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Product Market Regulation in the Non-Manufacturing Sectors of OECD Countries: Measurement and Highlights

Paul Conway,

Giuseppe Nicoletti

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TABLE OF CONTENTS

1. Introduction 5
2. Measuring anti-competitive regulations and their propagation throughout the economy 6
2.1 Generalities 6
2.2 The non-manufacturing regulation (NMR) system 8
2.3. Coding, aggregation and weighting 12
2.4. Measuring the 'knock-on' effects of anti-competitive non-manufacturing regulation: the regulatory impact indicators (RI) 13
3. Results 15
3.1 Regulation and reform in energy, transport and communication 15
3.2. Regulation and reform in retail distribution and professional services 19
3.3 Knock-on effects of non-manufacturing regulation 21
4. Using the OECD regulatory indicators in empirical analysis 21
5. Possible further developments in the NMR indicator system 23

REFERENCES 25

ABSTRACT/RESUMÉ

Product market regulation in the non-manufacturing sectors of OECD countries: measurement and highlights

This paper describes a new set of indicators that measure differences in the regulation of non-manufacturing sectors of OECD countries over the past three decades. The indicators focus on regulations that affect competitive pressures in areas where competition is economically viable and on the potential costs that these regulations entail for economic activities that use the output of regulated sectors as intermediate inputs in production. The paper illustrates the methodology used to compute the indicators and the patterns of product market regulation and regulatory reform that emerge from the analysis. The robustness of results is assessed in three ways: comparing the indicators to other available data covering the same areas; computing confidence intervals around the indicator values; and listing econometric results obtained by linking the indicators to measures of competition and economic performance.

JEL codes:L50, L91, L92, L93, L94, L95, L96, L98
Keywords: indicators, regulation, competition, services.

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Régulation des services dans les pays de l'OCDE : évaluation et traits saillants

Ce document décrit un nouvel ensemble d'indicateurs qui mesurent les différences dans la régulation des secteurs non-manufacturiels des pays de l'OCDE au cours de trois dernières décennies. Les indicateurs se concentrent sur les régulations qui influencent la pression concurrentielle dans les domaines d'activité économique où la concurrence est possible, ainsi que sur les coûts potentiels que ces régulations impliquent pour les activités économiques qui utilisent les produits des secteurs régulés comme biens intermédiaires. Le document illustre la méthodologie utilisée pour calculer les indicateurs ainsi que les profils de régulation et de réforme des marchés des biens qui émergent de l'analyse. La robustesse des résultats est vérifiée de trois façons: on compare les indicateurs à d'autres sources d'information concernant les même domaines d'analyse; on calcule des intervalles de confiance centrés sur les valeurs estimées des indicateurs; et on mentionne les résultats économetriques qui ont été obtenus par les nombreuses études qui ont exploité ces indicateurs pour examiner la relation entre l'intensité de la concurrence et la performance économique.

Classification JEL : L50, L91, L92, L93, L94, L95, L96, L98
Mots clés : indicateurs, régulation, concurrence, services

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PRODUCT MARKET REGULATION IN THE NON-MANUFACTURING SECTORS OF OECD COUNTRIES: MEASUREMENT AND HIGHLIGHTS

by

Paul Conway and Giuseppe Nicoletti[1]

1. Introduction

1. Since 2001, the OECD has produced indicators of product market regulation in the non-manufacturing sectors of member countries.[2] These indicators have been used extensively in setting policy priorities and in various empirical studies linking regulation to economic performance. These studies contain information on the data sources and methodologies used to construct these indicators, but a unified and exhaustive treatment is still lacking. The twin purposes of this paper are to provide such a treatment and illustrate how these indicators can be used to describe patterns of sectoral regulation in OECD countries and their impact on performance.

2. Measuring cross-country differences and changes in the regulation of non-manufacturing sectors is important for at least two reasons. First, these sectors represent around two thirds of economic activity and are the most dynamic part of the economy (in terms of productivity growth and employment) in many OECD countries. Second, non-manufacturing is the area in which most economic regulation is concentrated and where domestic regulations are most relevant for economic activity and the welfare of consumers. Because import penetration is much more limited than in manufacturing sectors, final and intermediate consumers of non-manufacturing products have little alternative than to purchase these products on the domestic market. Domestic regulations affect the quality, the variety and the price of such products in a number of ways.

3. Clearly, many of these regulations serve the public good, either by addressing market failures or by pursuing non-economic objectives. Accordingly, it is particularly important that the analysis of non-manufacturing regulations be driven by well-defined criteria. The overarching criterion on which this paper surveys and assesses regulations is their effect on competition where competition is viable. Therefore, each of the OECD sectoral indicators reflects regulations that curb efficiency-enhancing competition, whereas regulations in areas in which competition would not lead to efficient outcomes (e.g. natural monopolies) are not considered. This approach yields indicators that are well-focused and account for the different technological characteristics of sectors. At the same time, the indicators are silent on the quality of regulation according to criteria other than competition or the extent to which regulations achieve non-economic policy goals.

4. By and large, all the indicators are constructed in a similar way. They cover information in four main areas: state control, barriers to entry, involvement in business operations and, in some cases, market structure. The information summarised by the indicators is "objective", as opposed to survey-based, and consists of rules, regulations and market conditions. All of these regulatory data are vetted by Member country officials and/or OECD experts. The indicators are calculated using a bottom-up approach in which

1、 The authors would like to thank Faye Steiner, Silas Xu and Donato de Rosa for their contributions, as well as Irene Sinha for her first-rate secretarial support. The opinions expressed in this paper are the authors' own and do not necessarily represent those of OECD member countries.

2 Throughout this document, non-manufacturing is used as a shorthand for the business services plus energy sector.

the regulatory data are quantified using an appropriate scoring algorithm and then aggregated into summary indicators by sector of activity in each of the four areas or across them. While this approach involves a degree of discretion, notably in choosing scores and aggregation weights, it has the merit of transparency and makes it possible to trace each indicator value to the underlying detailed information about policies and market conditions.

5. The resulting indicators of non-manufacturing regulation cover energy, transport and communication over the 1975-2003 period in 21 OECD countries, and retail distribution and professional services for 1998 and 2003 in 30 OECD countries. In addition, indicators of the "knock on" effects of anti-competitive regulation in these sectors (plus the finance sector) on sectors that use the outputs of these sectors as intermediate inputs are also calculated. To the best of our knowledge, these indicators provide the broadest coverage, of sectors and areas, and the longest time-series currently available for comparing product market regulation across countries. They are complementary to indicators of economy-wide anticompetitive regulation already published by the OECD (Conway *et al.* 2005). All indicators are updated on a regular basis and their values as well as background documentation are publicly available at www.oecd.org/eco/pmr.

6. The remainder of this paper is organised as follows. The next section provides details about coverage, data sources and construction methods. It deals in sequence with the indicators for energy, transport and communication sectors (ETCR), the retail distribution and business services sectors (RBSR) and the indicators measuring the "knock-on" impact of anticompetitive non-manufacturing regulations throughout the economy (RI). Section 3 illustrates the results for these three sets of indicators, compares some of them with other available indicators of regulation and tests their sensitivity to the choice of aggregation weights. Finally, Section 4 lists some of the empirical applications of the OECD non-manufacturing regulation indicators. The paper concludes with a discussion of possible future developments in the OECD indicator system.

2. Measuring anti-competitive regulations and their propagation throughout the economy

2.1 Generalities

7. This section describes the techniques used to construct the indicators of product market regulation in non-manufacturing sectors. All of these indicators are constructed from the perspective of regulations that create barriers to entrepreneurship and restrict competition in domestic markets where technology and demand conditions make competition viable. It is important to note from the onset that the sole objective of the indicators is to quantify the degree to which regulatory settings in a given sector are anti-competitive. They make no attempt to measure the stance of regulation with respect to public policy goals other than promoting competition. Including public ownership among regulations that hinder competition in some sectors reflects the idea that, with public enterprises often enjoying soft budget constraints and state guarantees, the playing field is not level in markets where they operate. Recent research has also suggested that such enterprises may have stronger incentives than private firms to engage in anti-competitive behaviour (Sappington and Sidak, 2003a, 2003b).

8. All of the sectoral indicators measure explicit policy settings and formal government regulations and do not record 'subjective' assessments of market participants, as in indicators based on opinion surveys.[3] One of the benefits of this approach is that the indicators are comparable across countries and isolated from context-specific assessments. Differences in indicator values across time and countries can also be traced to changes or differences in specific regulatory settings. This is not possible with indicator

3 . The relative merits and comparative results of "objective" and survey-based indicators of product market policies are discussed in Nicoletti and Pryor (2006) and Crafts (2006).

systems based on opinion surveys, which can identify perceived areas of policy weakness, but cannot attribute these to policy settings. On the other hand, objective indicators are only able to capture differences in the enforcement of regulation or in informal regulations (such as litigation procedures) to a very limited extent.

9. Given the sectoral focus of the indicators, the coverage of the various regulatory areas – such as public ownership, barriers to entry or price controls – is tailored to the structural characteristics of each industry. In addition, the indicators are nested, aggregating detailed information into progressively larger regulatory areas according to a pyramidal structure. This allows specific aspects of regulation – such as barriers to entry – to be assessed in isolation in country benchmarking or empirical research.

10. In general, the computation of sectoral indicators involved three main steps:

- First, the basic information was coded into quantitative scores that are increasing in restrictions to competition.

- Second, these basic scores were aggregated into indices that cover specific areas of regulation (henceforth *low-level* indicators). In all sectors, these low-level indicators cover barriers to entry, *i.e.* regulations that curb entry and/or distort market structure relative to a competitive outcome (for instance limiting the number of competitors in a given market or the proportion of consumers who can choose between competing suppliers).

- In the third step, the low-level indicators were aggregated into an overall indicator of regulation for the sector.

The way in which the basic scores and/or the low-level indicators were aggregated differs across sectors depending on how many regulatory data were available.[4]

11. One potential difficulty with measuring the impact of regulation on competition is accounting for the influence of enforcement. Stringent regulations may not bite on competition if not enforced, and even the most liberal regulatory settings may not promote competition if not implemented correctly. Similarly, in some cases, regulations enacted at the national level may have little impact on markets if applied by local authorities or if local legislation is contradictory in spirit. To go some way towards overcoming this difficulty, data on actual market and industry structure (such as market shares or the degree of vertical integration) are incorporated into some of the sectoral indicators so as to proxy for the impact of policy enforcement. However, the indicator results may still incur some bias in countries with a federal structure, when regulatory policies are controlled by the sub-central levels of government.[5] Moreover, as already mentioned, barriers to competition may not be fully captured by the indicators when they are mostly informal.

12. All of the data used to calculate the sectoral indicators are stored in the *OECD International Regulation Database*. These data have been collected from a wide variety of sources, including

4 . With few regulatory data, there is little alternative than discretional weighting procedures. When a larger number of data are available, statistical techniques (such as principal components) were used. In any case, confidence intervals around the resulting point estimates were usually computed to assess the robustness of indicator values to the choice of weights (see below).

5 . Data for these countries often reflect the status of regulation in the most populous states, provinces or regions. When regulation is decentralised, the direction of the bias cannot be known *a priori* but, given that incumbents typically have easier access to local regulators than to national ones, an underestimation of the restrictiveness of regulations is more likely in federal (or highly decentralised) countries.

publications of the OECD and a range of other institutions. In addition, the *OECD Regulatory Indicators Questionnaire*, requesting data directly from OECD Member countries, collected extensive information on policy settings and recent changes in the regulation of non-manufacturing sectors for selected years, which were used either as a source of data or as a means of verifying existing data drawn from other sources.[6]

2.2 The non-manufacturing regulation (NMR) system

13. The non-manufacturing regulation (henceforth NMR) indicators can be divided into three broad categories (Figure 1). The first group of indicators measure regulatory restrictions in energy, transport and communication (henceforth ETCR). The second group of indicators assess regulation in retail distribution and some business services (henceforth RBSR). The third group of indicators, called the regulatory impact (henceforth RI) indicators, are derived from the first two groups plus an indicator of anti-competitive regulation in the finance sector.[7] The RI indicators measure the potential costs of the anti-competitive regulation captured by the ETCR and RBSR (plus finance) indicators on sectors of the economy that use the output of these sectors as intermediate inputs in the production process.

[Figure 1. Structure of the NMR indicator system]

14. The ETCR and RBSR indicators cover different (but largely overlapping) areas of regulation, countries, and periods and rely on various original data sources. Moreover, depending on sector characteristics, the indicators cover regulatory and market conditions in a number of different (horizontal or vertical) segments of each industry (*i.e.* fixed and mobile communications or electricity production and distribution). The areas and dimensions of regulation accounted for in each indicator are a function of data availability and the relevance of the various regulatory areas for each sector. For example, in OECD countries public ownership is not an issue in the professional services or road freight sectors and vertical integration is typically not relevant for the airline industry.[8] Tables 1 and 2 provide an overall view of these features for each indicator, which are discussed in more detail below. The construction of the (derived) RI indicators is described at the end of this section.

[Table 1: The coverage of the ETCR and RBSR indicators]

[Table 2: The ETCR and RBSR indicators: regulatory areas by industry]

The ETCR indicators

15. The ETCR indicators measure restrictions to competition in seven industries: electricity, gas, air passenger transport, rail transport, road freight, postal services and telecommunications (Figure 2). They have been estimated at an annual frequency over the period 1975 to 2003 for 21 OECD countries, [9] based on a number of published sources as well as on replies to the *OECD Regulatory Indicators Questionnaire*

6 . The *OECD International Regulation Database* and the *OECD Regulatory Questionnaire* are available via the OECD Indicators of Regulation Homepage at www.oecd.org/eco/pmr. Data collected via the questionnaire are for the years 1998 and 2003.

7 . The indicator of regulation in the finance sector is taken from de Serres *et al.* (2006) and assesses the degree to which regulation encourages or inhibits competition in markets for banking services and financial instruments.

8 . Only in a few countries (*e.g.* the United States) are airline companies allowed to own part of the airport infrastructure.

9 . These countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, the United States.

(for the 1998 and 2003 data points). The indicators cover transmission, distribution and supply in electricity and gas; infrastructure as well as passenger and freight services in rail transport; domestic and international routes in air passenger transport; basic letter, parcel and courier services in post; and trunk, long distance and mobile services in telecommunications. In each industry (or, if applicable, industry segment), the indicators include the following low-level indicators: barriers to entry in all sectors; public ownership in all sectors except road freight; vertical integration in electricity, gas and rail transport; market structure in rail transport, gas and telecommunications; and price controls in road freight.

[Figure 2. The structure of the ETCR indicator system]

16. The following low-level indicators were constructed for the ***energy sector*** (Table 3):

- Indicators for *entry regulation* focus on terms and conditions for third party access (TPA) and the extent of choice of supplier for consumers. In the electricity sector this is supplemented by information on the existence of a liberalised wholesale market for power, which is an important issue in most OECD countries. In the gas sector limitations on access to production or import markets are also addressed. Such limitations are irrelevant for electricity because they were lifted in virtually all OECD countries. Regulated TPA, free consumer choice, a liberalised wholesale power market and free access to import/production of gas are assumed to be competition-promoting policies.

- Indicators for *public ownership* record the prevailing ownership structure in the various segments of the electricity and gas sectors, ranging from fully private to fully public. The scoring allows for mixed ownership arrangements in which the natural monopoly segments remain under public hand.

- Indicators for *vertical integration* focus on whether competitive activities such as generation of electricity, production of gas, and supply of both to the final consumer are separated from natural monopoly activities such as the national grid and/or local distribution. The degree of separation ranges from full integration to mere legal/accounting separation to separation into different companies owned by different shareholders. The assumption here, reflecting industrial organisation theory, is that the scope for anticompetitive behaviour is largest when an electricity or gas company simultaneously controls the network and operates in upstream or downstream competitive markets (see OECD, 2001).

- An indicator of *market structure* in the gas industry records the market shares of the largest companies in the various segments of the industry to (somewhat crudely) capture the extent to which the regulatory framework succeeds in moderating the market power of incumbents.

[Table 3. Composition of the low-level indicators for the energy sector]

17. In the ***transport sector,*** the very different structural features of the three industries covered necessitate a different coverage and content of the corresponding low-level indicators (Table 4):

- *Entry regulation in rail transport services* distinguishes i) free entry (with access fees to the rail network infrastructure), ii) franchising to several firms and iii) franchising to a single firm. For EU countries, the latter is scored the same as the mere application of the EU 1991 Directive, which is not very demanding in terms of opening up rail markets to competition. *Entry regulation in passenger air transport services* covers, on the domestic side, the liberalisation of internal routes and, on the international side, the participation in an agreement liberalising access to

routes within a region and/or the existence of an "open skies" agreement with the United States.[10] The domestic and international dimensions of regulation are weighted by the share of domestic passengers, to account for the stronger relevance of domestic liberalisation in large countries. Finally, *entry regulation in road freight* looks at more subtle ways in which entry can be thwarted in this eminently competitive sector: through a restrictive or discretional licensing system and through the intervention of incumbents in decisions concerning entry or price setting.

- As mentioned above, *public ownership in road freight* is not covered, because no OECD government has any relevant stake in this industry. *Public ownership in rail and air transport* is, in both cases, covered by reporting the percentage shares owned by the government in the largest company (separately for infrastructure, passenger transport and freight transport in rail).

- *Vertical integration* is an issue only in the rail transport industry, for which a low-level indicator similar to the indicators for the energy industries is constructed. Here, the assumption is that the possible economies of scope from integrating infrastructure and services do not outweigh the advantages of unbundling in terms of easier regulatory oversight and stronger downstream competition.[11]

- *Market structure* is reported only for rail transport to distinguish franchising to several companies, each operating as a local monopoly, from franchising to several firms competing with each other in a given geographical area.

[Table 4. Composition of the low-level indicators for the transport sector]

18. In the ***communications sector***, the following low-level indicators were constructed (Table 5):

- Indicators for *entry regulation* are based on legal limitations on the number of competitors allowed in each of the post and telecommunications markets covered by the analysis. Possibilities range from no limitations to limitations in all markets or franchising to a single firm, and are weighted with the share of turnover generated in the average OECD country by each of the activities covered by the indicator (*e.g.* mobile, trunk and international long distance in telecommunications).[12]

- Indicators for *public ownership* record, in ways that are appropriate to each industry, the extent of government control in the various post and telecommunications services, using the same structure of weights as for the entry indicator.

- Finally, a low-level indicator for *market structure in telecommunications* is based on the market share of new entrants in each of the telecommunications services covered by the indicator to gauge the extent to which existing regulations actually succeed in promoting competition.

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10 . The assumption here is that such open skies agreements, by increasing the number of air freedoms enjoyed by airlines of signatory countries, are a step towards discarding the system of bilateral air service agreements that usually constrain international routes in a situation of bilateral monopoly. Open skies agreements, however, stand to the full-scale liberalisation of air routes in the same way as bilateral trade agreements stand to multilateral ones.

11 . For a discussion of this assumption, see OECD (2005).

12 . Using average shares avoids endogeneity problems that are likely to arise when liberalisation of one activity increases its share in total turnover.

[Table 5. Composition of the low-level indicators for the communications sector]

The RBSR indicators

19. The RBSR indicators cover regulatory restrictions to competition in two sectors (Figure 3): retail distribution and the professional business services. The retail distribution indicator covers 25 OECD countries in 1998 and 29 OECD countries in 2003;[13] the professional services indicator covers 22 OECD countries in 1996 and 30 OECD countries in 2003.[14] Data for these indicators come from the *OECD Regulatory Indicators Questionnaire* (for retail distribution in both years and professional services in 2003) and the survey in OECD (1996) (for professional services in 1996). The retail distribution indicator covers regulations for generic outlets as well as, more in detail, for food and clothing outlets, while the professional services indicator covers regulations in the engineering, legal, accounting and architectural professions. In each industry, the low-level indicators cover regulations that either affect entry or business conduct. Arguably, some regulations may affect both entry and conduct (*e.g.* price controls), but for convenience they are attributed to one of these two main categories.

[Figure 3. The structure of the RBSR indicator system]

20. Low-level indicators for ***retail distribution*** cover the following items (Table 6):[15]

- *Entry regulations* cover provisions that either raise the cost of accessing retail markets or create explicit barriers for certain types of outlets. The indicator includes information on two regulations that potentially increase costs – registration requirements and licensing requirements – and three regulations that impose barriers – restrictions on the range of products that can be sold (*e.g.* no newspapers in foodstores), restrictions on the range of services that can be supplied (*e.g.* no food sold at gas stations) and restrictions on the establishment of large outlets. Moreover, the indicator also includes information on the extent to which incumbents are protected from new entry, either because they are granted legal monopoly rights or because they are involved in decisions concerning new licenses.

- *Conduct regulations* cover provisions that restrict entrepreneurial choices concerning inputs, supply, or pricing. The indicator includes information on the existence of administered prices for a range of final consumer goods and on the flexibility of legislation setting shop-opening hours (if any). The assumption here is that limits on hours that are applicable at the national or federal level are more restrictive than limits set at the local or state/provincial level, which leave room for some territorial variability in rules.

[Table 6. Composition of low-level indicators for retail distribution]

21. Low-level indicators for the ***professional services*** are the same across the four professions and cover the following items (Table 7):[16]

13 . The country for which 2003 indicators of regulation in retail distribution are missing is Luxemburg. The missing countries in 1998 are Luxemburg, the Czech Republic, the Slovak Republic, New Zealand and the United States.

14 . The countries for which 1996 data are missing are: Czech Republic, Greece, Hungary, Iceland, Korea, Poland, Slovak Republic, and the United States.

15 . The indicators of regulatory conditions in retail distribution were first developed at the end of the 1990s and are discussed in detail in Boylaud and Nicoletti (2001).

- *Entry regulations* include mainly barriers to becoming a member of each of the professions. These may take the form of licensing and educational requirements, quantitative constraints on the number of suppliers of professional services and/or exclusive rights granted to suppliers in certain areas.

- *Conduct regulations* include restrictions on prices and fees, advertising, form of business and inter-professional cooperation. The indicator covers restrictions that are imposed either by law or by self-regulatory arrangements of the professions.

[Table 7. Composition of low-level indicators for the professional services]

22. It should be noted that in assessing regulations in both the retail distribution and the professional services sectors the implicit assumption is that barriers to entry or constraints on conduct that exist in one country but not in others are not needed to ensure service quality, protect workers or protect consumers and, hence, unnecessarily distort competition. This seems a reasonable assumption to make when dealing with inherently competitive sectors in OECD countries, which have by and large similar degrees of development, institutional quality, social protection systems and product quality enforcement. This assumption is supported by a growing body of research showing that many of the entry and conduct restrictions observed in the retail and professional services industries tend to benefit incumbents at the expense of productive efficiency and the welfare of consumers (OECD, 2000).

2.3. Coding, aggregation and weighting

23. As illustrated in Figures 2 and 3 and Tables 3 to 7, converting the regulatory data into sectoral indicators of product market regulation involved coding, weighting and aggregation along the pyramidal structure of the indicator system. While describing this procedure at length would be tedious, it is useful to sketch it in general terms and highlight some of the issues arising in this context. The reader is referred to the tables for more details.

24. The qualitative information on individual items (such as YES/NO answers) was coded by assigning a numerical value to each of the possible replies to a given question. Quantitative information was subdivided into classes using a system of thresholds. All the coded information was normalised over a scale of 0 to 6, reflecting increasing restrictiveness of regulatory provisions to competition. As a result, at each step of the aggregation procedure, the indicators also take values between 0 and 6. This range is arbitrary, but the choice of a different range has no implications for country rankings or empirical results obtained using the indicators. It is also important to note that the 0 and 6 scores are relative to theoretical situations (best practice or worst practice, respectively) and do not necessarily reflect the extreme situations found in the sample of countries that are examined. Hence, the rankings are not sensitive to changes in country coverage.

25. Scores on the individual regulatory items were aggregated into low-level indicators which were, in turn, aggregated into intermediate-level indicators by industry. Finally, the intermediate-level indicators were aggregated into broader sectoral aggregates, which provide the final ETCR, RBSR and NMR constructs. Alternatively, the flexible structure of the NMR system makes it also possible to aggregate the low-level indicators *by area of regulation* in order to obtain, for instance, indicators of public ownership, barriers to entry or conduct regulation at the level of sectoral aggregation. In all cases, the scores obtained by each country at each aggregation step can be easily related to their scores on lower-level indicators or even to their scores on individual regulatory items. Thus, the pyramidal structure of the NMR system is

16 . The indicators of regulatory conditions in the professional services are calculated using a slightly modified version of the methodology developed in Paterson *et al.* (2003).

potentially useful for both analyses aimed at identifying policy priorities in the product market area and empirical analyses aimed at verifying the effect of different kinds of product market regulations on economic performance.

26. To make aggregation possible, a set of weights for individual items and low-level indicators had to be chosen. Weights used in generating the ETCR indicators are usually simply 1/N, where N is the number of items or low-level indicators to be aggregated. Exceptions to this rule are: road freight in which the influence of incumbents was given more weight than licensing procedures; gas in which vertical separation of production from the rest of the industry was given a larger weight than separation of other segments; and the cases, already mentioned, in which indicators for horizontal segments of an industry were aggregated using the share of each segment in total turnover (*i.e.* domestic *versus* international air transport, mobile *versus* fixed telephony and basic letter *versus* other postal services). Weights for the RBSR indicators are more complex, reflecting the larger amount of regulatory information available, not all equally relevant for assessing the impact on competition.[17] It is important to stress that, in the end, the weight of each individual item in the industry-level indicators closely reflects both the information available at each aggregation step *and* the nesting structure of the indicator.[18]

27. Because the weighting stage inevitably involves a fair amount of discretion, it is important to verify the sensitivity of the intermediate indicator values to changes in the system of weights used in aggregation. For this purpose, a "random weights" procedure was devised that considers each of the weights as a random draw from a uniform distribution under the constraint that they should sum to unity at each stage of the aggregation process.[19] Repeated random draws of the weights generate a distribution of indicator values that can be used to compute confidence intervals at conventional levels, under the assumption of normality. Point estimates of the intermediate indicators, computed using the arbitrary set of weights described in Tables 3 to 7 can then be compared with the "mean" estimates resulting from the random weights procedure. The robustness of country rankings to uncertainty about the weights can be checked by looking at the bounds of the resulting confidence intervals. The random weights procedure has been applied to the aggregation of the low-level indicators into the industry-level ones. The sensitivity of the indicator values to changes in the weights assigned to individual regulatory items has not been tested.

2.4. Measuring the 'knock-on' effects of anti-competitive non-manufacturing regulation: the regulatory impact indicators (RI)

28. The effect of product market regulations that restrict competition in non-manufacturing sectors is by no means confined to these sectors. It will also have a less visible impact on the cost structures faced by firms that use the output of non-manufacturing sectors as intermediate inputs in the production process.[20]

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17 . In the case of retail distribution, weights were derived by running a principal components analysis on the 1998 individual regulatory items. See Boylaud and Nicoletti (2001) for details.

18 . For instance, if individual regulatory items were aggregated directly into industry-level indicators instead of going through the low-level indicators, the 1/N rule would yield a different set of weights. Weights would also differ if a different number of low-level indicators were included into some of the industry-level indicators.

19 . The implicit assumption here is that the weights are independently distributed. A more general alternative would have been to consider random draws of the entire set of weights characterising each aggregation step, subject to the same constraint. This would require the positing of a joint distribution of weights with marginal distributions that are uniform and an arbitrary correlation structure on the weights.

20 . The 'knock-on' effects of regulation in the non-manufacturing sector will also propagate through the economy via a number of other channels such as the effect on the price of investment goods and "Baumol disease" effects that act through wages. In this context, focusing on the role of non-manufacturing sectors

For example, if product market regulation in the business services sector in a particular country is restrictive of competition then the prices charged by firms operating in this sector will tend to be higher and/or the quality of service lower than for firms operating in a competitive business services environment. In turn, this will affect the costs of entry for new firms that need to use these services, the extent to which existing firms outsource these services, the organisation of work within firms, the allocation of resources between firms and, ultimately, the scope for the associated productivity improvements.

29. These "knock-on" effects of non-manufacturing regulation are likely to have become particularly salient over recent years given the large and increasingly important role of the non-manufacturing sector as a supplier of intermediate inputs in OECD countries. For example, on average across countries for which (harmonised) input-output data exist, in the late 1990s almost 80 % of the output of the business services sector was used as an intermediate input in the production processes of other sectors in the economy (Figure 4). Similarly, between 50 and 70 % of the output of the finance, electricity, and post and telecoms sectors is destined to be used as intermediate inputs to the production process. In addition, the importance of non-manufacturing sectors as a source of intermediate inputs has been growing rapidly over recent decades, along with the rest of the services sector. For example, Kongsrud and Wanner (2005) report that the service sector now accounts for roughly 70% of all jobs and value-added in the OECD area, which is more than 5 percentage points higher than in 1990.

[Figure 4: Share of intermediate and final demand in gross business sector output: selected non-manufacturing sectors]

30. In any given country the magnitude of these 'knock-on' effects of non-manufacturing regulation on the economy will be a reflection of two factors:

- the extent of anti-competitive regulation in non-manufacturing sectors, and
- the importance of these sectors as suppliers of intermediate inputs.

The first of these factors is captured by the NMR indicators;[21] the second factor is measured using total input coefficients derived from (harmonised) input-output tables, which provide a snapshot view of the purchases and sales of intermediate inputs between different sectors in a given year.[22]

31. Using total input-output coefficients, the sectoral regulation impact indicators (RI) are calculated as follows in each country:[23]

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as suppliers of intermediate inputs provides only a lower bound to these propagation effects. It does, however, facilitate their empirical measurement.

21. As mentioned above, an indicator of anti-competitive regulation in the finance sector – described in detail in de Serres *et al.* (2006) – is also used as part of the analysis of anti-competitive regulation in non-manufacturing and the calculation of the RI indicators.

22. Total input coefficients are calculated as follows. If Y is a vector of industry gross outputs, D a vector of demand for final goods, and A a matrix of technical coefficients – that is, the share of inputs from industry j used in producing one unit of output of industry k – then the basic relation between output and final demand can be expressed as:

$$D=(I-A)Y, \quad \text{or alternatively,} \quad Y=(I-A)^{-1}D$$

In this equation $(I-A)^{-1}$ is the Inverse Leontief Matrix of the input-output coefficients and describes how many units of an industry's output have to be produced at any stage of the value chain in order to produce one unit for final demand.

$$RI_{kt} = \sum_{j} NMR_{jt} \bullet w_{jk} \qquad 0 < w_{jk} < 1$$

where the variable NMR_{jt} is an indicator of anti-competitive regulation in non-manufacturing sector j at time t and the weight w_{jk} is the total input requirement of sector k for intermediate inputs from non-manufacturing sector j. The (harmonised) input-output data for OECD countries, and therefore the w_{jk}, exist at the 2-digit (ISIC rev3) level, implying that the NMR must also be calculated at this level of sectoral aggregation. Accordingly, the NMR indicators are mapped into the ISIC system as shown in Figure 5. If more than one of the NMR indicators map into a given 2-digit ISIC sector then NMR_{jt} is calculated as a simple average of the constituent indicators.

[Figure 5: The correspondence between the NMR indicators and ISIC sectors]

32. For non-manufacturing sectors, where $k=j$ in the above formula, the total impact coefficient for the sector's own output (w_{jj}) is typically relatively large, implying a large weight on the own indicator of anticompetitive regulation (NMR_{jj}) in the RI indicator for that sector. As a result, the RI indicators for the non-manufacturing sectors where $k=j$ are measured in a consistent way as for the other sectors where $k \neq j$ but are highly correlated with the original NMR indicator for that sector.

33. The RI indicators are calculated in this way for 39 (ISIC rev3) sectors in 21 OECD countries over the period 1975 to 2003 and provide a large database on the sectoral impact of non-manufacturing regulation in OECD countries. It should be noted that, in the formula, NMR_{jt} is equal to either the ETCR indicators, for which complete time-series data are available, or the RBSR (plus finance) indicators for the other sectors, which have been estimated for only one or two years. Thus, due to data limitations, the variability of the RI indicators over time reflects mostly changes in the regulation of the energy, transport and communication sectors.

3. Results

34. This section provides a summary description of cross-country patterns and trends emerging from the NMR indicators. Detailed values of the intermediate and low-level indicators in each of the industries covered by the NMR system as well as scores on each regulatory item and the underlying qualitative data, can be consulted and freely downloaded from the OECD regulatory indicators homepage (http://www.oecd.org/eco/pmr).

3.1 Regulation and reform in energy, transport and communication

Overview

35. The ETCR indicators cover some of the non-manufacturing industries in which anti-competitive regulation has traditionally been heaviest in OECD countries. This is because these sectors have long been (and partly still are) characterised by the presence of natural monopoly segments and network externalities, and firms have typically been burdened with non-economic objectives (such as universal service obligations). In many countries, legal restrictions to entry, widespread public ownership, and extensive cross-subsidies have often been seen as the only way to address these problems. These regulatory arrangements have seldom been challenged by international competition, given that these sectors were

23 . This technique for calculating the regulation impact indicators is a variant of that used by Faini *et al.* (2006). Total input-output coefficients have also been used by Allegra *et al.* (2004) to derive the impact on export-oriented sectors of economic activities that are problematic from the point of view of antitrust law.

relatively closed to international trade and investment until recently.[24] However, over time, technological advances, the evolution of governance and regulatory techniques, as well as increasing international exposure have made liberalisation and privatization increasingly possible in these sectors. The ETCR indicators endeavour to capture these developments.

36. Indeed, according to these indicators, product market policies have become more friendly to market mechanisms over recent decades (Figure 6). The indicators suggest that regulation in these sectors was restrictive in all OECD countries in the 1970s, though more so in Europe and Japan. Over the period 1975-2003, changes have been achieved in most of the regulatory areas covered by the indicator, but were most spectacular in reducing barriers to entry and, to a lesser extent, public ownership. Price controls were also almost completely eliminated in the road freight sector. Changes in market and industry structure were comparatively more difficult to achieve and remain an issue in many OECD countries.

[Figure 6: Regulatory reform in energy, transport and communications (1975-2003): breakdown by regulatory area]

37. As further highlighted in Figure 7, the United States was the first country to begin reforming product market regulation in the early 1980s. A number of other countries – notably the United Kingdom, Canada, New Zealand, the Nordic European countries and Japan – commenced reform a little later, from the mid-1980s. In Australia and most other European countries the bulk of product market reform occurred from the mid-1990s.

[Figure 7: The timing of reform in energy, transport and communications]

38. Given differences in the initial stance of policies and the pace of reforms, the cross-country dispersion in approaches to product market regulation increased in relative terms until the late 1990s (Figure 8). In the EU countries this policy divergence started later than in the OECD in general and appears to have been somewhat more pronounced, despite efforts at harmonisation through the Single Market Programme. From the beginning of this century, however, the OECD policy dispersion has fallen partly reflecting that regulation in the EU has converged more rapidly than in the past.

[Figure 8: Evolution and dispersion in product market environments, 1980-2003]

39. Convergence in product market policies has also been documented by IMF (2004) and Høj *et al.* (2006a), who note that initial conditions exert conflicting influences on the pace of reform: wide initial gaps relative to best practice policies suggest a large scope for improving performance through reform, potentially enhancing pressures for change; but they also suggest the presence of large product market rents, strengthening the resolve of rent-seeking beneficiaries of regulation to delay the reform process. Figure 9 provides country detail concerning policy convergence. It confirms that the balance between conflicting political economy influences swung decisively in favour of reform only after 1995, with countries further from best practice (such as, for instance, continental EU countries) speeding up their pace of change. Implementation of EU liberalisation directives has been an important stimulus for reform in the network industries of these countries.

[Figure 9: Initial conditions and product market reform, 1975-2003]

24 . For a detailed account of trade and FDI developments in non-manufacturing sectors see Nicoletti *et al.*, (2003). Golub (2003) provides measures of comparative openness to FDI in these sectors for OECD countries over the period 1980-2001.

40. As a result of these trends in product market reform, the aggregate ETCR indicator suggests that, in 2003, English-speaking countries, some small European countries and Germany had markets for energy, transport and communication that were more open to competition than in the rest of Europe and Japan (Figure 10). At the other end of the spectrum, product market policies in these markets were relatively more adverse to competition in France, Ireland and Greece

[Figure 10: Product market regulation in energy, transport and communication, 2003]

41. To assess the statistical significance of these estimated cross-country differences in regulation, Figure 11 graphs 90% confidence intervals for the 2003 values of the ETCR indicator, which are calculated using the random weights technique described in the previous section. Across a number of countries indicator values are not statistically different when uncertainty about the weights used to construct them is taken into consideration. However, at this level of confidence, two broad country groupings with clearly distinct regulatory regimes can be identified in 2003: a 'relatively liberal' group of countries – including the United Kingdom, Australia, the United States, the Netherlands, Canada, Denmark, and Germany – and a 'relatively restrictive' group of countries – including Greece, Ireland, France, and Switzerland. The rest of the countries for which these indicators exist are not statistically distinguishable from these two groups at the 90% level of confidence.

[Figure 11: Confidence intervals for the ETCR indicator, 2003]

42. The patterns of regulation captured by the ETCR indicator are indicative of broader trends in market-oriented reforms occurring in other sectors and product market areas. For instance, this indicator is highly correlated across countries with the OECD indicator of economy-wide regulation (PMR) in the years in which the two indicators overlap (Figure 12).[25] Similarly, the components of the ETCR indicator excluding or isolating the public ownership component are closely correlated with alternative regulatory indicators devised by Gwartney and Lawson (2006), which measure, among other things, the extent of business regulations and the government presence in the business sector (Figure 13 and Table 8).[26] For the indicators of business regulation excluding public ownership, the rank correlation ranges from around 70% to 50% depending on the year. These indicators tend to be less correlated towards the end of the period, due to less agreement on precise country rankings as indicator values converge. The indicators of public ownership show a similar pattern of diminishing rank correlation over time and are generally less correlated than the indicators of business regulation excluding public ownership. The patterns of deregulation reported by the two sets of indicators are also closely correlated over time in most countries, with rank correlation coefficients often above 70%. So although the ETCR indicator clearly misses aspects of economy-wide regulation, it appears to provide a good proxy for overall regulatory conditions in the 21 OECD countries for which it has been computed over the period 1975 to 2003.

[Figure 12: Economy-wide regulation versus regulation in energy, transport and communications]

[Figure 13: Cross-country correlation between the ETCR and the Economic Freedom of the World indices]

25 . The economy-wide indicators of product market regulation in OECD countries are described in Conway *et al.* (2005) and Nicoletti *et al.* (1999).

26 . More precisely, the rank correlations with the ETCR indicator have been computed using Areas 1-C and 5-C of the Economic Freedom of the World indicator, which seemed to contain information that was closest in spirit to the ECTR subcomponents excluding and isolating public ownership.

[Table 8. Cross-country and time-series correlation between the ECTR and the Economic Freedom of the World indices]

Sectoral detail

43. Looking across industries, the indicators suggest considerable variation in the stringency of regulation. In some industries, such as road freight, air transport, and telecommunications, regulation appears to have been completely overhauled (Figure 14). In other industries, such as gas, postal services, and rail transport, regulatory reforms appear to have been minor. As further highlighted in Figure 15, the timing of reform has also varied widely across industries, with road freight and airlines being liberalised (and privatised) earlier than the other industries and electricity and telecoms being deeply reformed over the past decade.

[Figure 14: Product market reform by sector: OECD average]

[Figure 15: The timing of sectoral reforms: OECD average]

Transport

44. Regulatory reform in the transport sector began in the early 1980s in road freight, a sector that was extensively liberalised in most OECD countries by the mid-1990s (Figure 16). Italy and Greece are exceptions, given a number of ongoing restrictions such as stringent entry and licensing requirements, price controls, and the involvement of professional bodies in pricing and entry decisions. Regulations covered by the air transport indicator were also lifted relatively early as domestic air markets were liberalised, 'open skies' and regional air agreements became more common, and a number of OECD governments reduced their ownership stake in airlines.[27] However, despite reform, competitive pressures in international air routes often remain fairly weak due to the persistence of restrictive bilateral air service agreements and limits to foreign ownership of national carriers, two elements that are not currently captured by the ETCR indicator. Early reforms in road freight and air transport partly reflect the fact that these industries are the least affected by natural monopoly elements and universal service requirements. Liberalisation and privatisation are therefore relatively easier to implement and their benefits more certain than in the railways industry, where reforms were much less extensive and more recent, especially in continental EU countries. With the exception of the United Kingdom, this industry continues to be characterised by high levels of public ownership (particularly in Europe) and vertical integration (the United States and Japan), and barriers to entry.

[Figure 16: Regulation in energy, transport and communication: 1975 and 2003]

Communications

45. In the communications sector reform largely took place since the mid-1980s, though at a different pace and extent in post and telecommunications. While postal services remain public-owned and relatively regulated in most countries, telecommunications reform has taken off in the second half of the 1990s, largely reflecting wide-ranging EU liberalisation directives. As a result, explicit restrictions to entry are now uniformly low across both the EU and other OECD countries, where reform had occurred in the previous decade (such as in the United States and Japan). The remaining dispersion in indicator values in

27 . Note that the time-series indicator of regulation in the air transport sector covers only a limited range of regulatory settings given restricted data availability over the full sample period. For a comprehensive analysis of air transport regulation based on more extensive cross-section regulatory data see Gonenc and Nicoletti (2001).

2003 mainly depends on cross-country differences in the degree of public ownership and market structure. Differences in market structure reflect persisting difficulties in accessing networks for new entrants, resistance to new entry by incumbent service providers and high switching costs for customers wishing to change operators. Regulations that promote competition by attempting to overcome these factors (*e.g.* access pricing and network unbundling rules, number portability requirements, etc.) are currently implemented to different degrees across OECD countries (Høj *et al.*, 2006b), but the ETCR indicator only accounts for them through its market structure component.

Energy

46. Reforms in the energy sector tended to lag the telecoms sector by several years and have been rather uneven across OECD countries, even within the EU. Reforms in the electricity sector have been significant in the United Kingdom, Nordic European countries, German-speaking countries, Spain and Italy. However, despite evidence that competitive electricity markets can work well under appropriate regulatory frameworks, this sector continues to be characterised by relatively high levels of public ownership and vertical integration in a number of other countries, such as Switzerland, Canada, France, Greece and Ireland.[28] Reforms in the gas sector have generally been much more modest and, with the exceptions of the United States, Canada and, to a lesser extent, Germany and the United Kingdom, regulation continues to deter competition. High levels of public ownership are a characteristic of this sector in some EU countries whereas access to some segments of the market is restricted in Japan. Varying degrees of vertical integration continue to characterise this sector in a number of countries.

3.2. Regulation and reform in retail distribution and professional services

47. The two sectors covered by the RBSR indicators are typically composed of a multitude of competing private firms. Hence, competition issues have been inherently subtler than in energy, transport and communications, where public legal monopolies were not uncommon in OECD countries. For instance, save for specific areas (e.g. alcohol and tobacco), public ownership has typically never been an issue and barriers to competition were generated by a different (and more heterogeneous) range of policies than those covered by the ETCR indicators. These policies have traditionally been related to either consumer protection or urban planning motivations or both. Being essentially country-specific, they have led to a wide dispersion of regulatory approaches across countries, each being insulated by the low tradability of professional and, especially, retail trade services. With trade, technological developments and other global factors having had less of an impact in these sectors, OECD-wide reform trends have been less pronounced and less choral than in the energy, transport and communications sectors.

Retail distribution

48. Despite its generally fragmented market structure, the retail sector is often subject to numerous regulations that weaken competitive pressures. There are large differences in the indicator of retail regulation across OECD countries, suggesting very different policy approaches in this sector (Figure 17). In addition, the large cross-country variation in retail regulation appears to have changed little between 1998 and 2003, implying little evidence of recent policy convergence in this sector.

[Figure 17: Regulation in retail distribution]

49. In Belgium, Greece, Germany, and Canada retail regulation was relatively strict in 1998 and became slightly more so in 2003. In Iceland, Korea, and Hungary retail regulation has also become

28 . Regulatory failures that have led to electricity supply disruptions after liberalisation in some OECD countries may have contributed to slow down reform in this sector (see Hoj *et al.*, 2006b).

somewhat less conducive to competition over this time period, but from more moderate initial levels. In all other OECD countries retail regulations have generally become more pro-competitive since 1998. However, with the exception of Turkey, the United Kingdom, Japan and France, the change in indicator value was relatively small, implying only modest improvements in the degree to which regulation is supportive of competition in this sector. In most countries, the modest improvement in the regulatory environment between 1998 and 2003 is the result of lower barriers to entry and fewer operational restrictions, whereas the extent of retail price controls has not changed a great deal.

50. The 90% confidence intervals around the 2003 low-level retail indicators identify Belgium, Greece, Germany, Poland, Spain, Austria, Norway, and France as a group of countries in which retail regulation is relatively strict. At the other end of the spectrum, retail regulation is found to be relatively liberal in Sweden, Czech Republic, Ireland, Switzerland, Slovak Republic, Australia, Korea and New Zealand (Figure 18). Turkey and Japan are the only two countries in which the loosening in retail regulation between 1998 and 2003 is statistically significant at the 90% level of confidence. That is, the confidence intervals around the 1998 and 2003 retail indicators do not overlap, implying that the improvement between 1998 and 2003 is robust to the choice of weights used to calculate the indicator.

[Figure 18: Confidence intervals for the indicators of regulation in retail distribution, 1998 and 2003]

Professional services

51. Regulation in the professional services often limits the scope for competition by restricting entry, allowing for price fixing, granting exclusive rights to perform particular services, and restricting advertising and business structures. These regulations are claimed to be in the interest of consumers on the basis that they improve service quality and overcome information asymmetries. In practice, however, there is little empirical evidence that indicates a positive impact on consumer welfare (OECD, 2000; OFT, 2001; Paterson *et al.,* 2003; Høj *et al*. 2006b) and it is not always apparent why the regulation of these professions should differ from that of other service providers.

52. The indicators of regulation in professional services suggest that, on average across the OECD, legal services is the profession in which most regulatory hurdles are found (Figure 19). Accountancy is the second most regulated of the professional services, followed by architecture and engineering. On average across services, only minor progress has been made in liberalising these professions since 1998 (Figure 20, panel A). In the relatively liberal countries (Denmark, Sweden, Australia, Finland, Switzerland, the United Kingdom, Ireland, and the Netherlands) restrictions on entry into the professional services are lighter relative to the rest of the OECD countries, while differences among restrictive countries mostly reflect differences in conduct regulation – that is restrictions on price setting, advertising, form of business, and inter-professional cooperation.

[Figure 19: Regulation in the professional services: OECD average]

[Figure 20: Regulation in the professional services]

53. Entry restrictions in accounting and legal services tend to be quite common across countries, while wide differences in entry rules characterise the other services (Figure 20, panel B). Conversely, differences in conduct regulation tend to be concentrated in the legal services and accounting professions. While reform activity has generally been low in the professional services, some countries implemented significant liberalisation in specific areas – such as accounting in Austria and Germany, legal services in France and Korea, and engineering in Portugal and Austria. In all other countries for which data exist

regulatory reform in professional services has been relatively minor since 1996 and in a number of countries regulation has become slightly less conducive to competition over this period.

54. The random weights technique applied to the overall indicator of professional services identifies the countries with light entry regulations (plus Mexico) as forming a group of countries with relatively liberal regulation in this sector in 2003 (Figure 21). Conversely, the regulatory regime for professional services is found to be relatively restrictive in Turkey, Luxembourg, Germany, Canada, Southern European countries and some new EU members. Amongst the more limited set of countries for which 1996 data exists, the improvements in regulation in Switzerland, Mexico, Australia, Austria, Spain and Germany are found to be significant at the 90% level of confidence.

[Figure 21: Confidence intervals for the professional services indicators, 1996 and 2003]

3.3 Knock-on effects of non-manufacturing regulation

55. How do the non-manufacturing regulations highlighted in previous paragraphs propagate their effects throughout OECD economies? By way of illustration, Figure 22 graphs the Regulation Impact (RI) indicators in 1995 and 2003 for selected sectors. The indicators are broken down into the contribution from each of the six non-manufacturing sectors covered by the NMR (plus banking) indicators. While the country rankings largely reflect those of the NMR indicators, a number of additional insights are delivered by the graph. For example, the knock-on effects of restrictive regulation in the energy sector have fallen considerably since 1995 as pro-competitive reforms have been introduced. This is especially the case in Europe, where energy markets were reformed somewhat later than in other countries, and for the energy-intensive iron and coal sector. The impact of anti-competitive regulation in the communication sector is estimated to be relatively small in 2003, reflecting extensive reform in telecommunications and the relatively small weight of this sector as a source of intermediate inputs. Looking at country detail for the manufacturing sector as a whole, the impact of anti-competitive non-manufacturing regulation is relatively light in most of the Scandinavian and English-speaking countries. In contrast, these regulations bear heavily on the manufacturing sector of some of the Euro-area countries and Japan (Figure 23).

[Figure 22: The knock-on effects of non-manufacturing regulation in selected sectors]

[Figure 23: The impact of non-manufacturing regulation on the manufacturing sector]

56. As a further illustration, Figure 24 graphs the RI indicators for ICT-using, ICT-producing, and non-ICT intensive sectors in 2003.[29] According to these indicators, the impact of anti-competitive regulation on the cost structures faced by firms is typically largest in ICT-using sectors, reflecting the fact that these sectors tend to use intermediate inputs from regulated non-manufacturing sectors relatively more intensively than other sectors. This impact is particularly high in many continental EU countries, Japan, and Canada. In addition, the variation in the RI indicators across countries is also largest in ICT-using sectors.

[Figure 24: The impact of non-manufacturing regulation on ICT-producing, ICT-using, and non-ICT intensive sectors]

4. Using the OECD regulatory indicators in empirical analysis

57. A large body of economic research has stressed the negative consequences of weakly competitive markets for employment, investment, productivity and growth. To the extent that the NMR indicators

29 . ICT-using, ICT-producing, and non-ICT sectors are classified according to Inklaar *et al.* (2003).

capture the impact of policies on product market competition, they are a useful tool for testing such conjectures. Using these indicators as proxies for competitive pressures in empirical analyses has two main advantages. First, aside from possible political economy linkages between economic performance and public policies in product markets, these indicators can be held to be more exogenous to performance than traditional indicators of the degree of competition, such as concentration indices and mark-ups.[30] Second, by relating directly performance to regulations that curb competition, they make the results of empirical analyses of more immediate use for policy-making. Testing the explanatory power of the indicators in empirical applications is also a way to verify the empirical content of the indicators themselves, *i.e.* to what extent they capture effectively the impact of policies on competition. A few direct tests of the relationship between the NMR indicators and measures of market competition have also been performed and have generally proved conclusive. For instance, Scarpetta *et al.* (2002), Brandt (2004) and Conway *et al.* (2007) find that various OECD measures of barriers to entry are negatively related to firm entry rates, while Høj *et al.* (2006b) show that the NMR are positively correlated with sectoral markups.

58. A number of empirical studies have looked at the effect of product market policies on different dimensions of economic performance by means of the NMR indicators. A non-exhaustive list of recent studies classified by theme follows:[31]

- *Domestic and foreign direct investment*. Alesina *et al.* (2005) investigated the effect of non-manufacturing regulation on domestic capital formation in energy, transport and communication using the sectoral ETCR indicators, while Conway *et al.* (2006) used the RI indicators to estimate the impact of regulation on investment in ICT. The ETCR and RI indicators were also used to investigate the effect of regulation on FDI and the presence of foreign affiliates by Nicoletti *et al.* (2003) and Conway *et al.* (2006), respectively. Kox and Lejour (2006) use data from the *International Regulation Database* to calculate indicators of bilateral 'policy heterogeneity', which they use to explain intra-EU FDI and trade in services.

- *Productivity*. Nicoletti and Scarpetta (2003) and Conway *et al.* (2006) looked at the impact of competition on total factor and labour productivity growth, respectively, using the NMR indicators. The former used the ETCR and RBSR indicators to proxy for competitive pressures at both the sectoral and economy-wide levels, while the latter used the RI indicators to gauge the influence of regulation on the ability to incorporate positive global productivity shocks in domestic productivity developments at the sectoral level. Faini *et al.* (2006) also estimated the impact of non-manufacturing regulations on manufacturing productivity performance using the sectoral NMR indicators. Griffith *et al.* (2004) estimate the impact of regulation on productivity in several network industries using the sectoral ETCR indicators.

- *Employment and wages*. Nicoletti and Scarpetta (2005), and Bassanini and Duval (2006) and Amable *et al.* (2006) used the aggregate ETCR indicator to estimate the impact of product market regulation inhibiting competition on aggregate employment and unemployment rates. Berger and Danninger (2006) used the sectoral ETCR indicator to look at effects on sectoral employment growth. Estevão (2005) relates the aggregate ETCR indicator to the pass-through of wage moderation onto GDP per capita growth and unemployment. Kugler and Pica (2004) use the sectoral NMR indicators to analyse how the interaction with product market regulation affects the employment outcomes of labour market reforms. Jean and Nicoletti (2004) and Boulhol *et al.*

30 . The possibility to explore political economy linkages is an additional advantage of the NMR indicators. These can be controlled for in empirical analyses of the regulation-performance link through appropriate instrumental variable methods.

31 . The cited papers often differ significantly in methodology, purpose and findings, but details are omitted because the aim here is merely to provide references to the reader.

(2006) use the sectoral NMR indicators to analyse the influence of competition on the wage premia and bargaining power of workers, respectively.

59. The NMR indicators have also been used by government institutions (other than the OECD) and individual researchers for benchmarking purposes and to describe patterns of regulation in OECD countries. These include, for instance, the International Monetary Fund, the European Union, the European Central Bank, the Irish National Competitiveness Council, the Japanese Cabinet Office and the UK Department for Trade and Industry. Blanchard (2005), Crafts (2006) and Siegel (2007) provide examples of using the NMR indicators to describe cross-country changes in product market policies.

60. Finally, the policy patterns highlighted by the ETCR indicators have also proven useful in throwing some light on the political economy of structural reforms in OECD countries. Galasso *et al.* (2006) use the NMR indicators to investigate factors encouraging or hindering product market reforms. IMF (2004) looks at the convergence, the timing and possible exogenous determinants of product market, labour market, fiscal and financial reforms. Some of these issues are studied more systematically, focusing on product and labour market reforms, by Høj *et al.* (2006a), Duval (2005) and Duval and Elmeskov (2005) - who also explore interactions between reforms in different sectors and areas, including macroeconomic policies.

5. Possible further developments in the NMR indicator system

61. There are several potentially promising directions for further developing the OECD's indicators of non-manufacturing regulation to increase their relevance in policy analysis and empirical work. First, the coverage of the indicators could be enhanced to better capture cross-country differences in 'second-generation' reforms, going beyond mere access liberalisation, which have been found to exert an important influence on competition in non-manufacturing sectors. For example, the indicators of regulation in network sectors could be expanded to reflect the institutional arrangements governing regulators in these sectors, such as the degree of independence from government and method used to determine the price of network access for third parties. Further sector-specific arrangements that are relevant for the development of competition could also be incorporated into the indicators. For example, the indicator for telecommunications services could be expanded to cover number portability and unbundling provisions; information about the stringency of bilateral air service agreements or the methods used to allocate landing slots could be included into the air transport indicator; and additional information about market structure in network industries could be added.

62. Future work could also investigate further the sensitivity of indicator values to uncertainty about the weights used to in their construction. As discussed above, the current approach assesses the sensitivity of indicator values by introducing uncertainty into the weights used to aggregate the low-level indicators intro the overall summary indicators for each sector. This approach could be refined and possibly expanded to assess the sensitivity of indicator values to uncertainty in the weights used to construct the low-level indicators from the regulatory data. The choice of aggregation weights is typically one of the most contentious aspects of any indicators construction project. Further development of the 'random weights' technique may prove to be an effective means of addressing these concerns.

63. Finally, the NMR indicators could be combined with the OECD's indicators of economy-wide product market regulation – the PMR indicators.[32] Integrating these two sets of indicators would increase the economy-wide coverage of the PMR indicator while rooting further the system on the specific policies

32 . The OECD's PMR indicators provide a comprehensive coverage of product market regulation at the economy-wide level in the following broad regulatory domains: state control, barriers to entrepreneurship, and barriers to international trade and investment. They are discussed in detail in Conway *et al.* (2005).

that promote or inhibit competition at the sectoral level. Such a comprehensive indicator system would provide a rich summary of regulatory information that would be useful for both country benchmarking exercises as well as empirical work on the effect of product market regulation on economic performance.

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Table 1. The coverage of the ETCR and RBSR indicators

		N. of items in indicator	Activities covered
ETCR	***Gas***	12	production/import, transmission, supply
	Electricity	6	generation, transmission, distribution, supply
	Airlines	4	passenger transport, international and domestic routes
	Railways	9	passenger and freight transport, operation of infrastructure
	Road transport	7	freight
	Post	6	basic letter, basic parcel, courier
	Telecoms	8	trunk, international, mobile
RBSR	***Retail distribution***	16	generic outlets, foodstores, clothing stores
	Business services	36	legal, accounting, architectural, and engineering services

Table 2. The ETCR and RBSR indicators: regulatory areas by industry[1]

		Barriers to entry	Public ownership	Market structure	Vertical integration	Price controls	Constraints on business operation
ETCR	Gas	X	X	X	X		
	Electricity	X	X		X		
	Airlines	X	X				
	Railways	X	X	X	X		
	Road freight	X				X	
	Post	X	X				
	Telecoms	X	X	X			
RBSR	Retail distribution	X				X	X
	Legal services	X				X	X
	Accounting services	X				X	X
	Architectural services	X				X	X
	Engineering services	X				X	X

1. Items shaded in grey cover 1975 to 2003 annually. Other items cover 1996/1998 and 2003.

Table 3. Composition of the low-level indicators for the energy sector

A. Indicator for the electricity industry

	Weights by theme (b_j)	Question weights (c_k)	Coding of data					
Entry regulation:	1/3							
			Regulated TPA		Negotiated TPA		No TPA	
How are the terms and conditions of third party access (TPA) to the electricity transmission grid determined?		1/3	0		3		6	
				yes			no	
Is there a liberalised wholesale market for electricity (a wholesale pool)?		1/3		0			6	
			No threshold	<250 gigawatts	Between 250 and 500 gigawatts	Between 500 and 1000 gigawatts	More than 1000 gigawatts	No consumer choice
What is the minimum consumption threshold that consumers must exceed in order to be able to choose their electricity supplier ?		1/3	0	1	2	3	4	6
Public ownership:	1/3							
			Private	Mostly Private	Mixed	Mostly Public	Public	
What is the ownership structure of the largest companies in the generation, transmission, distribution, and supply segments of the electricity industry?		1	0	1.5	3	4.5	6	
Vertical Integration:	1/3							
			Separate Companies		Accounting separation		Integrated	
What is the degree of vertical separation between the transmission and generation segments of the electricity industry?		1/2	0		3		6	
			Unbundled		Mixed		Integrated	
What is the overall degree of vertical integration in the electricity industry?		1/2	0		3		6	
Country scores (0-6)					$\Sigma_j b_j \Sigma_k c_k$ answer$_{jk}$			

B. Indicator for the gas industry

	Weights by theme (b_j)	Question weights (c_k)	Coding of data		
Entry regulation:	1/4				
			Regulated TPA	Negotiated TPA	No TPA
How are the terms and conditions of third party access (TPA) to the gas transmission grid determined?		1/3	0	3	6
What percentage of the retail market is open to consumer choice?		1/3		(1-% of market open to choice/100)*6	
			No, free entry in all markets	Yes, in some markets	Yes, in all markets
Do national, state or provincial laws or other regulations restrict the number of competitors allowed to operate a business in at least some markets in the sector: gas production/import		1/3	0	3	6
Public ownership:	1/4				
			None	Between 0 and 100 %	100%
What percentage of shares in the largest firm in the gas production/import sector are owned by government?		1/3	0	3	6
What percentage of shares in the largest firm in the gas transmission sector are owned by government?		1/3	0	3	6
What percentage of shares in the largest firm in the gas distribution sector are owned by government?		1/3	0	3	6
Vertical Integration:	1/4				
			Ownership separation	Legal/Accounting separation	Integrated
What is the degree of vertical separation between gas production/import and the other segments of the industry?		1/2	0	3	6
What is the degree of vertical separation between gas supply and the other segments of the industry?		3/10	0	3	6
Is gas distribution vertically separate from gas supply?		1/5	0	3	6
Market structure:	1/4				
			< 50%	between 50 and 90%	> 90%
What is the market share of the largest company in the gas production/import industry?		1/3	0	3	6
What is the market share of the largest company in the gas transmission industry?		1/3	0	3	6
What is the market share of the largest company in the gas supply industry?		1/3	0	3	6
Country scores (0-6)				$\Sigma_j b_j \Sigma_k c_k$ answer$_{jk}$	

Table 4. Composition of the low-level indicators for the transport sector

A. Indicator for rail transport

	Weights by theme (b_j)	Question weights (c_k)	Coding of data			
Entry regulation:	1/4					
			Free entry (upon paying access fees)	Entry franchised to several firms		Entry franchised to a s firm or regulated accord EU 1991 directive
What are the legal conditions of entry into the passenger transport rail market?		1/2	0	3		6
What are the legal conditions of entry into the freight transport rail market?		1/2	0	3		6
Public ownership:	1/4					
			No public ownership	Between 0 and 100 %		100%
What percentage of shares in the largest firm in operation of infrastructure sector is owned by government?		1/4	0	3		0
What percentage of shares in the largest firm in passenger transport sector is owned by government?		1/4	0	3		6
What percentage of shares in the largest firm in freight transport sector is owned by government?		1/4	0	3		6
			no			yes
Do national, state or provincial government holds equity stakes in business company : Railways		1/4	0			6
Market structure:	1/4					
			>1			1
What is the maximum number of operators that compete in the same area / rail district in the passenger transport market?		1/2	0			6
What is the maximum number of operators in the freight transport market?		1/2	0			6
Vertical Separation:	1/4					
			Ownership separation	Legal separation	Accounting separation	No separation
What is the degree of separation between the operation of infrastructure and the provision of railway services (the actual transport of passengers or freight)?		1	0	3	4.5	6
Country scores (0-6)				$\Sigma_j b_j \Sigma_k c_k$ answer$_{jk}$		

Table 4. (cont'd)

B. Indicator for passenger air transport

	Weights by theme (b_j)	Question weights (c_k)[1]	Coding of data	
Entry regulation:	1/2			
Does your country have an open skies agreement with the United States?		1/2*W	Yes 0	No 6
Is your country participating in a regional agreement?		1/2*W	0	6
Is the domestic aviation market in your country fully liberalised? That is, there are no restrictions on the number of (domestic) airlines that are allowed to operate on domestic routes?		(1-W)	0	6
Public ownership:	1/2			
What percentage of shares in the largest carrier (domestic and international traffic combined) are owned by national, state or provincial authorities?		1	% of shares owned by government / 100 * 6	
Country scores (0-6)			$\Sigma_j b_j \Sigma_k c_k answer_{ik}$	

1. The weight W is the average share of international traffic in total traffic (measured in '000 rpk's) in the OECD.

C. Indicator for road freight

	Weights by theme (b_j)	Question weights (c_k)	Coding of data	
Entry regulation:	1/2			
			no	yes
In order to establish a national road freight business (other than for transporting dangerous goods or goods for which sanitary assurances are required) do operators need to obtain a license (other than a driving license) or permit from the government?		1/6	0	6
Are criteria other than technical and financial fitness and compliance with public safety requirements considered in decisions on entry of new operators?		1/6	0	6
Does the regulator, through licenses or otherwise, have any power to limit industry capacity?		1/6	0	6
Are professional bodies or representatives of trade and commercial interests involved in specifying or enforcing entry regulations?		1/4	0	6
Are professional bodies or representatives of trade and commercial interests involved in specifying or enforcing pricing guidelines or regulations?		1/4	0	6
Price controls:	1/2			
			no	yes
Are retail prices of road freight services in any way regulated by the government?		1/2	0	6
Does the government provide pricing guidelines to road freight companies?		1/2	0	6
Country scores (0-6)			$\Sigma_j b_j \Sigma_k c_k answer_{ik}$	

Table 5. Composition of the low-level indicators for the communications sector

A. Indicator for postal services

	Weights by theme (b_j)	Question weights (c_k)[1]	Coding of data		
Entry regulation:	1/2				
			No, free entry in all markets	Yes, in some markets	Yes, in all markets
Do national, state or provincial laws or other regulations restrict the number of competitors allowed to operate a business in at least some markets in the sector: national post - basic letter services		w^l	0	3	6
Do national, state or provincial laws or other regulations restrict the number of competitors allowed to operate a business in at least some markets in the sector: national post - basic parcel services		w^p	0	3	6
			no		yes
Do national, state or provincial laws or other regulations restrict the number of competitors allowed to operate a business in at least some markets in the sector: courier activities other than national post		w^c	0		6
Public ownership:	1/2				
			None	Between 0 and 100 %	100%
What percentage of shares in the largest firm in the sector: national post - basic letter services are owned by the government?		w^l	0	3	6
What percentage of shares in the largest firm in the sector: national post - basic parcel services are owned by the government?		w^p	0	3	6
			No Govt involvement in sector	Govt. controls at least 1 firm, but other firms operate as well	Govt controls all dominant firms in sector
What is the extent of public ownership in the courier (activities other than national post) sector?		w^c	0	3	6
Country scores (0-6)				$\Sigma_j b_j \Sigma_k c_k$ answer$_{jk}$	

1. The weights wl, wp, and wc are the OECD-average revenue shares of basic letter services, basic parcel services, and courier in the total revenue of these three sectors respectively. The three weights sum to one.

Table 5. (cont'd)

B. Indicator for telecommunications services

	Weights by theme (b_j)	Question weights (c_k)[1]	Coding of data		
Entry regulation:	1/4				
			Free entry	Franchised to 2 or more firms	Franchised to 1 firm
What are the legal conditions of entry into the trunk telephony market?		$1/4*w^t*(1-w^m)$	0	3	6
What are the legal conditions of entry into the international market?		$1/4*(1-w^t)(1-w^m)$	0	3	6
What are the legal conditions of entry into the mobile market?		$1/2*w^m$	0	3	6
Public ownership:	1/4				
What percentage of shares in the PTO are owned by government?[2]		$1-w^m$		% government ownership / 100 * 6	
What percentage of shares in the largest firm in the mobile telecommunications sector are owned by government?		w^m		% government ownership / 100 * 6	
Market structure:[3]	1/4				
What is the market share of new entrants in the trunk telephony market?		$1/4*w^t*(1-w^m)$		6-normalised market share[2]	
What is the market share of new entrants in the international telephony market?		$1/4*(1-w^t)(1-w^m)$		6-normalised market share	
What is the market share of new entrants in the mobile market?		$1/2*w^m$		6-normalised market share	
Country scores (0-6)				$\Sigma_j b_j \Sigma_k c_k$ answer$_{jk}$	

1. The weight w^m is the OECD-wide revenue share from mobile telephony in total revenue from trunk, international, and mobile. The weight w^t is the OECD-wide revenue share of trunk in total revenue from trunk and international telephony.
2. "PTO" stands for "Public telecommunications operator".
3. For the purposes of calculating the indicator the market share of new entrants has been normalised to be between 0 and 6 with 6 being the smallest market share over all countries and time and 0 being the largest.

Table 6. Composition of low-level indicators for retail distribution

Panel A. Entry regulation

	Weights by theme (b_j)[1]	Question weights (c_k)	Coding of data						
Registration in commercial register	0.20		Registration not required	Registration required					
				automatic approval	statutory deadline for approval within 15 days	statutory deadline for approval is 15 to 30 days	statutory deadline for approval is 30 to 70 days	statutory deadline for approval > 70 days	
When establishing a new outlet to sell food is it necessary to register in a commercial register?		1	0	1.5	2	3	4.5	6	
Licences or permits needed to engage in commercial activity	0.16								
				no			yes		
Do new outlets selling food need licenses or permits to engage in commercial activity (type 2 licenses)?[2]		1/3		0			6		
				no or not required			yes		
If licences or permits are required for selling food (type 2) are they product specific?[2]		1/3		0			6		
If licences or permits are required for selling food (type 2) do they relate to a certain type of activity?[2]		1/3		0			6		
Specific regulation of large outlet	0.16								
			No specific regulation for large outlets	> 4999m²	between 2999m2 and 4999m²	between 1999m2 and 2999m²	between 999m2 and 1999m²	between 500m2 and 999m²	less than 500m2
What is the threshold surface limit at which regulation of large outlets applies?		1	0	1	2	3	4	5	6
Protection of existing firms	0.17								
				no			yes		
Are professional bodies or representatives of trade and commercial interests involved in Type 2, Type 3 or Type 4 licensing decisions?[2]		1/3		0			6		
Are there products that can only be sold in outlets operating under a local or national legal monopoly (franchise)?		1/3		0			6		
Country scores (0-6)			$\Sigma_j b_j \Sigma_k c_k answer_{jk}$						

Panel B. Conduct regulation

	Weights by theme (b_j)[1]	Question weights (c_k)	Coding of data	
Regulation of shop opening hours	0.10			
			no	yes
Are shop opening hours regulated?		2/3	0	6
			Local / provincial level or not regulated	State level
At which level of government are regulations on shop opening hours applied?		1/3	0	6
Did the regulation of shop opening hours become more flexible in the last five years?			If the answer to this question is yes then 0.5 is subtracted from this sub indicator	
Price controls	0.20			
			no	yes
Are the prices of certain products subject to price controls?		1/7	0	6
Are the retail prices of Certain staples (e.g. milk and bread) subject to price controls?		1/7	0	6
Are the retail prices of Gasoline subject to price controls?		1/7	0	6
Are the retail prices of Tobacco subject to price controls?		1/7	0	6
Are the retail prices of Alcohol subject to price controls?		1/7	0	6
Are the retail prices of Pharmaceuticals subject to price controls?		1/7	0	6
Are the retail prices of other products subject to price controls?		1/7	0	6
Country scores (0-6)			$\Sigma_j b_j \Sigma_k c_k answer_{jk}$	

1 The weights by theme are calculated using factor analysis. See Boylaud and Nicoletti (2001).

2 Type 2: Licenses or permits needed to engage in commercial activity (not related to outlet siting).
Type 3: Licenses or permits needed for outlet siting (in addition to compliance with general urban planning provisions).
Type 4: Compliance with regulation especially designed for large outlets.

Table 7. Composition of low-level indicators for the professional services

Panel A: Entry regulation

	Weights by theme (b_j)	Question weights (c_k)	Coding of data					
Licensing:	2/5							
			0	1	2	3	>3	
How many services does the profession have an exclusive or shared exclusive right to provide?		1	0	1.5	3	4.5		6
Education requirements (only applies if Licensing not 0):	2/5							
What is the duration of special education/university/or other higher degree?		1/3	equals number of years of education (max of 6)					
What is the duration of compulsory practise necessary to become a full member of the profession?		1/3	equals number of years of compulsory practise (max of 6)					
Are there professional exams that must be passed to become a full member of the profession?		1/3	no			yes		
			0			6		
Quotas and economic needs tests	1/5							
			no			yes		
Is the number of foreign professionals/firms permitted to practice restricted by quotas or economic needs tests?		1	0			6		
Country scores (0-6)			$\Sigma_j b_j \Sigma_k c_k$ answer$_{jk}$					

Panel B: Conduct regulation

	Weights by theme (b_j)	Question weights (c_k)	Coding of data						
Regulations on prices and fees	0.38								
Are the fees or prices that a profession charges regulated in any way (by government or self-regulated)?		1	no regulation 0	non-binding recommended prices on some services 1	non-binding recommended prices on all services 2	maximum prices on some services 3	maximum prices on all services 4	minimum prices on some services 5	minimum prices on all services 6
Regulations on advertising	0.23								
Is advertising and marketing by the profession regulated in any way?		1	no specific regulations 0		advertising is regulated 3		tising is prohibited 6		
Regulation on form of business	0.19								
Is the legal form of business restricted to a particular type?		1	no restrictions 0		partnership and some incorporation allowed 2		incorporation forbidden 5		sole practitioner only 6
Inter-professional cooperation	0.19								
Is cooperation between professionals restricted?		1	all forms allowed 0		generally allowed 3		only allowed with comparable professions 4.5		generally forbidden 6
Country scores (0-6)			$\Sigma_j b_j \Sigma_k c_k$ answer$_{jk}$						

Table 8. Cross-country correlation between the ETCR and the EFW indicies[1]

	ETCR excluding public ownership vs EFW Business regulation	ETCR public ownership vs EFW govt enterprises and investment
1985	na	-0.485**
1995	-0.7091***	-0.3803*
2000	-0.6701***	-0.5429**
2001	-0.6753***	-0.3795*
2002	-0.5338**	-0.2716
2003	-0.5506***	-0.3989*

Table 8b: Spearman rank correlations over time by country[2]

	ETCR public ownership vs EFW govt enterprises and investment
Australia	-0.9713***
Austria	-0.902***
Belgium	-0.8581***
Canada	-0.7746***
Denmark	-0.977***
Finland	-0.4763
France	na
Germany	0.8356***
Greece	-0.9418***
Ireland	-0.5892*
Italy	-0.9535***
Japan	0.1787
Netherlands	-0.7022**
New Zealand	-0.8681**
Norway	-0.8581***
Portugal	-0.952***
Spain	0.55
Sweden	-0.7074**
Switzerland	na
United Kingdom	-0.9232***
United States	-0.7**

* significant at 10%, ** significant at 5%, *** significant at 1%

1 The EFW indicator values are taken from Gwartney and Lawson (2006). The range from 0 to 10 from most to least restrictive

2 It is not possible to compute correlations between the ETCR and EFW indicators for business regulation (excluding public ownership) because the EFW covers only five years over the period 1975 to 2003

Figure 1. Structure of the NMR indicator system

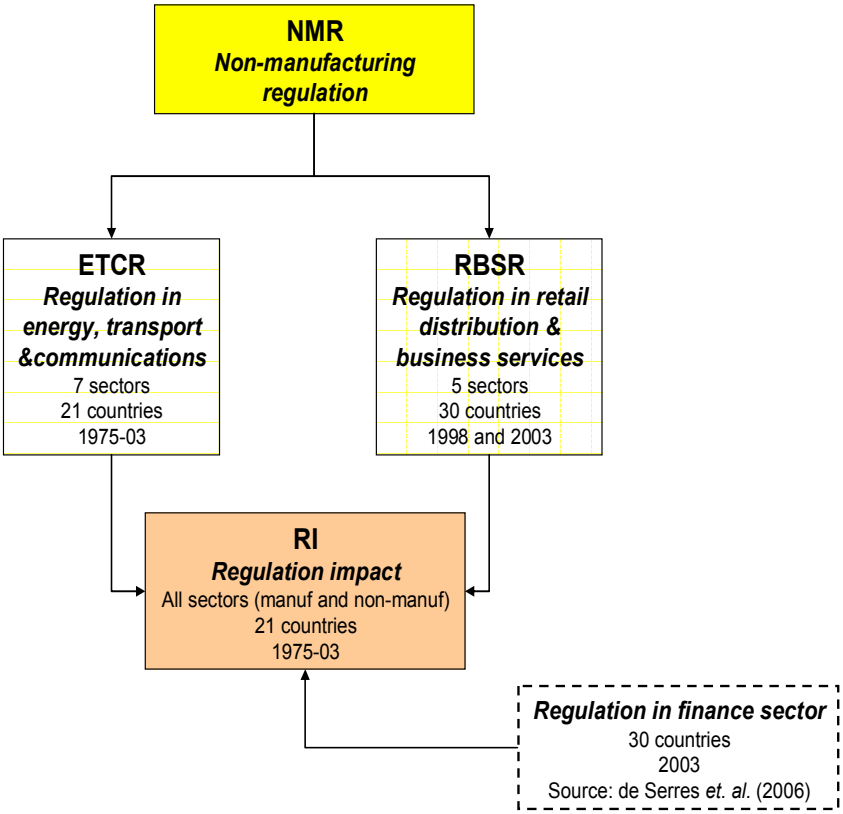
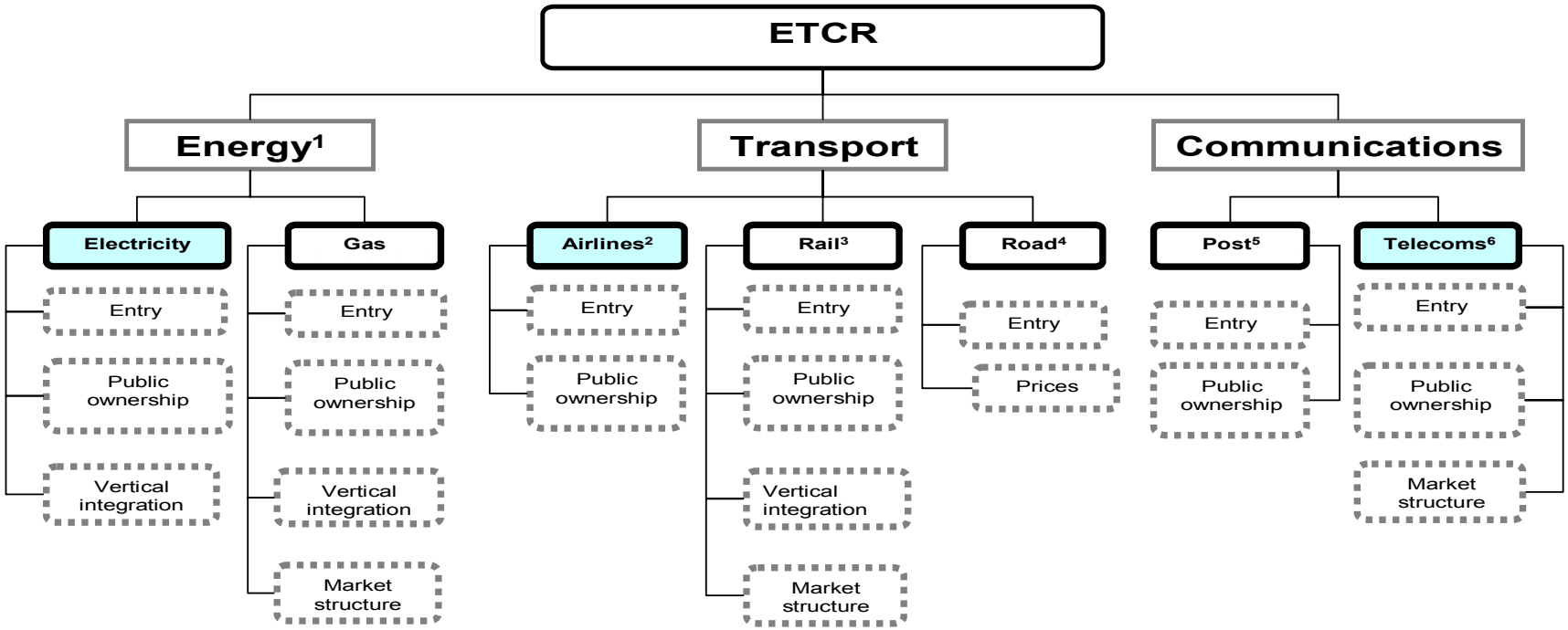
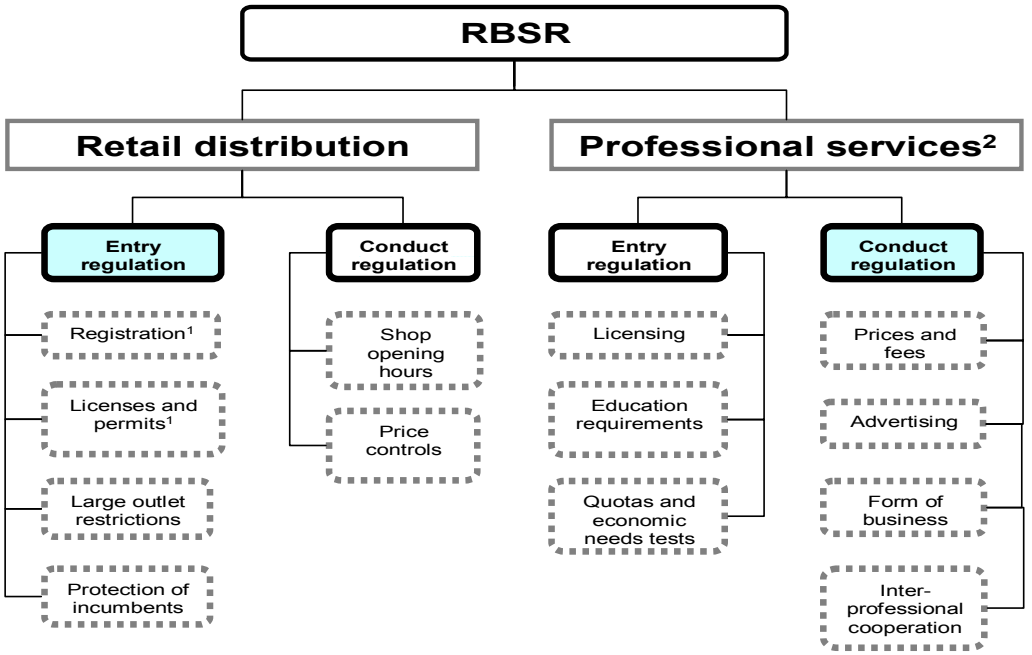


Figure 2. The structure of the ETCR indicator system



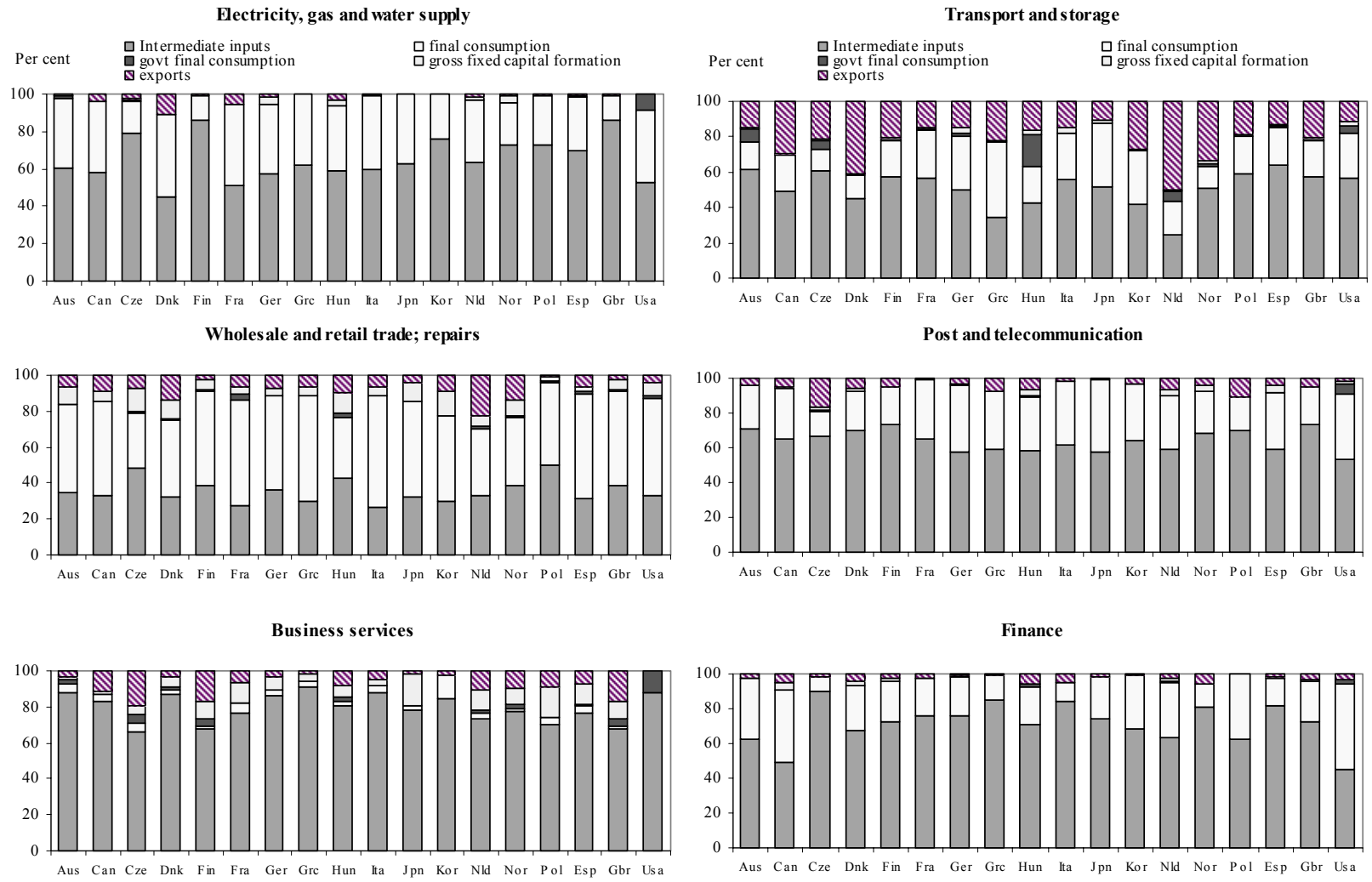
1. The indicators cover production, transmission and supply.
2. The indicator covers passenger service.
3. The indicator covers both passenger and freight services.
4. The indicator covers freight services.
5. The indicator covers basic letter, parcel and courier services.
6. The indicator covers trunk and long distance fixed telephony as well as mobile telephony.

Figure 3. The structure of the RBSR indicator system



1. Items covered more in detail for food and clothing outlets
2. The indicator covers the engineering, legal, accounting and architectural professions

Figure 4. Share of intermediate and final demand in gross business sector output: selected non-manufacturing sectors



Source: OECD harmonised input-output tables. The countries included in the graphs reflect data availability. For most countries the input-output tables are for a given year in the mid- to late-1990s.

Figure 5. The correspondence between the indicators of non-manufacturing and ISIC sectors

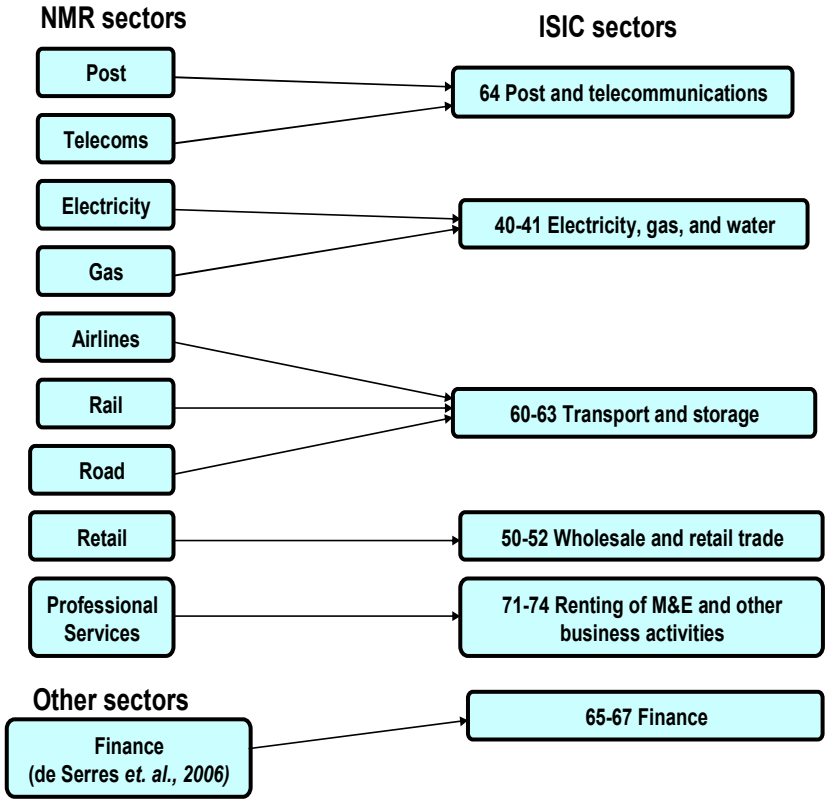
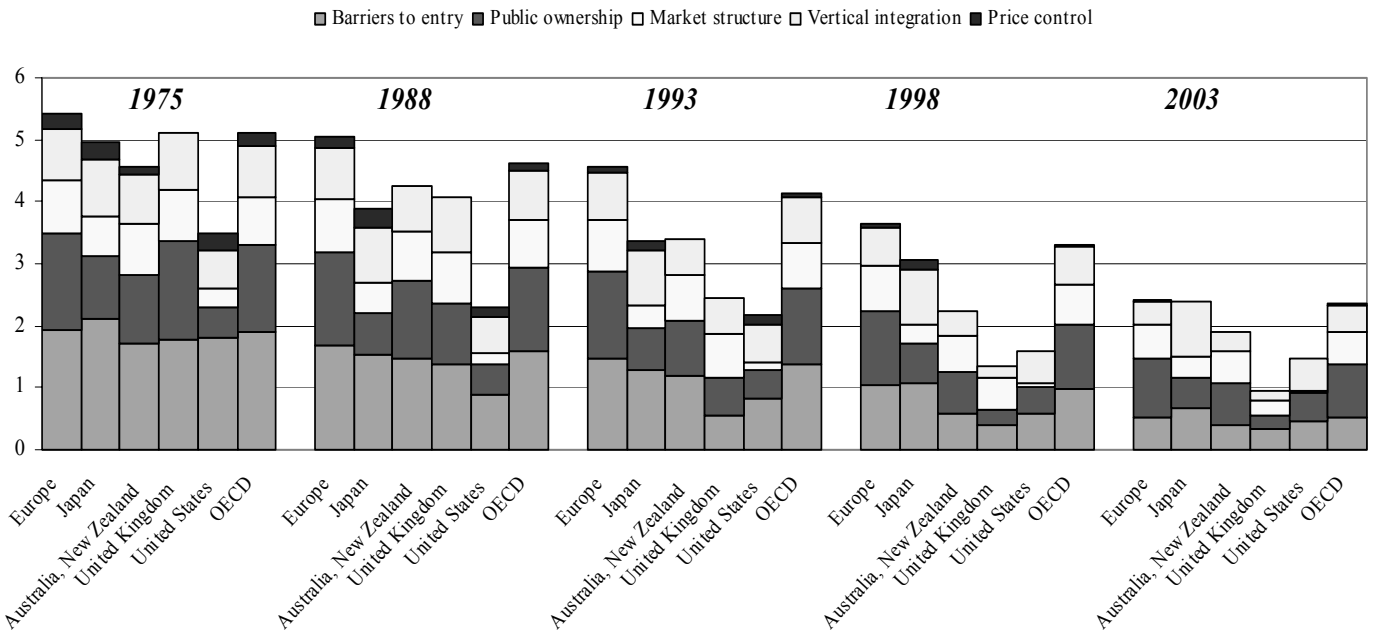


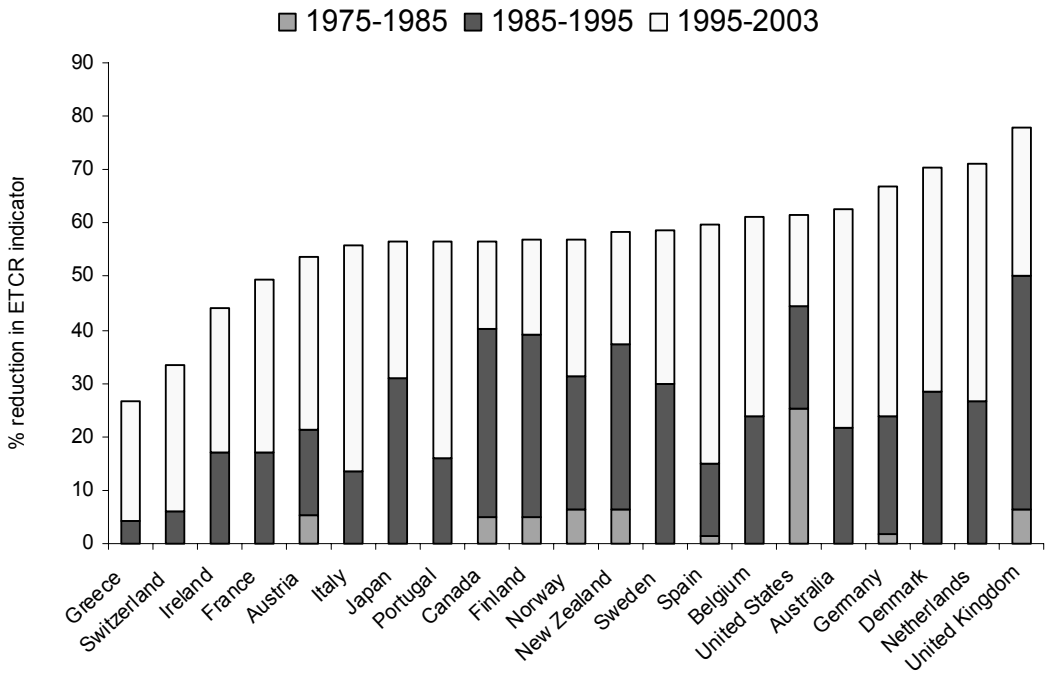
Figure 6. Reform in energy, transport and communication (1975-2003): breakdown by regulatory area[1]

(0 to 6 scale from least to most restrictive of competition)



1. Simple averages of the regulatory indicators for seven industries: electricity, gas, road freight, railways, air transport, post and telecommunications. Data for Europe, Australia-New Zealand and OECD are simple cross-country averages. Europe is defined as EU15.

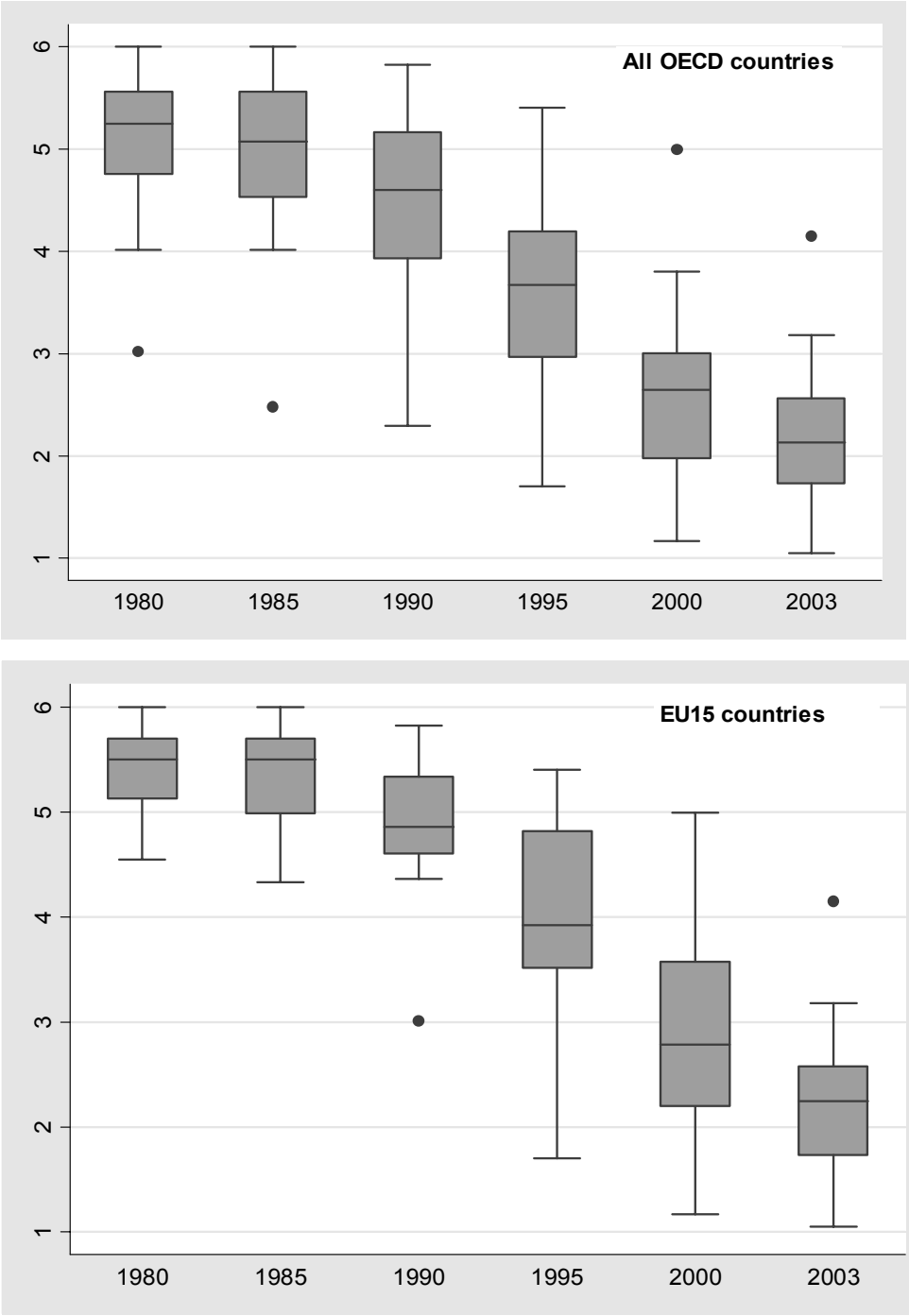
Figure 7. Timing of reforms in energy, transport and communications
(increasing in reform effort)



source: OECD International Regulation Database

Figure 8. Evolution and dispersion in product market environments, 1980-2003[1]

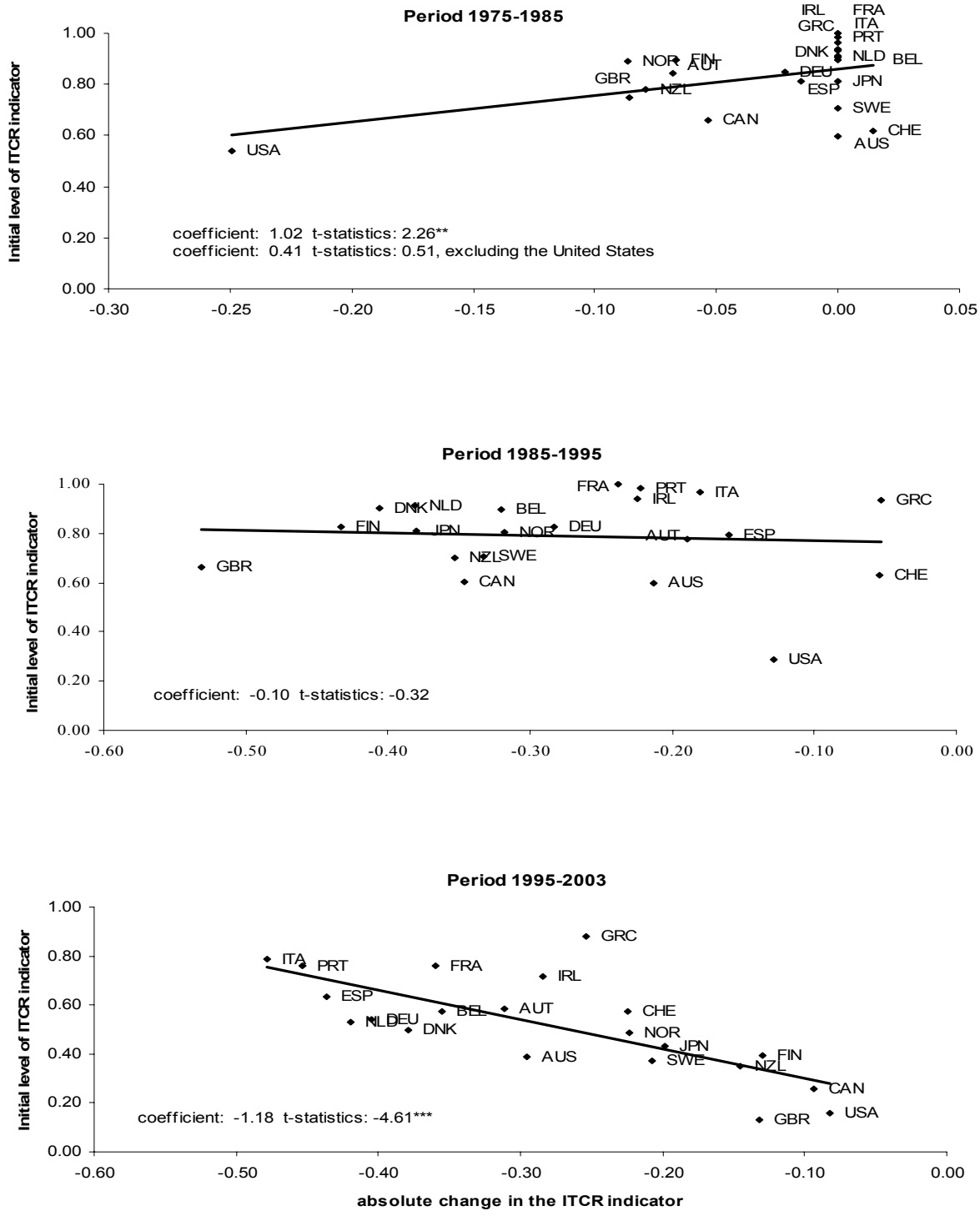
The scale of the indicators is 0-6 from least to most restrictive



Source: OECD international regulation database

1 Box plot of the overall indicator of regulation in energy, transport and communication in different years. The horizontal line in the middle of the box is the median value of the overall indicator across OECD or EU15 countries. The edges of the box are the 2nd and 3rd quartiles of the cross-country distribution. The two whiskers are the extreme values and the dots represent outliers.

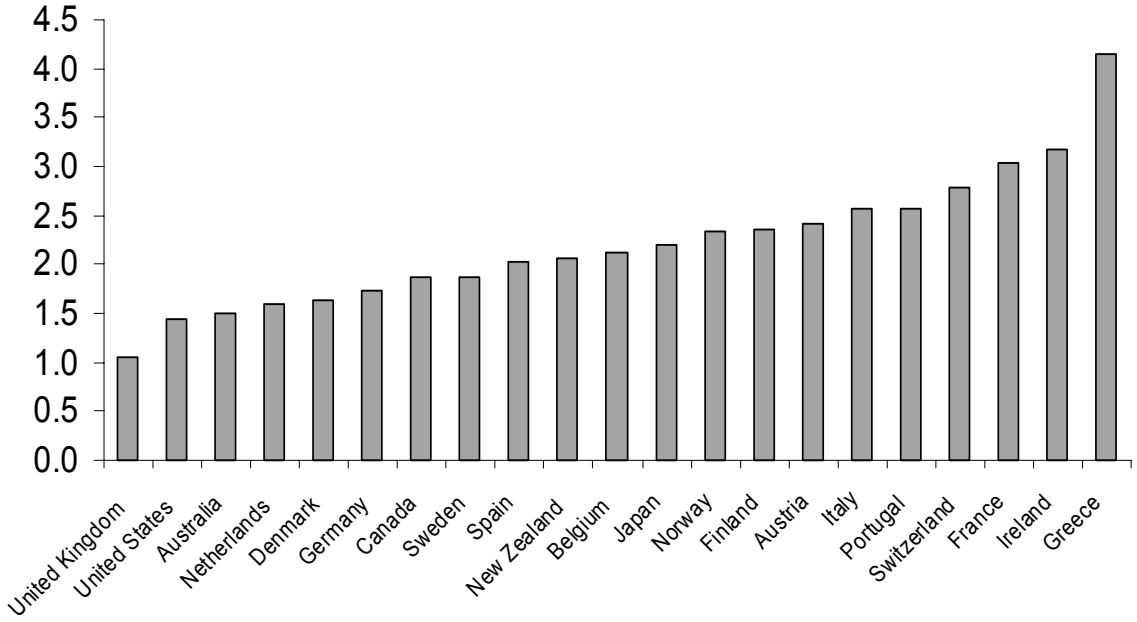
Figure 9. Initial conditions and product market reform, 1975-2003
(scale normalised to 0 - 1 from least to most restrictive of competition)



Source: OECD International Regulation Database

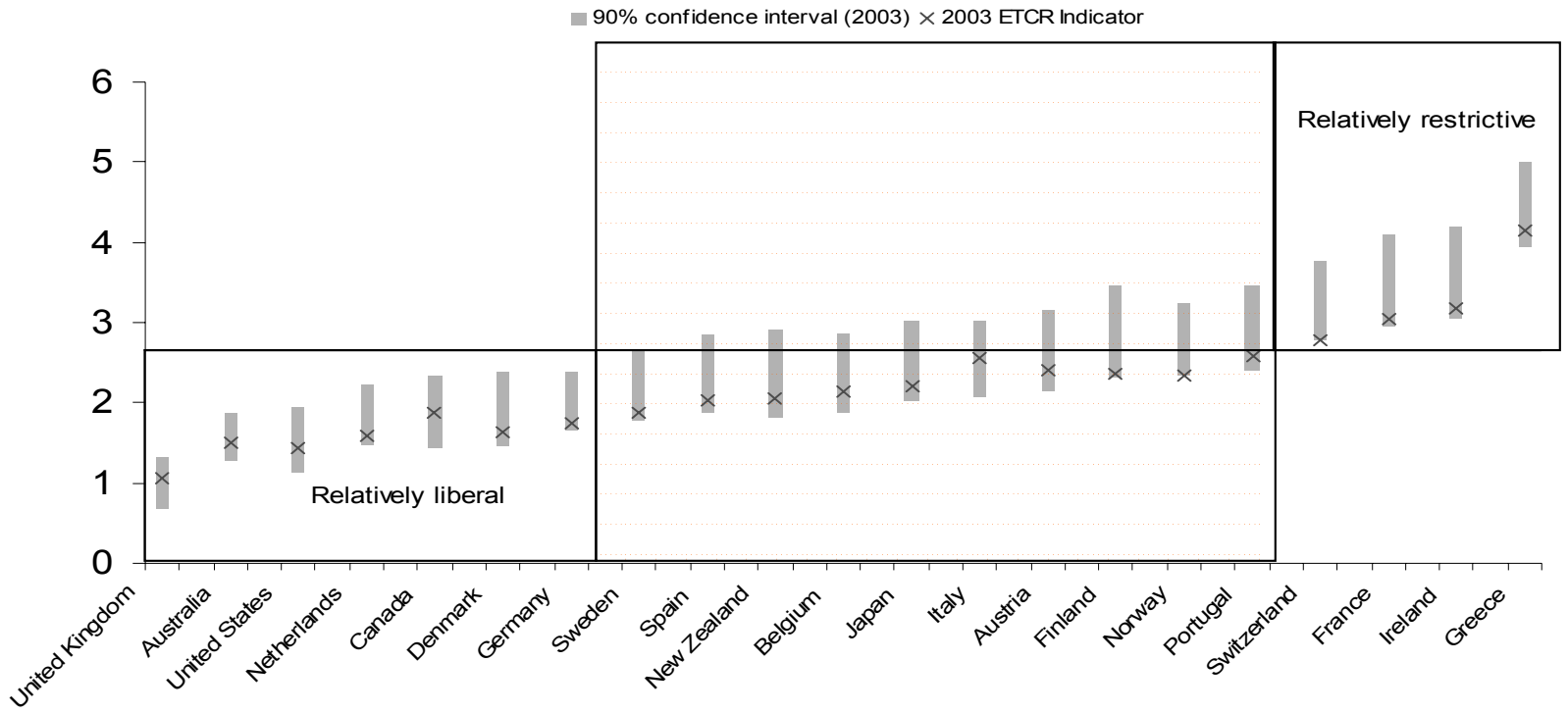
1. The ITCR indicator is measured as a simple average of regulation in 7 non-manufacturing sectors: Rail, road, airlines, gas, electricity, telecom and post. The indicators are normalised, ranging from 0 to 1, expressed as percent

Figure 10. Product market regulation in energy, transport and communication, 2003
(scale of the indicator is 0 - 6 from least to most restrictive of competition)



source: OECD International Regulation Database

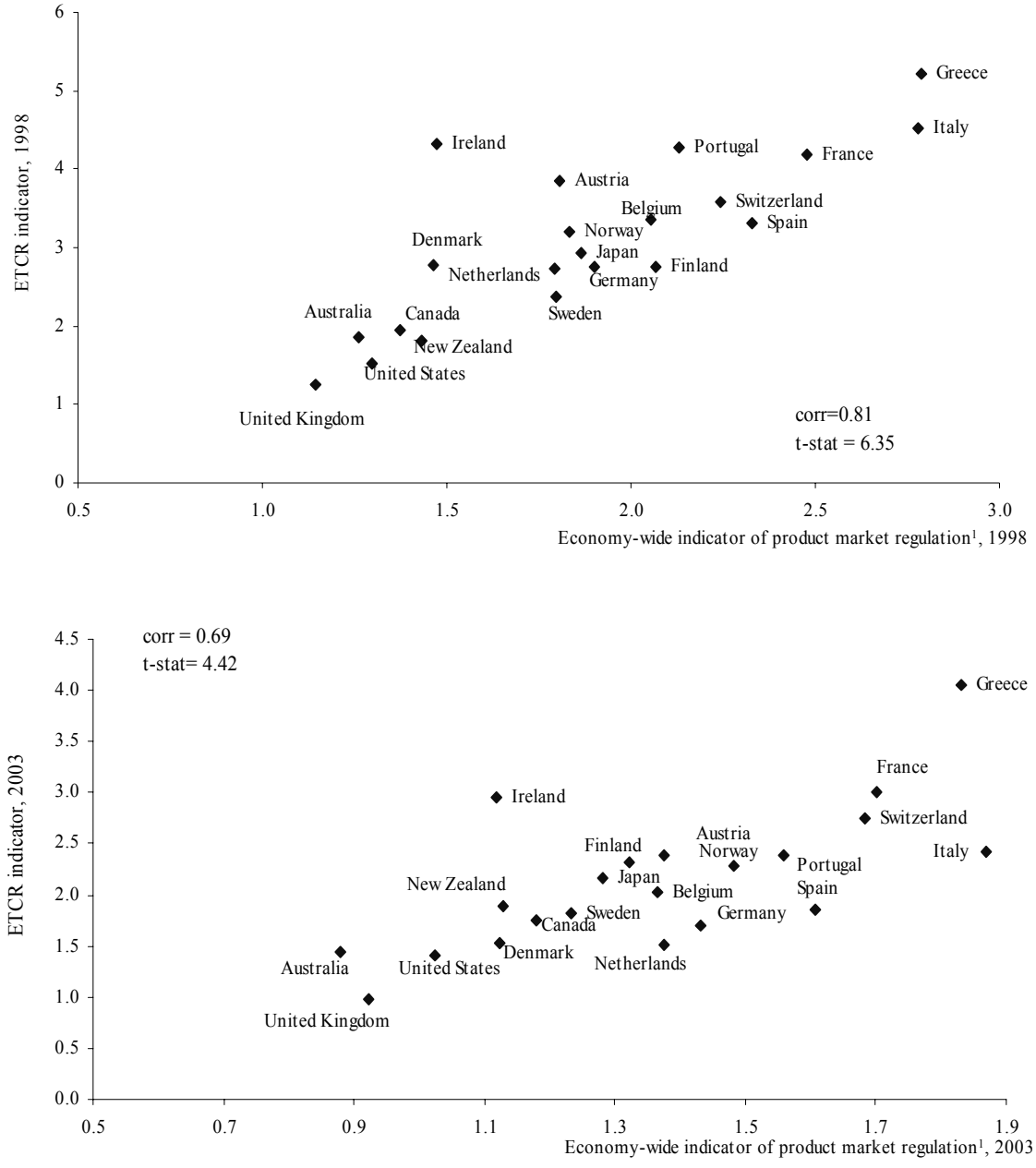
Figure 11. Confidence intervals for the ETCR indicator, 2003[1]
(scale of the indicator is 0 - 6 from least to most restrictive of competition)



1 The confidence intervals are calculated using stochastic weights on the low-level indicators to generate a distribution of indicators for each country. The 90% confidence intervals are calculated from this distribution under the assumption of normality. To aid comparison, countries with a relatively low (high) indicator value are sorted by the lower (upper) bound of the confidence interval.

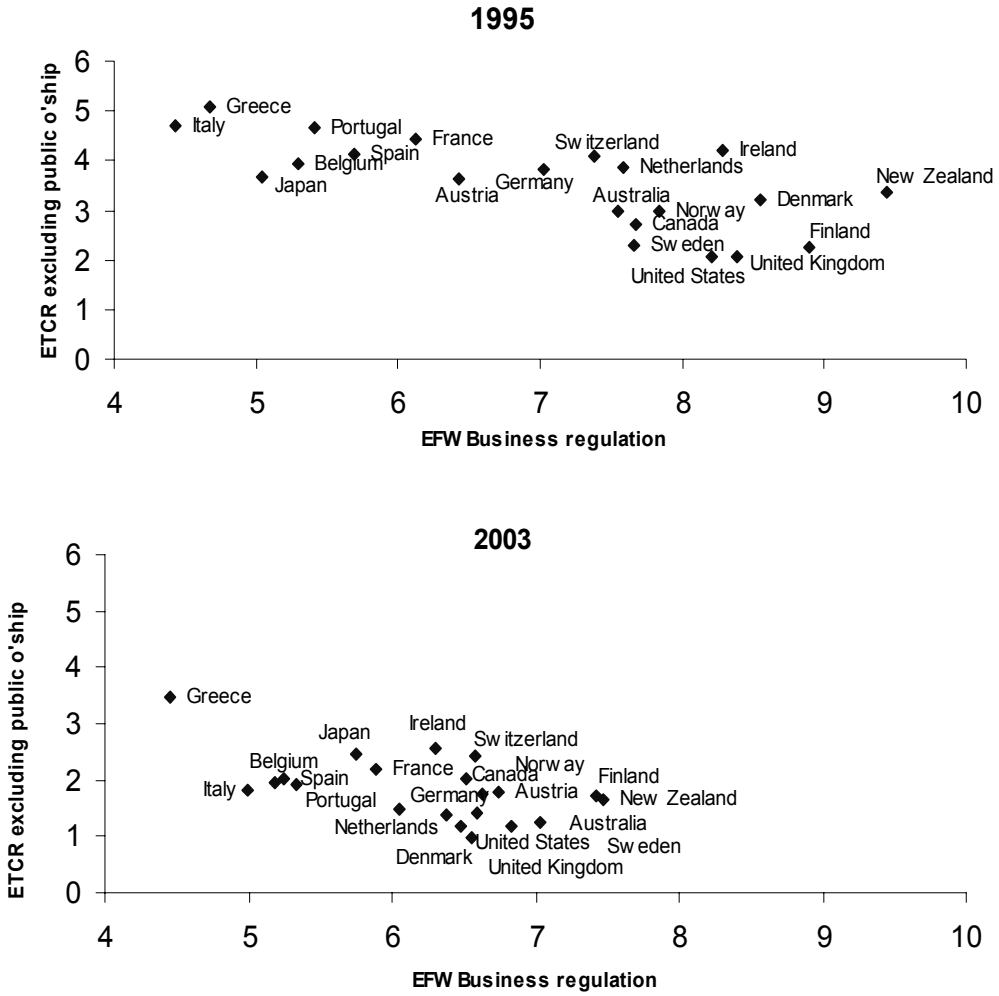
source: OECD International Regulation Database

Figure 12. Economy-wide regulation versus regulation in energy transport and communication
(scale is 0-6 from least to most restrictive of competition)



1. See Conway *et al.* (2005) and Nicoletti *et al.* (1999)
source: OECD International Regulation Database

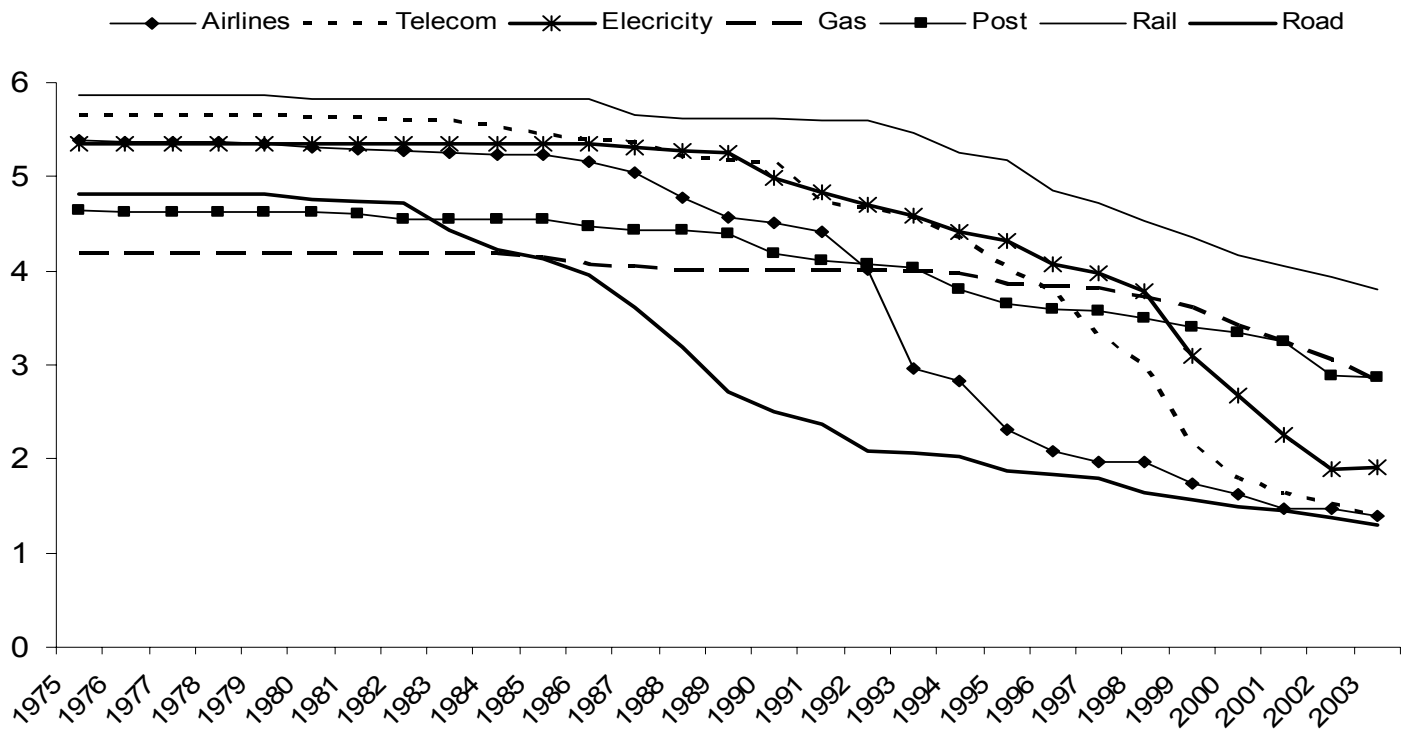
Figure 13: Cross-country correlation between the ETCR and the Economic Freedom of the World indices[1]



1. The scale of the ETCR indicator is 0-6 from least to most restrictive of competition. The scale of the EFW indicator is 0-10 from most to least restrictive.

source: OECD International Regulation Database; Gwartney and Lawson (2006).

Figure 14. Product market reform by sector: OECD average[1]
(scale is 0-6 from least to most restrictive of competition)

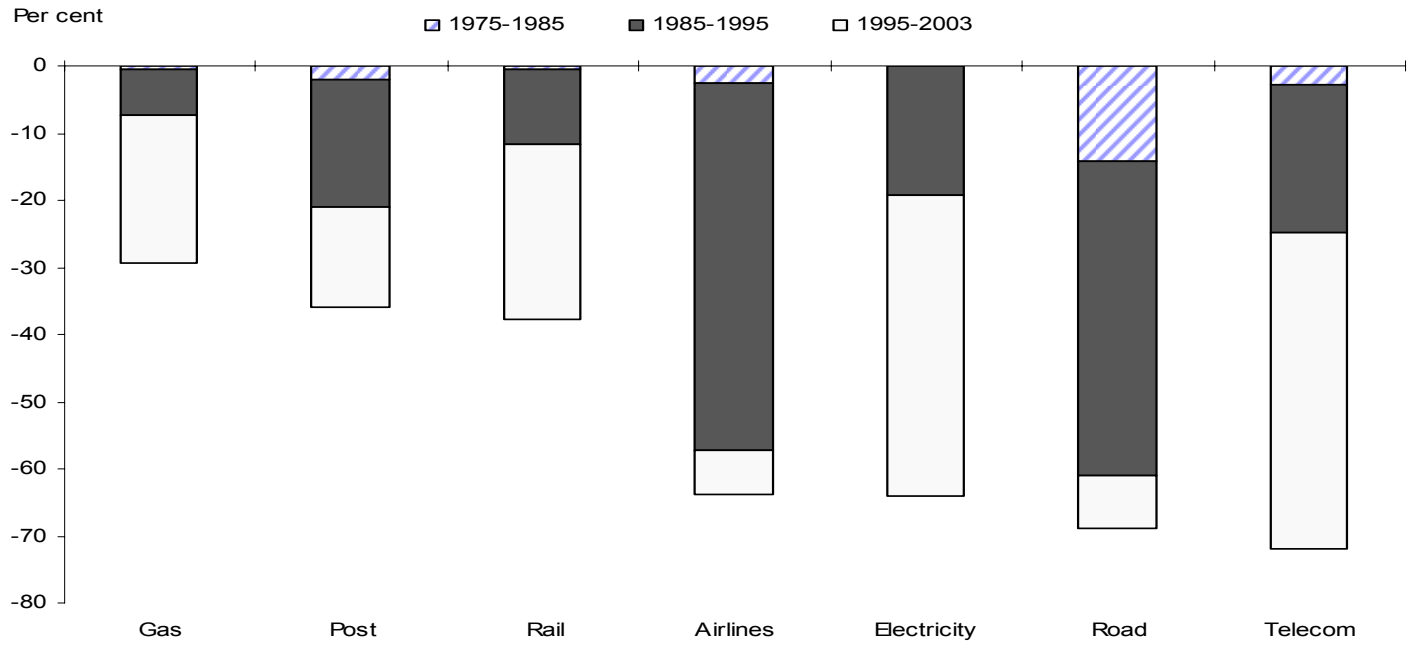


1. Simple average of sectoral indicators over the 21 OECD countries for which data exist. The scale is 0-6 from least to most restrictive of competition.

source: OECD International Regulation Database

Figure 15. The timing of sectoral reforms: OECD average

(per cent change in the indicators)



Note: The total bar indicates the per cent reduction in regulations over the period 1975-2003, broken down into 3 sub-periods.

Source: OECD International Regulation Database

Figure 16. Regulation in energy, transport and communications: 1975 and 2003
(scale is 0-6 from least to most restrictive of competition)

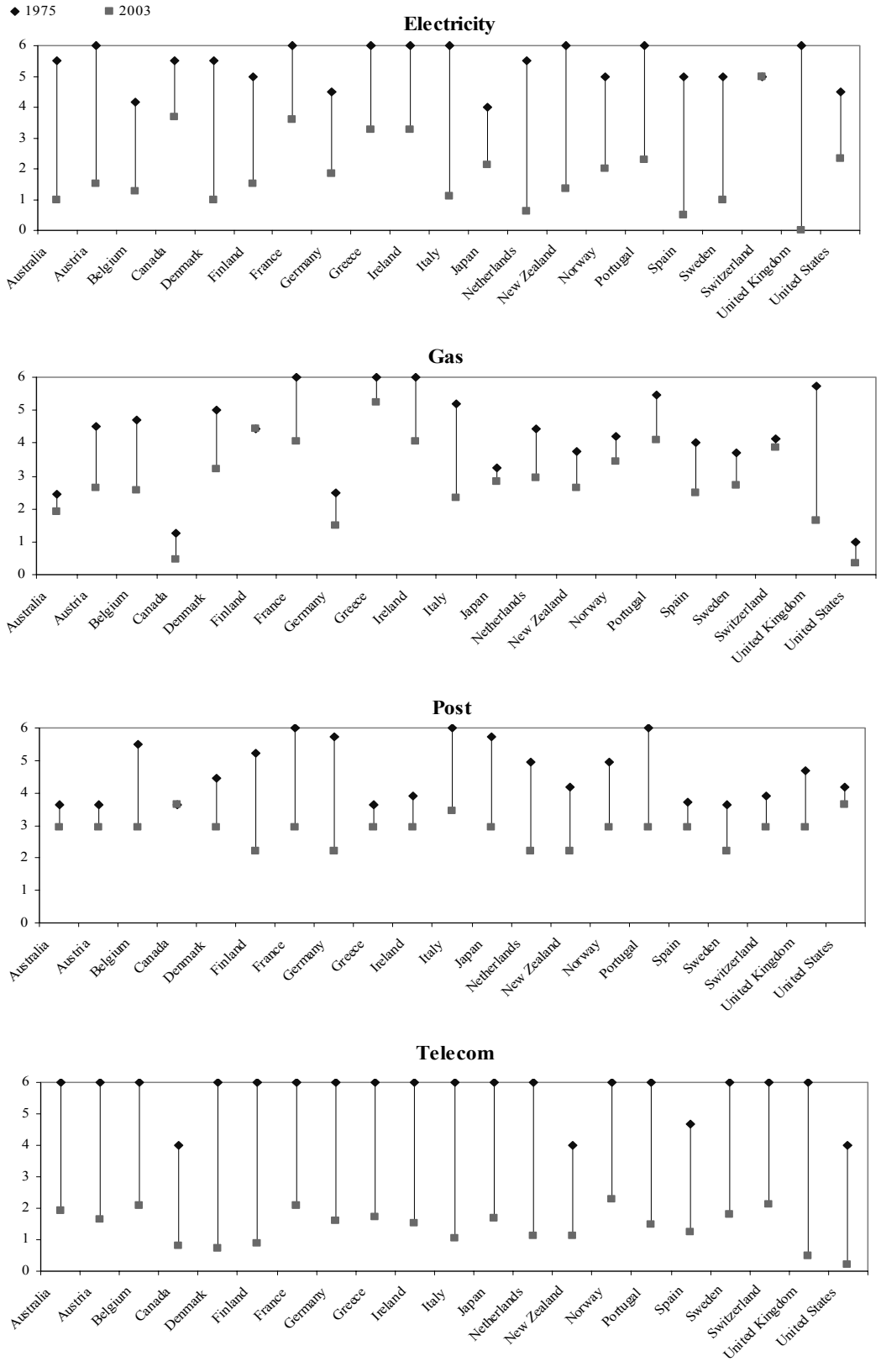
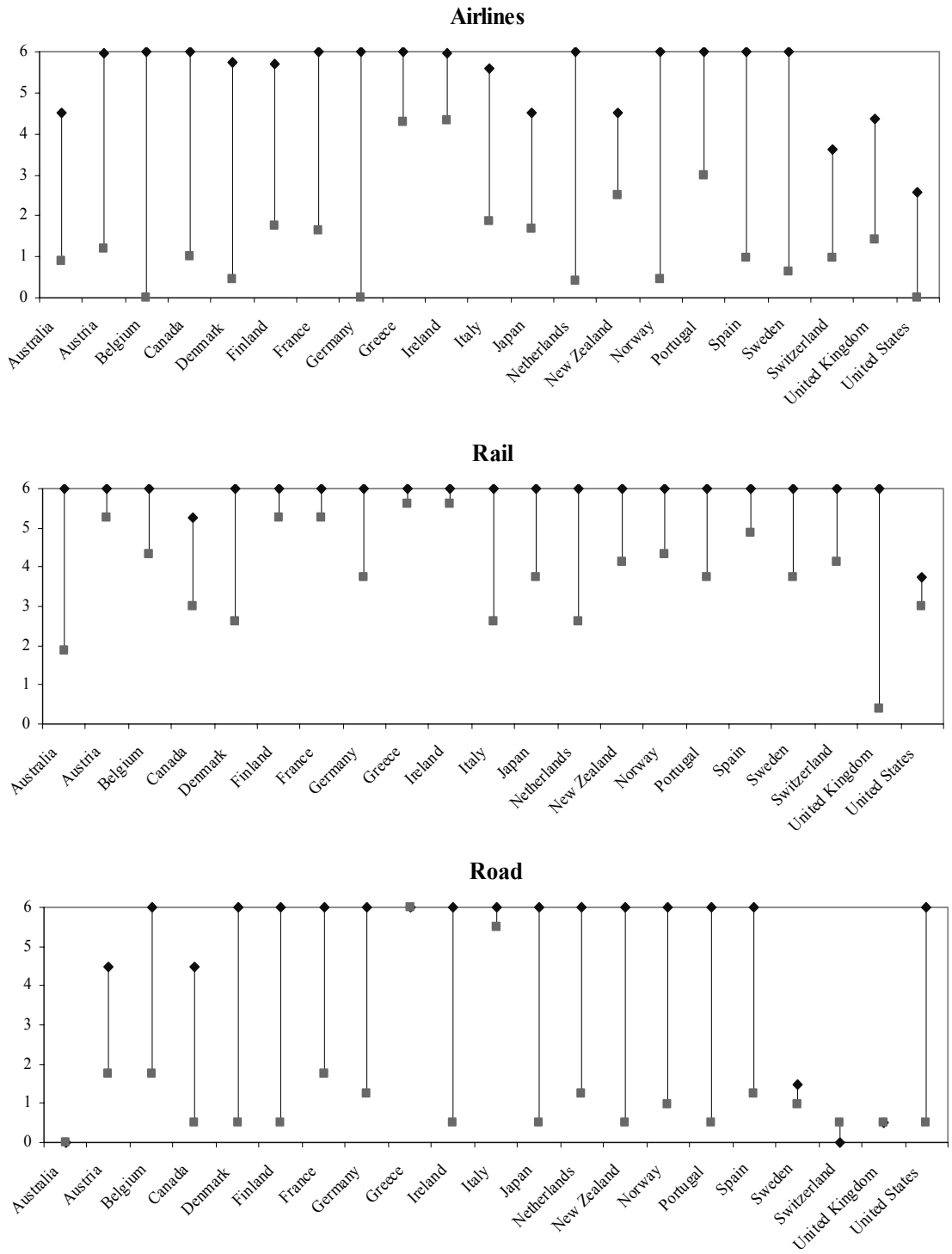


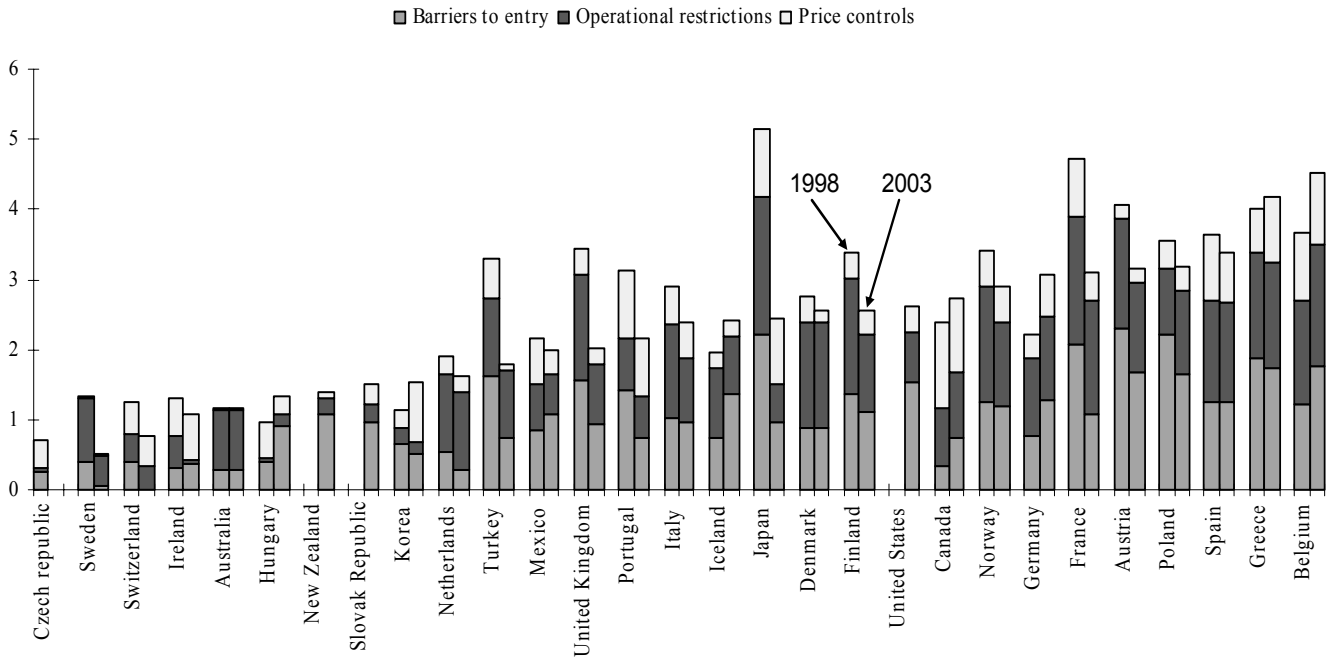
Figure 16. Regulation in energy, transport and communications: 1975 and 2003 (cont'd)



source: OECD International Regulation Database

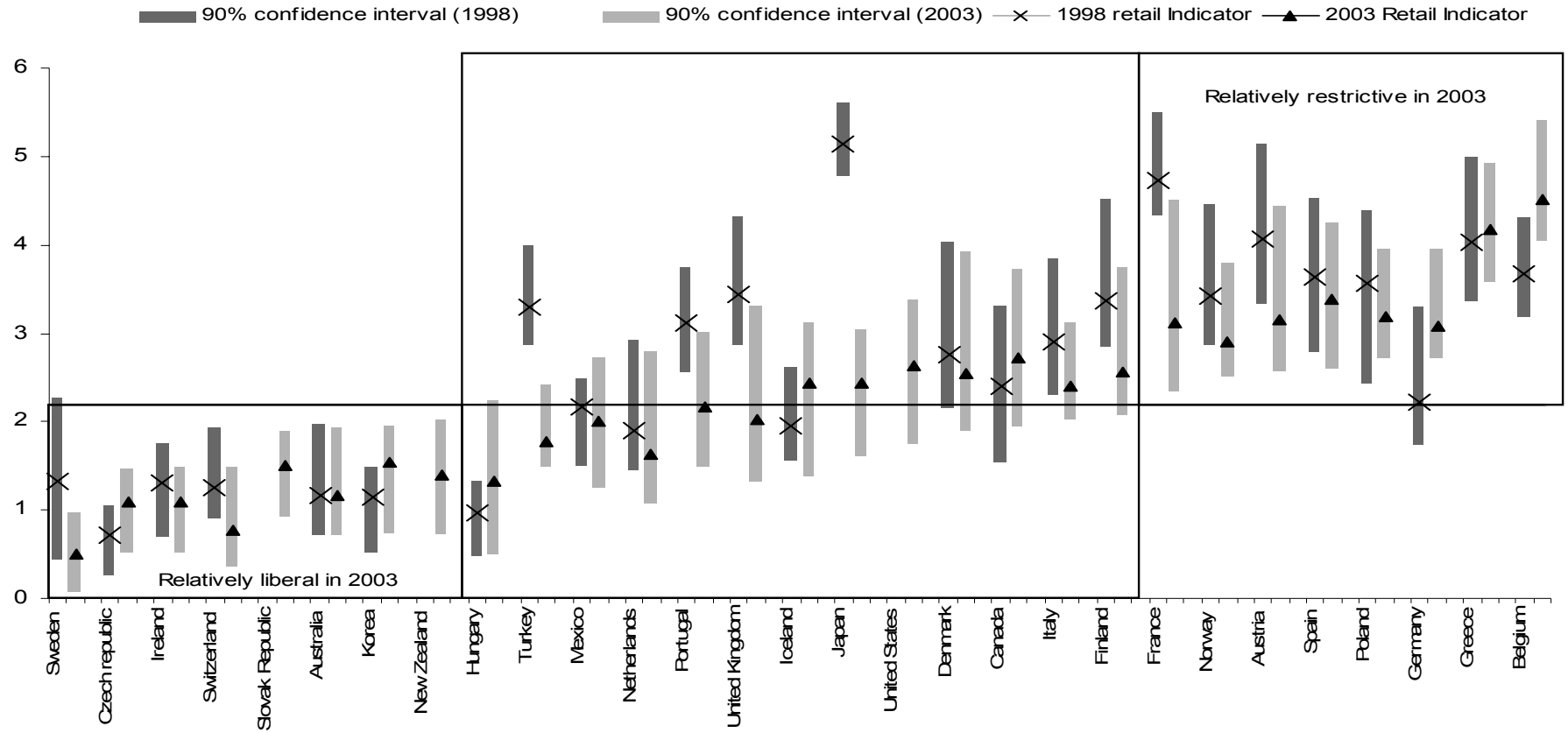
Figure 17. Anticompetitive regulations in retail distribution

(scale is 0-6 from least to most restrictive of competition)



source: OECD International Regulation Database

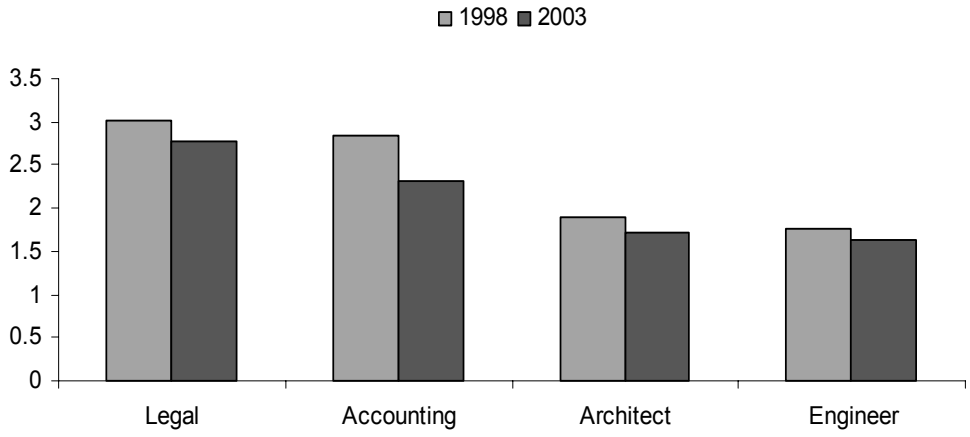
Figure 18. Confidence intervals for the indicators of regulation in retail distribution, 1998 and 2003[1]
(scale is 0-6 from least to most restrictive of competition)



1 The confidence intervals are calculated using stochastic weights on the low-level indicators to generate a distribution of indicators for each country. The 90% confidence intervals are calculated from this distribution under the assumption of normality. To aid comparison, countries with a relatively low (high) indicator value in 2003 are sorted by the lower (upper) bound of the confidence interval.

source: OECD International Regulation Database

Figure 19. Regulation in the professional services, OECD average[1]
(scale is 0-6 from least to most restrictive of competition)

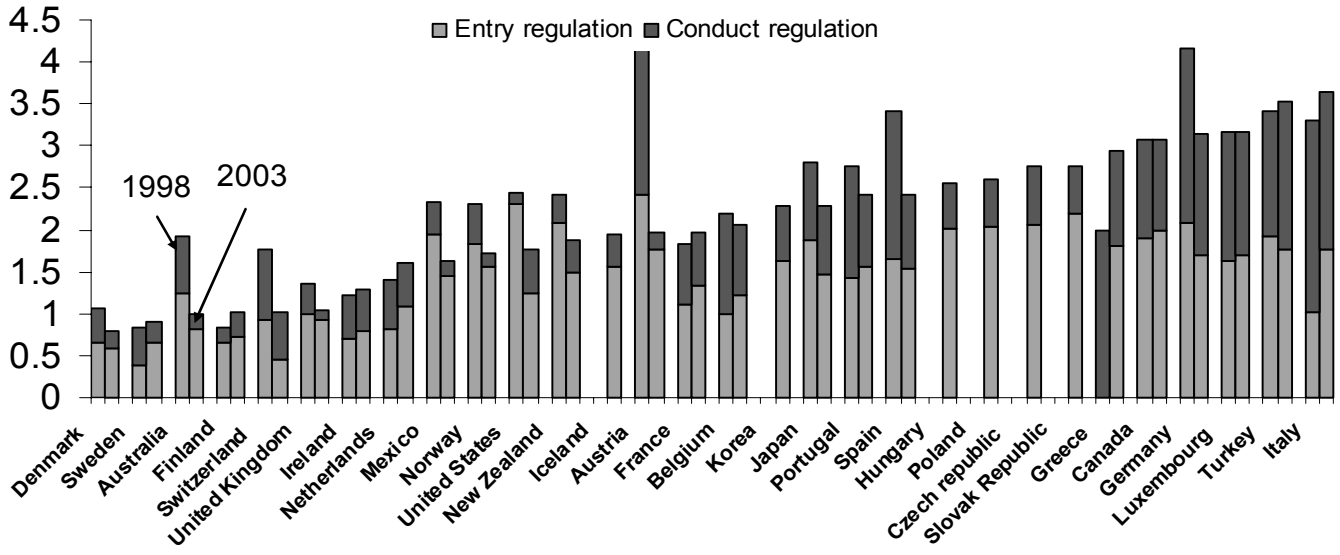


1 The simple cross-country average of the indicators for each of the professional services
source: OECD International Regulation Database

Figure 20. Regulation in the professional services

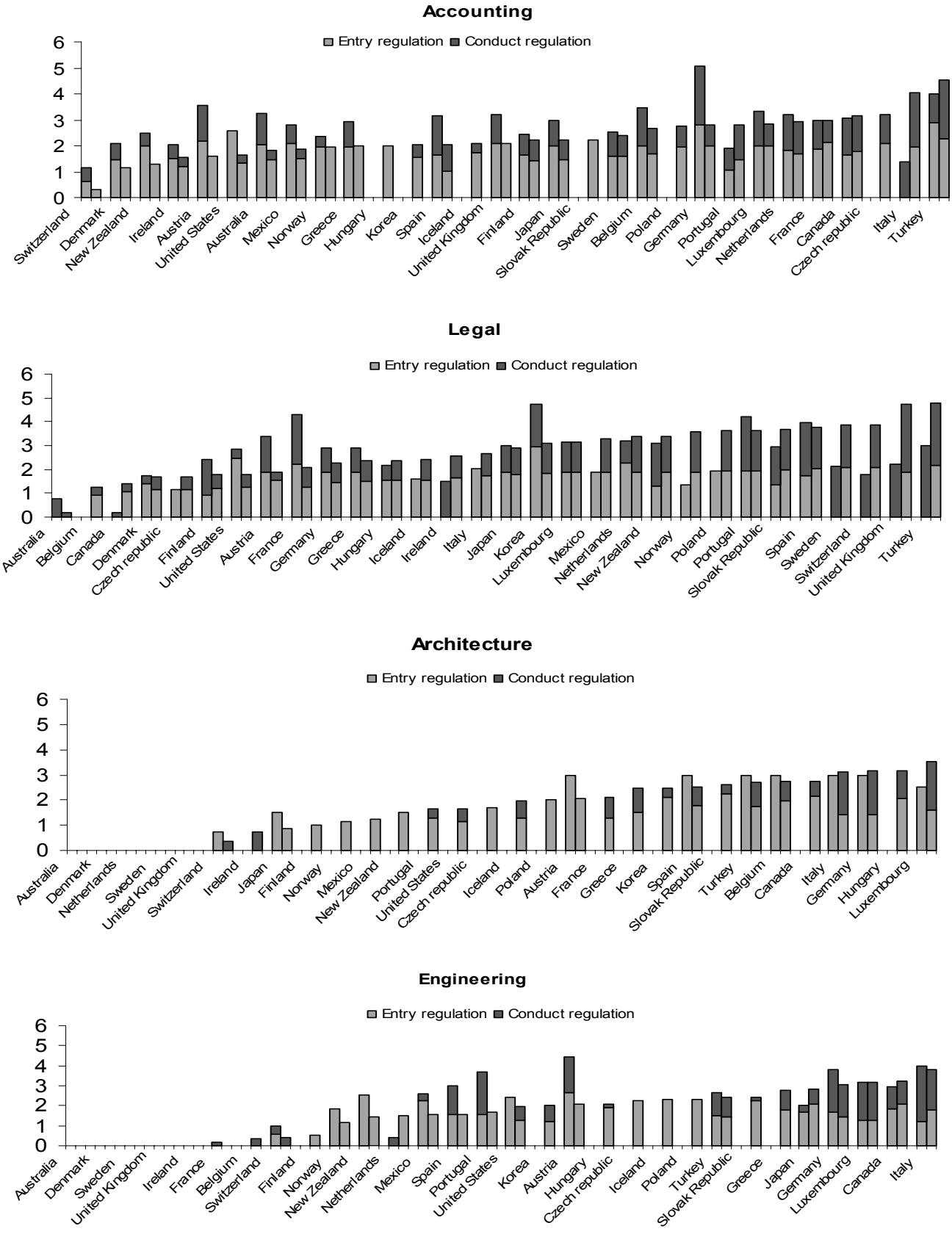
A. Average of 4 professional services

(scale is 0-6 from least to most restrictive of competition)



source: OECD International Regulation Database

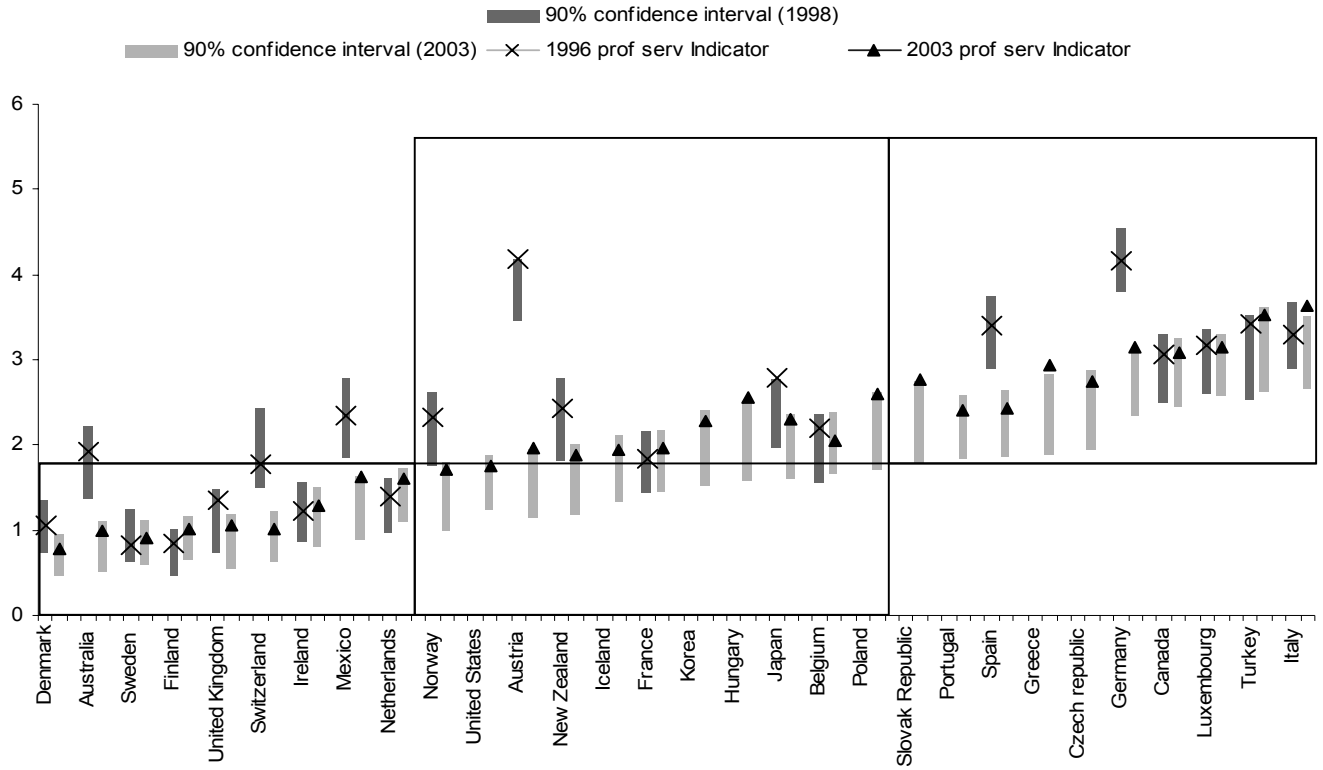
Figure 20. Regulation in the professional services (cont'd)
B. Individual professional services
(scale is 0-6 from least to most restrictive of competition)



source: OECD International Regulation Database

Figure 21. Confidence intervals for the professional services indicators, 1996 and 2003[1]

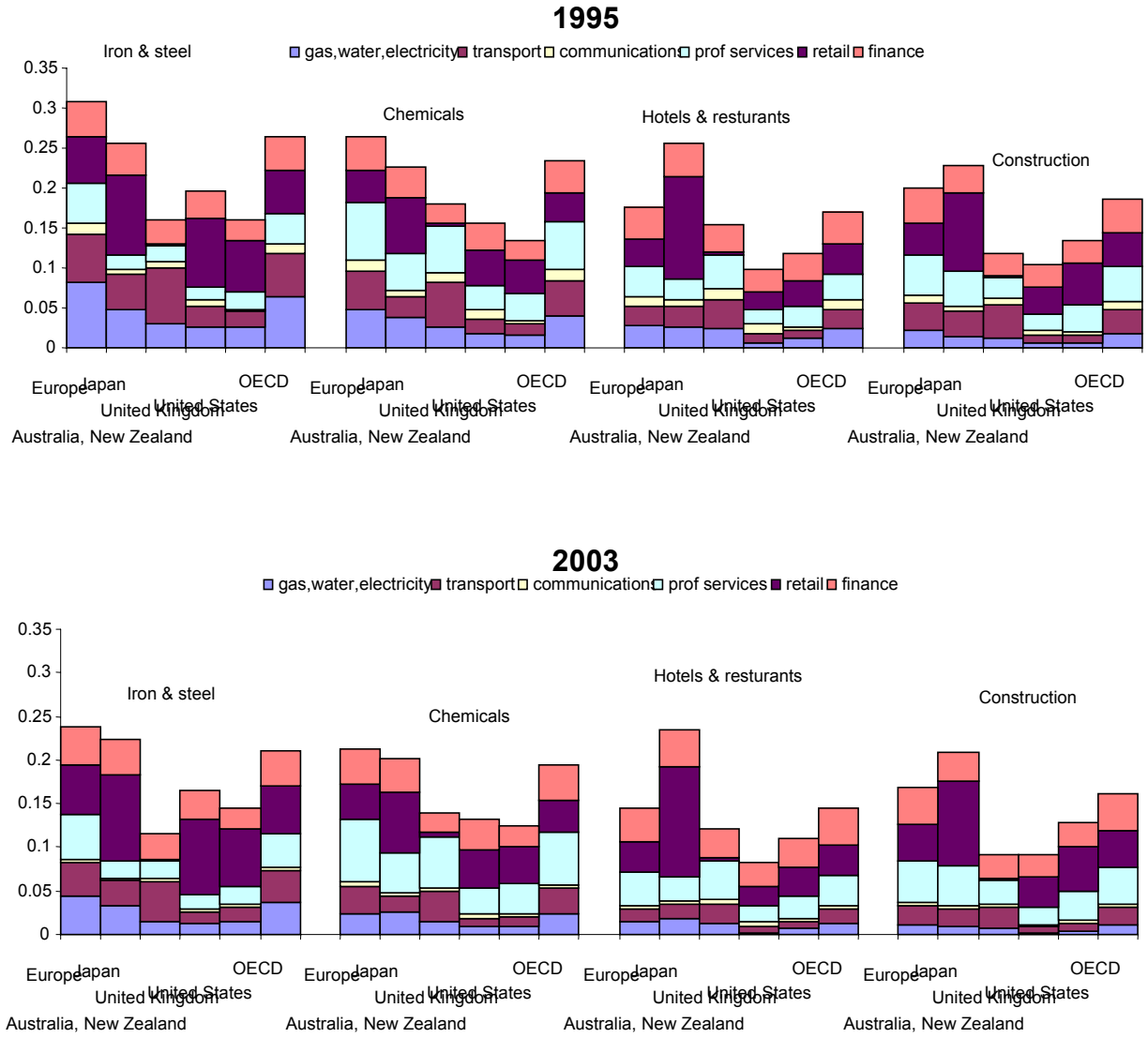
(scale is 0-6 from least to most restrictive)



1 The confidence intervals are calculated using stochastic weights on the low-level indicators to generate a distribution of indicators for each country. The 90% confidence intervals are calculated from this distribution under the assumption of normality. To aid comparison, countries with a relatively low (high) indicator value in 2003 are sorted by the lower (upper) bound of the confidence interval.

source: OECD International Regulation Database

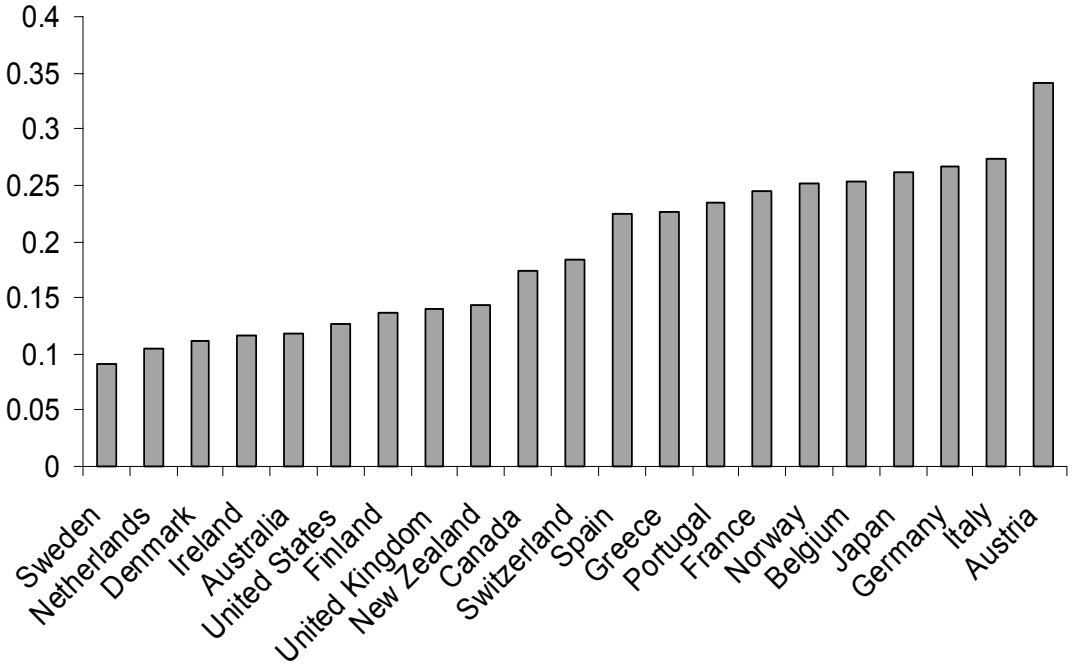
Figure 22. The knock-on effects of non-manufacturing regulation in selected sectors[1], 1995 and 2003
(scale normalised to 0-1 from least to most restrictive)



1. Simple averages of the RI indicators for selected sectors broken down by contribution from sectors for which NMR indicators exist (plus finance). Data for Europe, Australia-New Zealand and OECD are simple cross-country averages. Europe is defined as EU15.

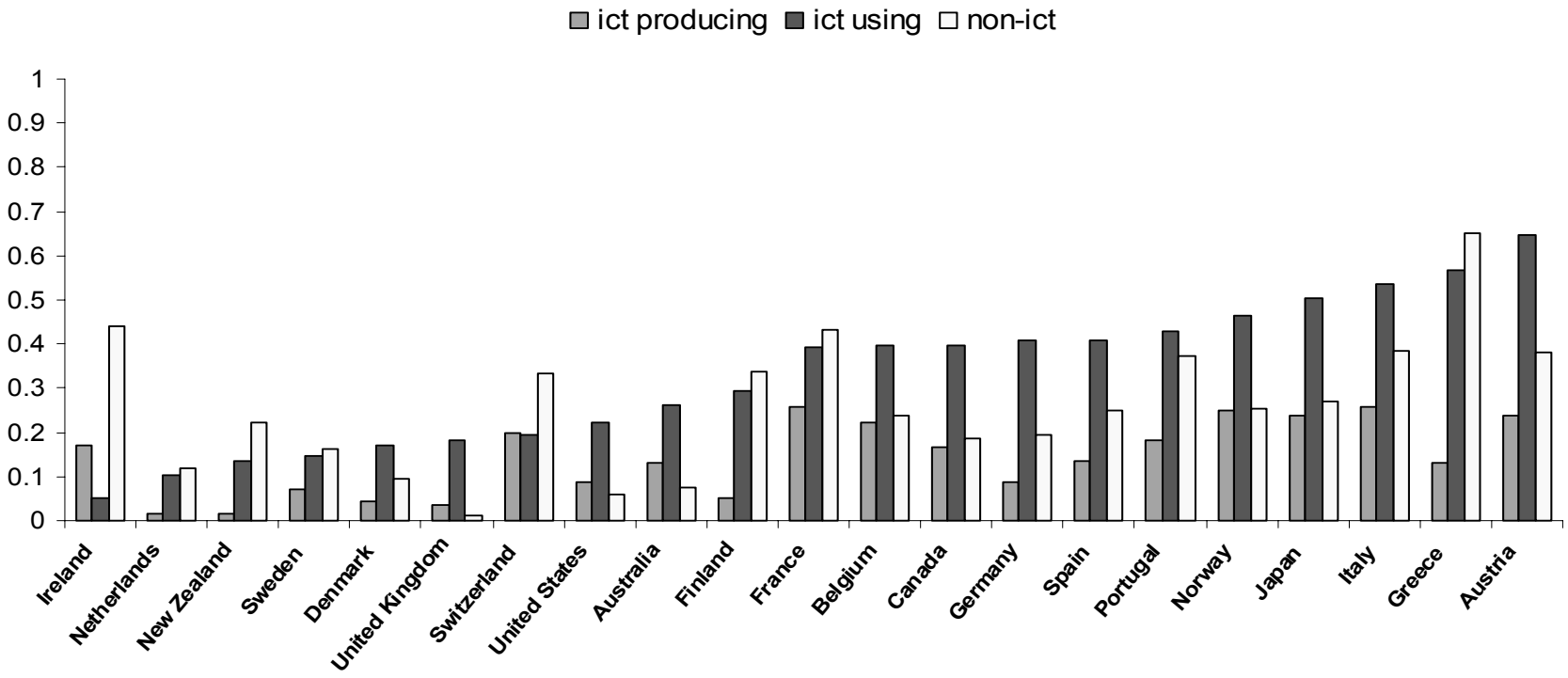
source: Author's calculations

Figure 23. The impact of non-manufacturing regulation on the manufacturing sector, 2003
(scale normalised to 0-1 from least to most restrictive of competition)



source: OECD International Regulation Database

Figure 24. The impact of non-manufacturing regulation on ICT-producing, ICT-using, and non-ICT intensive sectors, 2003[1]
(scale normalised to 0-1 from least to most restrictive of competition)



1. These data are the simple averages of the regulation impact indocstors for the individual industries included in ICT-producing, ICT-using, and non-ICT intensive sectors in 2003. The data are ordered according to the indicator values for ICT-using sectors.
source: author's calculations

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