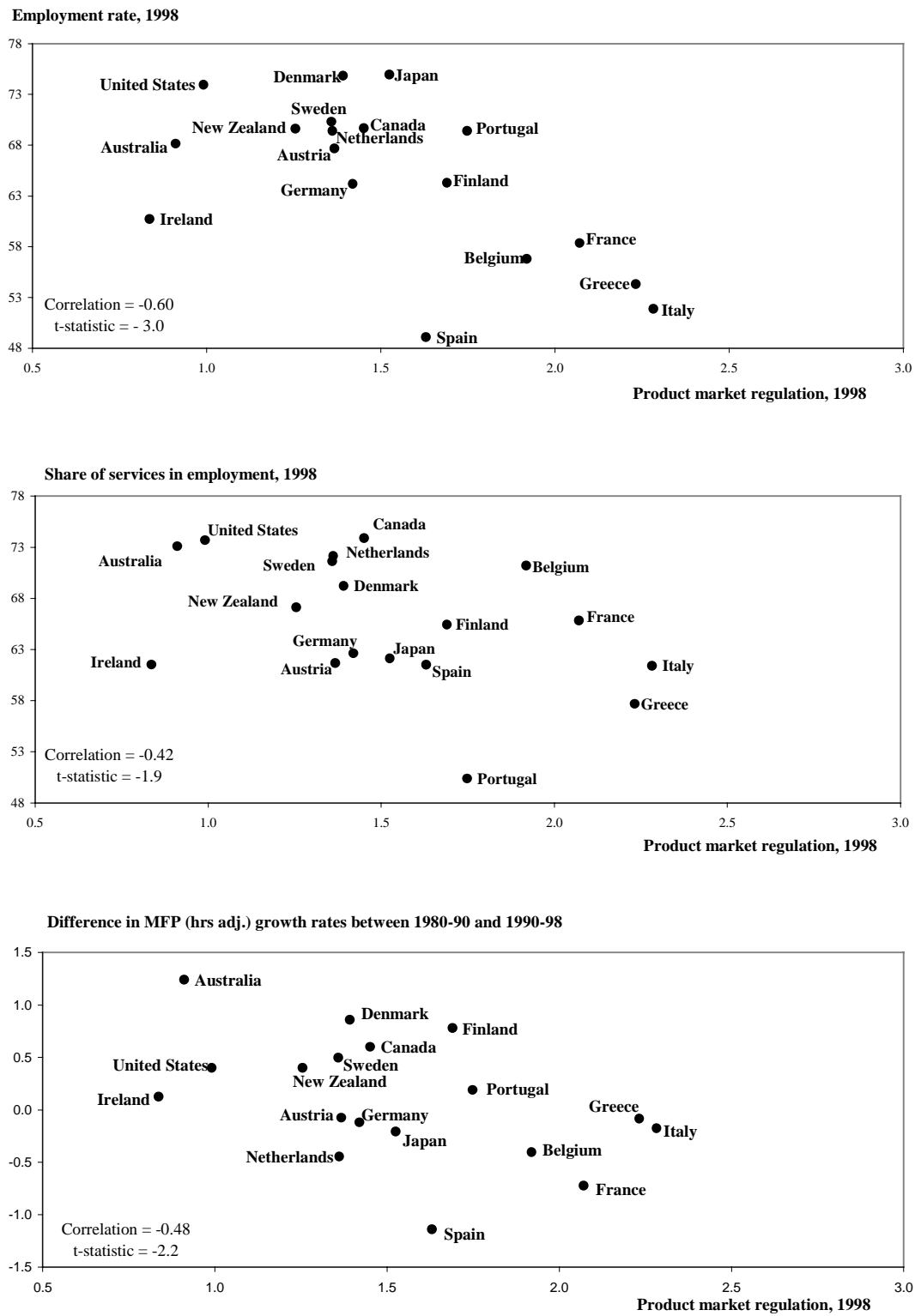
Figure 3. Product market liberalisation in OECD countries

**Notes :**

1. *High regulation* : Entry is restricted and prices or services are set or approved by a regulatory authority.
Medium regulation : Some limited entry is allowed and businesses have some freedom to set prices or services.
Low regulation : Businesses are free to enter and have full control over prices and services they supply.
2. Domestic and regional routes.
3. *High regulation* indicates that access to competitive markets is restricted and, for electricity, vertical integration.
Medium regulation indicates that some limited market access is allowed and, for electricity, limited vertical separation.
Low regulation indicates that market access is free and, for electricity, full vertical separation.
4. In electricity generation.
5. Fixed telephony: trunk and international.

Source: OECD, Regulatory reform, privatisation and competition policy, 1992; and OECD International Regulation Database.

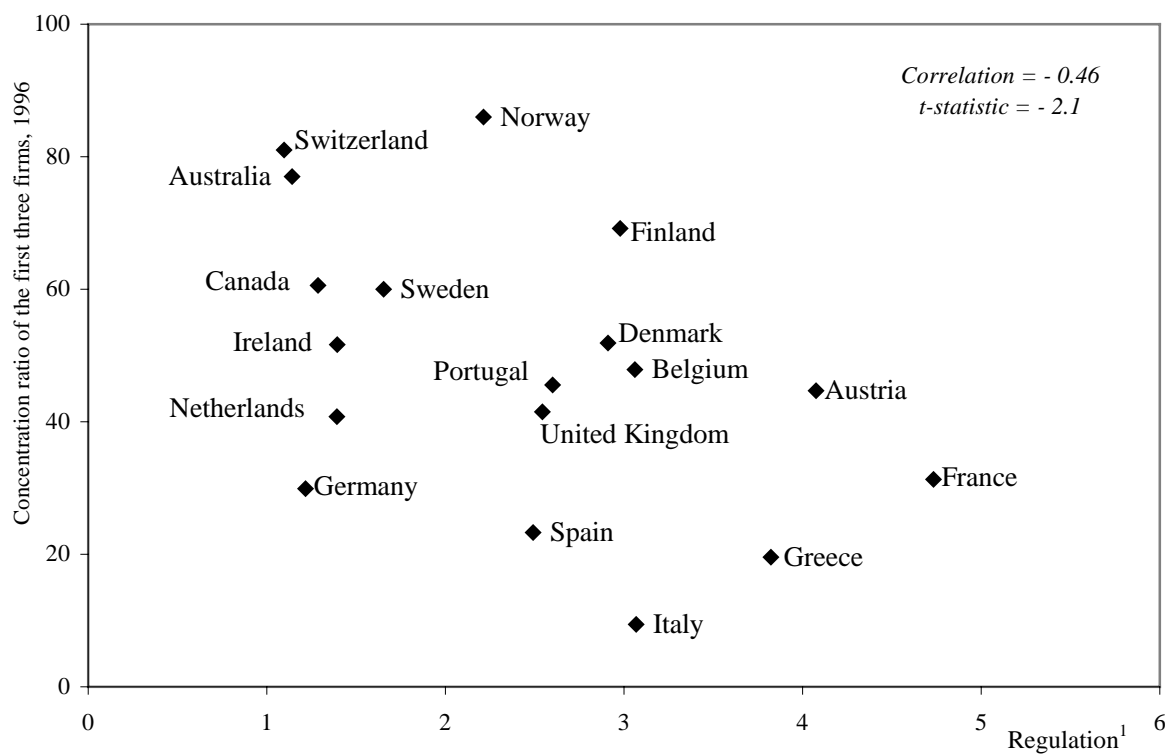
Figure 4. Regulation, the employment rate, the share of service employment and total factor productivity



1. The scale of indicators is 0-6 from least to most restrictive.

Sources: OECD; Bassanini *et al.* 2000.

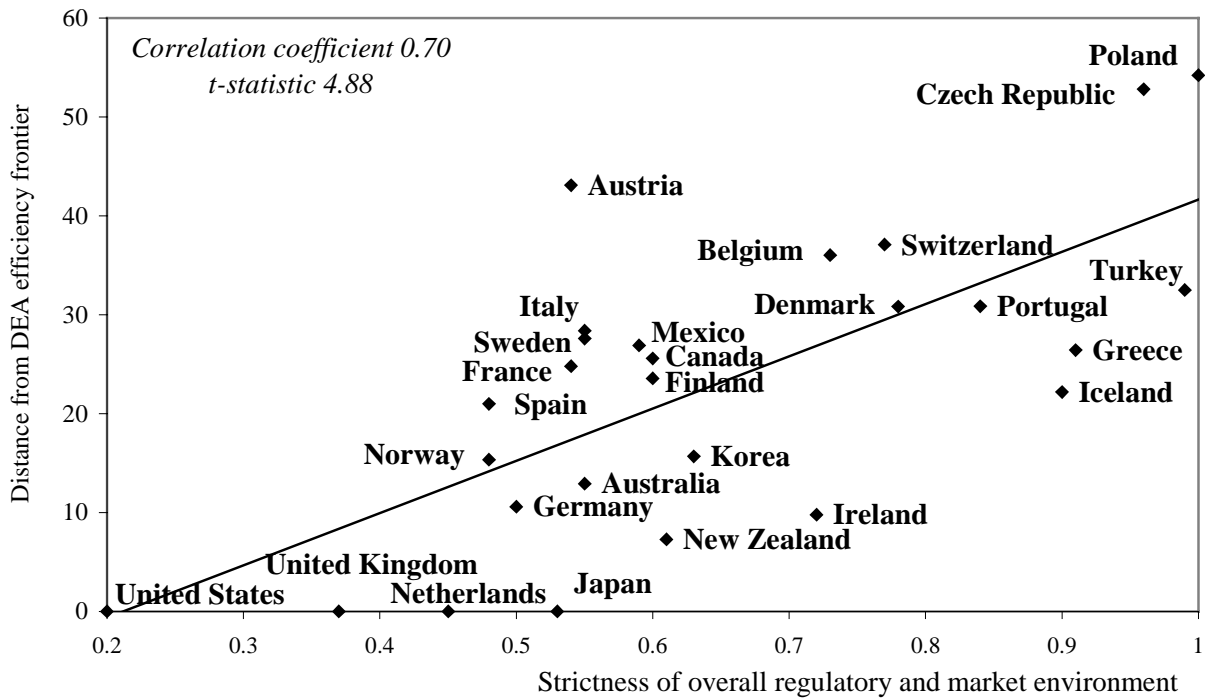
Figure 5. Concentration and regulation in retail distribution



1. The scale of indicators is 0-6 from least to most restrictive.

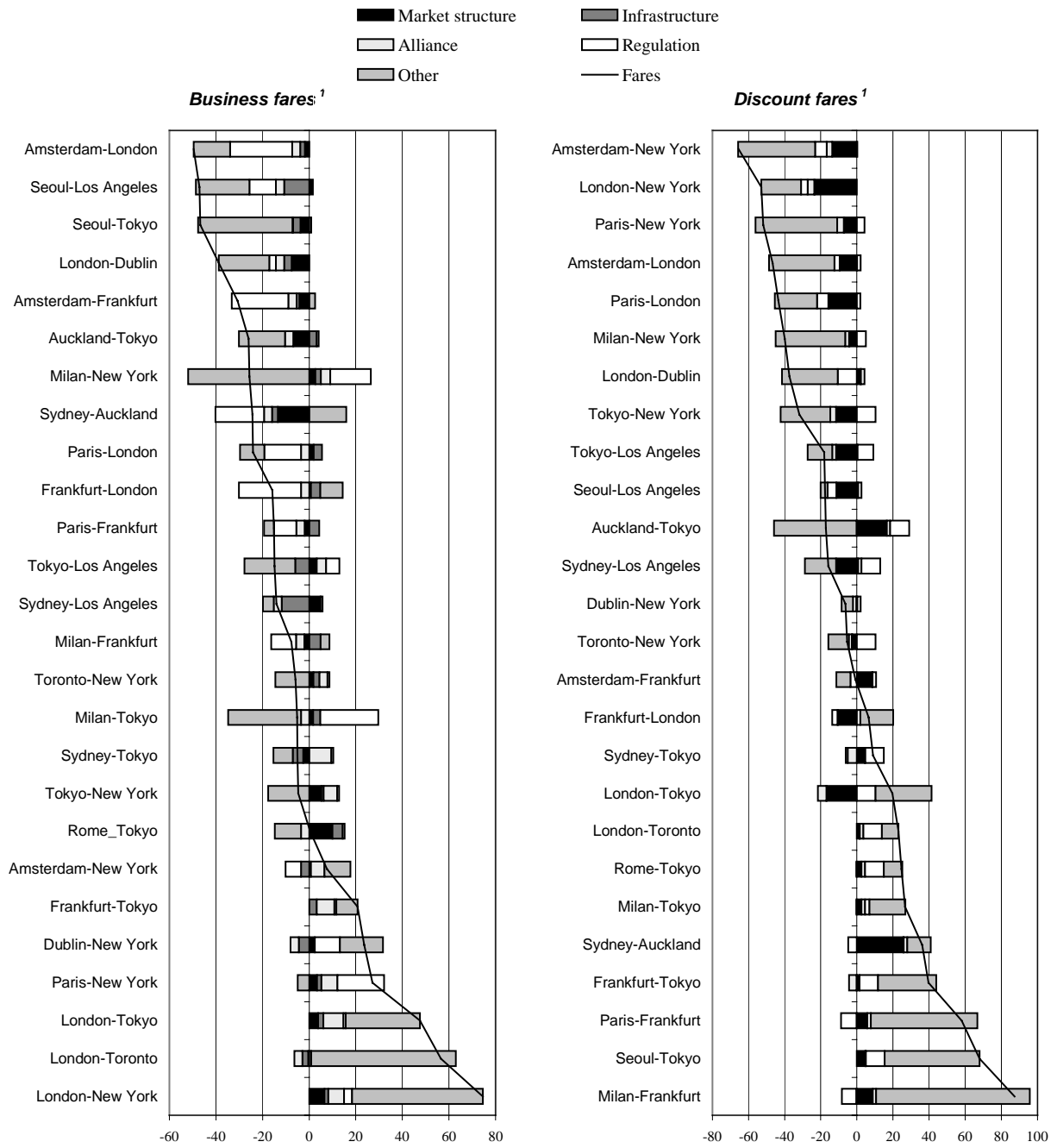
Source: Boylaud and Nicoletti (2001)

Figure 6. **Efficiency in air passenger transportation and the regulatory and market environment**



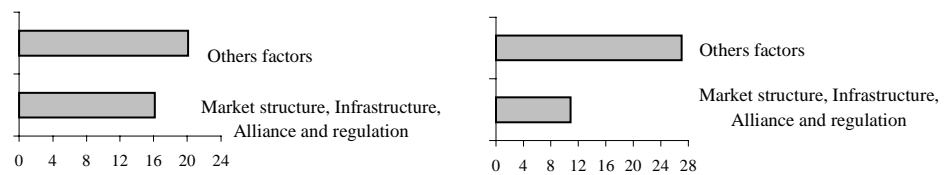
Source : Gonenc and Nicoletti (2000)

Figure 7. The contribution of regulation, government control and market structure to air fares in selected routes



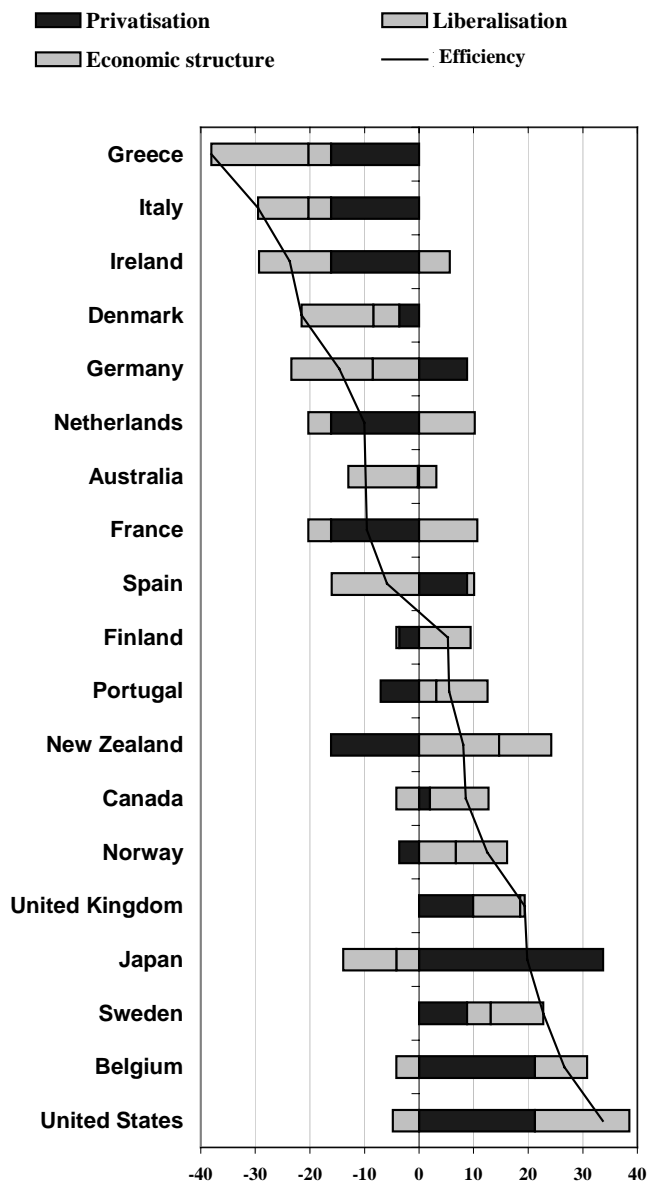
1. Percentage deviations of fares from sample average (102 routes), taking into account route stage length

Average contributions to the fare gap (absolute values)



Source: Gonenc and Nicoletti (2001)

Figure 8. The contribution of ownership, regulation and industry structure to efficiency performance in the electricity supply industry¹



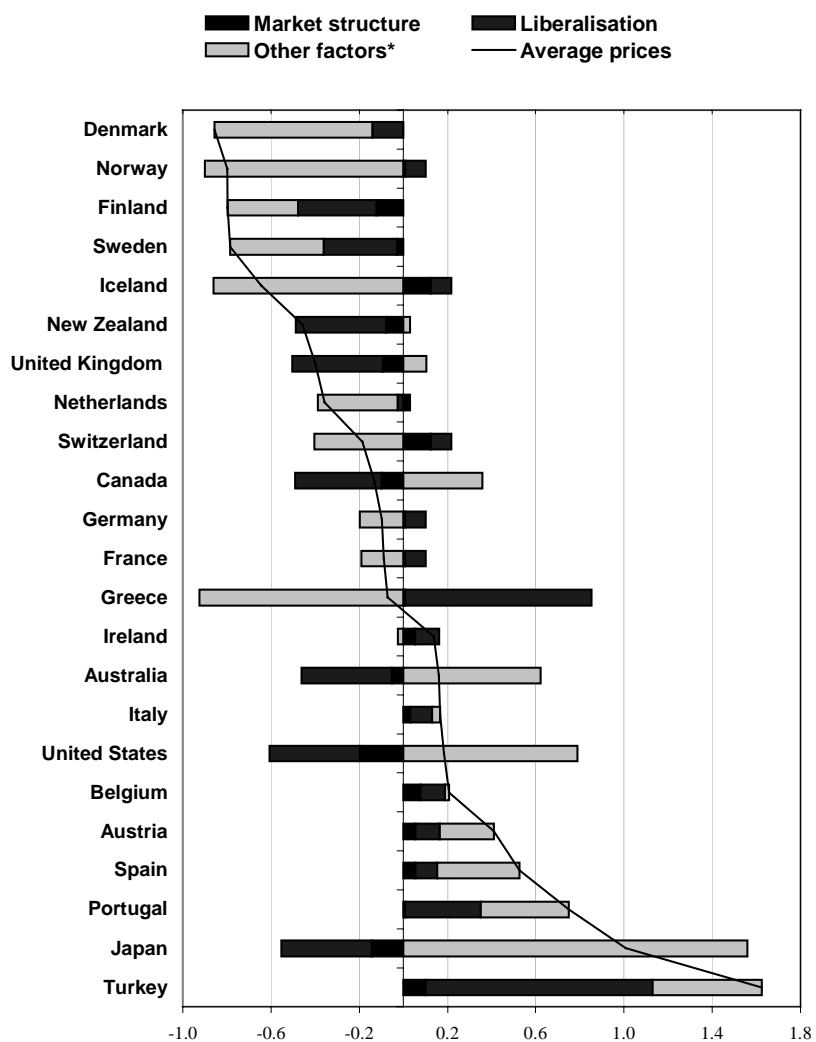
1. Efficiency is defined as the rate of capacity utilisation. Percentage deviations from OECD average.

Average contributions to the efficiency gap (absolute values)



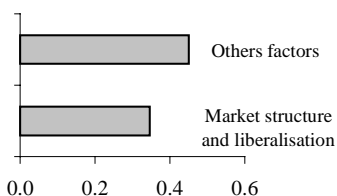
Source: Steiner (2001)

Figure 9. The contribution of regulation and market structure to average telecommunications prices¹



* Includes the effect of ownership, economic structure, technology, price rebalancing and other unexplained country-specific effects.

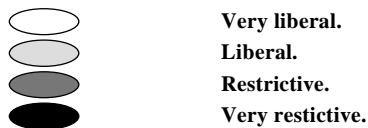
Average contributions to price gap (absolute values)



1. Deviation from OECD average. Average of prices of fixed and mobile communications
 Source: Boylaud and Nicoletti (2001)

Table 1. A map of regulatory environments in service industries and electricity supply¹
(OECD countries, 1998)

	<i>Competitive industries</i>				<i>Network industries</i>		
	Retail distribution	Road freight	Mobile telephony	Air passenger transport	Fixed telephony	Electricity	Railways
Australia	○	○	◐	◐	◐	○	○
United States	○	○	◐	○	◐	◑	○
Sweden	◐	◐	◐	◐	◐	○	◐
United Kingdom	◑	○	◐	◐	◐	○	◐
Germany	◐	◑	◐	◐	◐	◐	○
Netherlands	◐	◑	◐	○	◐	◑	○
New Zealand	-	○	◑	○	◐	○	◑
Finland	◑	◐	◐	◐	◐	○	◑
Norway	◑	◐	◐	◐	◐	○	◑
Korea	◐	○	◐	◑	◐	-	◑
Canada	◐	◐	-	◑	◐	◑	◐
Ireland	◐	-	◐	◐	◐	◑	◑
Mexico	◐	◐	◐	◑	◐	-	◑
Iceland	◑	-	◐	◑	◐	-	-
Denmark	◑	-	◐	◐	◐	◑	◑
Belgium	◑	◑	◐	◐	◐	◑	◑
Japan	◑	◑	◐	◑	◐	◑	◐
Austria	◑	◑	◐	◐	◐	-	◑
France	◑	◐	◐	◑	◐	◑	◑
Switzerland	○	◑	◐	◑	◐	-	◑
Czech Republic	○	◑	◑	◑	◑	-	○
Hungary	◐	◑	◑	-	◑	-	○
Portugal	◑	◐	◐	◑	◑	◑	-
Poland	◑	◑	◐	◑	◑	-	○
Spain	◑	◑	◑	◐	◐	◑	◑
Italy	◑	◑	◑	◐	◐	◑	◑
Turkey	◑	◑	◐	◑	◑	-	◑
Greece	◑	◑	◐	◑	◑	◑	-



1. See box 3 for details.
2. Long distance (international and trunk) only.
3. The indicators for the retail distribution and mobile telephony industries were partially estimated.
4. The indicator for the retail distribution industry was partially estimated.
Source: OECD International Regulation Database

Table 2. Effects of ownership, regulation and market structure on productivity and prices in the mobile telephony industry

Summary of results of panel regressions (1993-1997)

Dependent variable	Productivity	Price
	(Cellular subscribers per employee)	(Mobile revenue per cellular subscriber)
Number of periods	5	5
Number of countries	22	23
Number of observations	110	115
Market share of new entrants	n.s.	--
Time to liberalisation	+	n.s.
Degree of state control	n.s.	n.s.
Time to privatisation	--	n.s.

n.s. = not significant

+ = significantly positive effect

-- = significantly negative effect

Source : Boylaud and Nicoletti (2000)

Table 3. Effects of ownership, regulation and market structure on productivity and prices in the air passenger transportation industry

Summary of results of cross-country and cross-route regressions¹

Level of analysis	Route level				National level	
	Prices			Productivity	Productivity	
Dependent variable	Business fare	Standard economy fare	Discount fare	Highest load factor	Efficiency (DEA measure)	Average load factor on international routes served by domestic carriers ⁵
Number of obs.	154	154	406	168	27	27
Strictness of regulatory and market environment	+	+	+	--	--	--
Strictness of regulatory environment	+	+	n.s.	+	--	n.s.
<i>Strictness of fare regulations</i>	+	+	n.s.	n.s.		
<i>Strictness of access rights for charters</i>	n.s.	n.s.	+	+		
Strictness of market environment	n.s.	n.s.	n.s.	--	--	--
<i>Capacity concentration</i>	n.s.	n.s.	n.s.	--		
<i>Lack of challenger carriers</i>	n.s.	n.s.	+	--		
<i>Role of airline alliances on route</i>	n.s.	+	n.s.			
Strictness of national market environment at route ends	n.s.	n.s.	+			
Strictness of infrastructure access conditions at route ends	+	+	n.s.	n.s.		
Degree of government control over route carriers	+	n.s.	n.s.	+		

1. The reference periods for the cross-sections are 1996/1997 for regulation, market structure and efficiency indicators, and 1998/1999 for air fares.

n.s. = not significant

+ = significantly positive effect

-- = significantly negative effect

Source: Gonenc and Nicoletti (2000).

Table 4. Effects of ownership, regulation and industry structure on efficiency and prices in the electricity supply industry

Summary of results of panel regressions (1986-1996)

Dependent variable	Price		Efficiency	
	Industrial price	Ratio of industrial to residential prices	Rate of capacity utilisation	Deviation of reserve margin from optimum
Number of periods	11	11	11	11
Number of countries	19	19	19	19
Number of observations	209	209	209	209
Degree of unbundling of generation from transmission	n.s.	--	+	--
Degree of private ownership	+	+	+	n.s.
Extent of third party access	n.s.	--	n.s.	n.s.
Existence of wholesale pool	--	--		
Time to liberalisation	+			

n.s. = not significant
+ = significantly positive effect
-- = significantly negative effect

Source: Steiner (2000).

Table 5. **Effects of ownership, regulation and market structure on productivity and prices in the telecommunications industry**Summary of results of panel regressions (1991-1997)¹

Dependent variable	Prices			Productivity			Quality		
	International	Trunk	International, trunk and mobile	International	Trunk	International, trunk and mobile	International	Trunk	International and trunk
Industry	(International revenue / Outgoing minutes)	(OECD tariff basket)		(Outgoing minutes per employee)	(Mainline per employee)		(Answer seizure ratio)	(Service reliability)	
Number of periods	7	7	5.6	7	7	6.2	7	7	7
Number of countries	22	22	65	24	24	70	24	24	48
Number of obs.	154	154	406	168	168	446	168	167	335
Market share of new entrants	--	n.s.	--	+	+	+	+	n.s.	n.s.
Time to liberalisation	--	--	--	+	+	+	+	+	+
Degree of state ownership	+	--	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Time to privatisation	n.s.	n.s.	n.s.	n.s.	--	--	n.s.	n.s.	n.s.
Internationalisation of domestic market	+			--			n.s.	n.s.	n.s.

1. 1993-1997 for pooled estimates

n.s. = not significant

+ = significantly positive effect

-- = significantly negative effect

Source : Boylaud and Nicoletti (2000).

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